Industrial Strategy
with a focus on the Manufacturing Sector

Ministry of Economy
Republic of Macedonia

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Acronyms

GDP	Gross Domestic Product
CEFTA	Central European Free Trade Agreement
CIP	Competitiveness Industrial Performance index
COSME	Competitiveness of Enterprises and Small & Medium-sized Enterprises
DPMEA	Cabinet of the Deputy Prime Minister´s Office for Economic Affairs
EBRD	European Bank for reconstruction and development
EC	European Commission
EEN	Enterprise Europe Network
EMAS	Eco-Management and Audit Scheme
Erasmus+	EU programme for education, training, youth and sport
EU	European Union
Eureka	intergovernmental organisation for market-driven industrial R&D
EUROSTAT	EU statistical office
FDI	Foreign Direct Investment
FP7	Framework Programme 7
H2020	Horizon 2020 EU Research and Innovation programme
ICT	Information and communications technology
IFI	International Financial Institution
IOT	Internet of Things
IP	Industrial Policy
IPA	Instrument for Pre-accession Assistance
KET	Key Enabling Technologies
KPI	Key Performance Indicator
MVA	Manufacturing Value Added
MNC	Multinational Companies
NERP	National Economic Reform Programme
OECD	Organisation for economic cooperation and development
PPP	Public Private Partnership
R&D	Research and development
RCA	Revealed Comparative Advantage
RCC	Regional Cooperation Council
RIS³	Research and Innovation Strategies for Smart Specialisation
SBA	Small Business Act
SEE	South East Europe
SME	Small and Medium-sized Enterprises
SOE	State-Owned Enterprise
SWOT	Strengths weaknesses, opportunities, threats
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
WBS	Western Balkans States
WEF	World Economic Forum

Executive Summary

The industrial sector is an important foundation of the economy and one that is closely connected with critical economic themes, such as economic growth, investment, export, employment, research and development, productivity, valued added, innovation and so on. The importance of the industrial sector is why the Republic of Macedonia adopted its first Industrial Policy in 2009 and its continuing salience is the reason for the current strategy.

If anything, the importance of the industrial sector has increased since the first strategy was prepared and approved. Since 2009, major developments have dramatically changed the economic context of most economies. The economic and financial crises of the preceding decade have reshaped the economic landscape. At the same time, the advent of technological developments such as robotics, additive manufacturing, artificial intelligence, etc. mean that new opportunities are emerging which are rapidly influencing the nature of industrial global, regional and national value chains. Furthermore, new policy initiatives and funding streams have been established at the level of the European Union (EU), as well as the Western Balkans region, with a much greater focus on industrial policy, Key Enabling Technologies, smart specialisation, etc. These greatly influence the Macedonian economy.

These developments, combined with the advent of the a new Government in 2017 with its unique set of policies, institutions and funding initiatives mean that there is a need not only to renew the industrial policy of the country but also to also refocus it on the sectors which offer the greatest potential to impact on productivity and growth, including attracting investment, stimulating export, adding higher quality and better paying jobs, while also contributing to sustainable growth in terms of the circular economy and green industry.

In the Republic Macedonia, manufacturing accounts 12,2% of GDP (2016). Making progress in this area is of central policy importance in its own right, as well as in the context of accession to the European Union (EU), not least because Industrial Policy was an accession negotiating closing benchmark for current Candidate Countries (e.g. Serbia and Montenegro), as well as former ones (e.g. Bulgaria and Croatia). It is expected to remain important in future accession negotiations, thus, it is essential for the country to develop a clear framework to support the sector.

Industrial policy is increasingly on the government agenda in the EU generally and the Western Balkans region specifically. Industrial policy tends to be broad and all-encompassing, however, there is a growing recognition of the critical role played by the manufacturing sector. In the Republic of Macedonia itself, key issues are evident which reinforce the need for the industrial strategy to focus on the manufacturing sector:

- There is a need to revise and update the previous industrial policy/strategy;
- The preceding industrial policy was broad and generic. An assessment of its impact demonstrated partial impact but also weaknesses, such as the need to secure greatly increased state funding, to supplement state funding with donor/IFI funding, as well as to secure effective leadership, coordination, public private dialogue, reporting, monitoring and evaluation of the new strategy and action plan;
- There are other national strategies covering the field of competitiveness, innovation, etc. so there is limited policy scope for another horizontal strategy;
- There are many institutions in the field of competitiveness, innovation, FDI, etc., so it is important for the new strategy to be targeted, so as to avoid overlaps, though some are unavoidable and can still add value, if coordinated effectively;
- There is a need for it to embrace the framework of programmes in the newly Economic Growth Plan (EGP), which emphasises production/ manufacturing specifically.

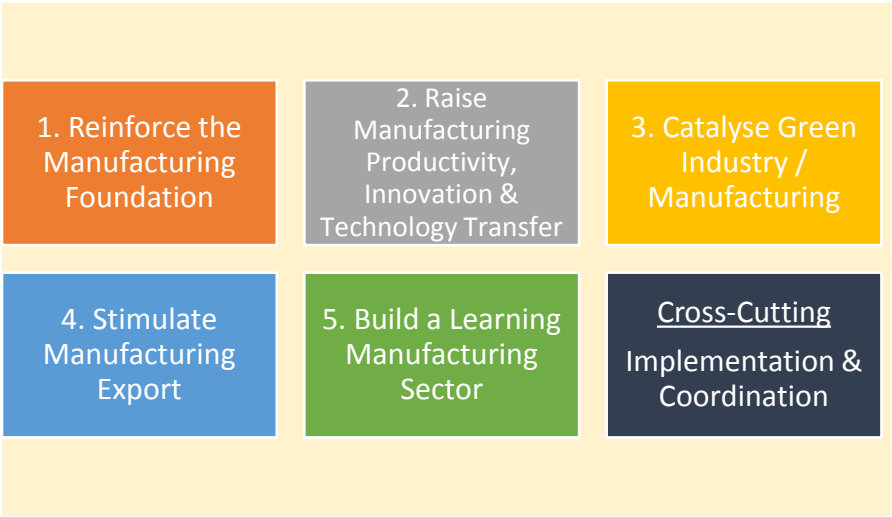
Therefore, there is a strong rationale for this strategy to focus on the manufacturing sector, since this is critical to growth, productivity, high quality jobs, innovation, export, circular economy, etc. Such a focus is consistent with the extensive efforts made in the last decade of successfully attracting of Foreign Direct Investment (FDI) to the Technological and Industrial Development Zones (TIDZs), which has succeeded in raising the profile and image of the country while also counteracting the deindustrialisation trend evident in the Western Balkans region.

The industrial strategy is the result of extensive work carried out during 2017-2018, with the support of the EU. The analysis is based on global, European, Western Balkans and Republic of Macedonia perspectives, including four consultation exercises involving both the relevant governmental institutions, as well as the private sector and its representatives.

Stripped to its core, the industrial policy with a focus on the manufacturing sector comprises the following **Vision**:

> "To promote **industrialisation** by stimulating the growth and development of the **manufacturing** sector in order to boost **productivity**, create **good jobs**, **raise incomes** and strengthen **human capital,** while addressing the challenges of the **circular economy**."

The vision will be achieved through a focus on the five **Strategic Objectives**, including a cross-cutting element, for the horizontal aspects of implementation and coordination:



The rest of the document lays out the policy, institutional, statistical, SWOT and other analyses leading to the strategic objectives, each of which identifies a series measures (38 in all) to be implemented between now and the end of 2027.

The strategy includes a focus on coordination and implementation, covering issues such as the role of the Ministry of Economy, how the strategy will be coordinated, funded, monitored and evaluated. In addition to the strategy, an Action Plan has been prepared covering the period 2018-2020.

1. Introduction

1.1 A revised Industrial Policy

The industrial sector is a foundation of the economy that is closely connected with key economic themes, such as economic growth, investment, export, employment, research and development, productivity, valued added and so on. The importance of the industrial sector is the very reason why the Republic of Macedonia adopted its first Industrial Policy in 2009 and is the reason for the current strategy.

Since 2009, important developments have dramatically changed the economic context of most economies. The economic and financial crises of the preceding decade have reshaped the economic landscape. At the same time, the advent of important technological developments such as robotics, additive manufacturing, artificial intelligence, etc. mean that new opportunities are arising which are rapidly influencing the nature of industrial global, regional and national value chains. Furthermore, new policy initiatives and funding streams have arisen at the level of the European Union (e.g. a much greater focus on industrial policy, Key Enabling Technologies, smart specialisation, etc.), as well as the Western Balkans region, both of which greatly influence the Macedonian economy.

These development, combined with the advent of the a Government in 2017 with its own set of policies, institutions, funding streams, etc., mean that there is a need not only to renew the industrial policy of the country but also to also refocus it on the sector which offers the greatest potential to impact on productivity and growth, including attracting investment, stimulating export, adding higher quality and better paying jobs, while also contributing to sustainable growth in terms of the circular economy and green industry.

1.2 Industrial Policy as a Comprehensive Approach

Industrial Policy (IP) means different things to different countries. There are different definitions but the most commonly accepted is that IP comprises *any government measure, or set of measures, to promote or present structural changes.* (Curzon Price, 1981).

This is a broad definition but the aim of IP is basically to accelerate structural change towards more dynamic or productive activities. In one way or another IP should concentrate on enhancing key issues such as productivity, competitiveness and economic growth. Industrial policy can also be defined as the strategic effort by the state to encourage the development and growth of a sector of the economy.

The approach used in this policy document is a mixture of the functional/horizontal and selective/vertical approaches, customised to the specificities of the country using the OECD definition of IP (2013, Beyond Industrial Policy, p.16, emphasis added):
"Industrial policy is any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity toward sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention."

This document refers to both industrial "policy" and "strategy". The terms strategy refers to a unique plan designed with the aim of achieving a competitive position and to reach policy objectives. It is an interpretative framework that guides realisation of policy goals. Policy refers to a set of general rules made for rational decision-making. A major distinction between policy and strategy is that policy is a guide to the thinking and action of those who make decisions, while strategy concerns the direction in which human, financial and physical

resources will be deployed to maximise the chance of achieving a selected objective in the face of competing policy challenges.

1.3 Lessons of the Macedonian Industrial Policy 2009-2020

The Republic of Macedonia adopted the first Industrial Policy 2009-2020 as a comprehensive approach for supporting the competitiveness of the manufacturing industry. The document identified five areas of intervention:

- International cooperation and support for Foreign Direct Investment (FDI);
- Applied research, innovation and development (R&D);
- Development of eco-friendly products and services;
- Enhancement of SME and entrepreneurship development;
- Collaboration of companies in clusters and networks.

The original industrial policy document was supplemented with two action plans. The revision of the original IP was based on an assessment of its implementation, which illustrated both the positive achievements and the weaknesses in implementation (see Box below).

Box 1: Assessment of previous Industrial Policy: key findings

The main findings and lessons of the previous Macedonian IP are the following:

- The new IP should not be a policy but an industrial strategy and action plan;
- The new industrial strategy (IS) should include good practice elements, including analysis, SWOT, vision, targets, strategic objectives and directions for the measures to be developed in the action plan;
- The new industrial action plan should include good practice elements, including measures, responsibilities, co-responsibilities, timelines, key performance indicators, indication of resources needed, etc.
- The timescale should mirror, to the extent possible, the EU´s 7-year timescale since this will continue to be the principal source of funding for the foreseeable future and the policy priorities of the funding streams change every 7 years;
- A continuing budget of Euro 25,000 for IP support is not credible and does not justify a new IP. The MoE must make significantly greater financial allocations for industrial development, as well as SME development and export development. Such commitments must be medium term and guaranteed to ensure continuity and effective planning;
- The MoE should focus on policy making, rather than programme implementation. It has few staff members and they are overloaded. As a result, policy making is underdeveloped and implementation is poor. Implementation is not the core role of the MoE and there are better placed implementation institutions, not least APPRM, which is currently starved of funding. A separation of policy-making and action plan/programme implementation is as important as obtaining adequate funding for implementation;
- Even with greater state funding, it is essential to supplement IP resources through donors/IFIs. Therefore, the MoE should make significantly greater efforts to undertake regular (e.g. quarterly) donor coordination to position itself to obtain significantly greater funding non-governmental funding in the future;
- The MoE must establish two coordination tools for the industrial/SME/export strategies and action plans:
    - Intergovernmental coordination: to ensure progress, overcome delays and obstacles.
    - Public Private coordination: to ensure that business sector stakeholders are engaged in the IP process.
- The MoE must establish credible M&E and reporting of the industrial/SME/export strategies and action plans:
    - Reporting: the current annual reporting is weak, inconsistent and does not allow for effective and transparent reporting on the use of public funds. This needs to be strengthened in the future.
    - Monitoring: the current monitoring is weak, inconsistent and does not allow for effective and transparent monitoring of the use of public funds. This needs to be strengthened in the future.
    - Evaluation: the issue of evaluation is mentioned in the MoE strategies but is not taking place. The exception is this assessment and the cluster assessment, both connected with this assignment. This is a major weakness in MoE policy making (e.g. long-term public funding for clusters that are in fact business associations) and must be undertaken regularly in the future (through the M&E Unit).
- The new industrial strategy should have a mixture of horizontal elements as well as a stronger sectorial emphasis, based on the principle of smart specialisation;
- There should be coordination with other strategies, not least the Competitiveness / Innovation Strategy. It is also

necessary that the development of the SME/business environment policy, trade policies, competition policy, investment policy, development policy labour and capital markets, environmental policy, technological development and transfer of benefits be taken into consideration;

- There should be avoidance of overlap with other strategies and action plans, not least the MoE´s own strategies (e.g. SMEs, Women Entrepreneurship, etc. and other ministries´ strategies (e.g. Competitiveness, Innovation, R&D, etc.);
- There is a need for MoE to define a focused "industrial" agenda which does not overlap with existing policy agendas;
- There is a need for the new IP to connect with and enabling complementarities with the EC´s industrial policy focus, greater manufacturing focus and link the SEE 2020 regional approach;
- There is a need for the industrial action plan to focus on measures which are priority in nature and which will stand a greater change of obtaining state/donor funding. Given actual capacities and likely resources, it is necessary to focus on fewer measures rather than too many;
- There is a need for capacity building of MoE staff to enable better focus on policy, coordination and engagement with EU/EUD/RCC/OECD, etc. including application of funding to IFI/donor/EU funding.

Source: Pinto, R., 2017, An Assessment of the Macedonian Industrial Policy, 2017

The analysis presented in the Box above represents a detailed assessment of what did not work so well and recommendations for the future, which were taken into consideration in the preparation of this document. After all, "Those who fail to learn from the mistakes of their predecessors are destined to repeat them" (George Santayana).

1.5 Need for an Industrial Strategy

The whole world, including the European Union (EU) and Western Balkans (WB) countries, rediscovered the important of industrial policy in the aftermath of the recent economic and financial crisis. The industrial policy emphasis has been increasing over time and is particularly important for Candidate Countries such as the Republic of Macedonia, not least because industrial policy forms a part of a chapter of the *Acquis Communautaire* (specifically Chapter 20 of the *acquis*: Enterprise and industrial policy), which will need to be negotiated and agreed with Brussels. Furthermore, there is a growing range of policy and funding initiatives, including in the Western Balkans region, which the Republic of Macedonia can take advantage of in seeking to raise its competitiveness, innovation and productivity levels.

Industrial policies range from selective to functional policies. Selective policies attempt to "pick winners", supporting specific firms, industrial champions, conglomerates or investment projects. Functional policies promote the 'competitiveness' of sectors (e.g. manufacturing) or even the supply side of the economy through measures focusing on competitiveness, innovation, business environment, etc. At the level of sectors or technologies, industrial policies attempt to 'defy' a country's static comparative advantage and develop its 'latent' comparative advantage, for example through supporting selected industries, reforms, investment, subsidies, etc. While industrial policy is not limited to manufacturing, that is the emphasis of this strategy. The structural transformation of transition countries necessitates manufacturing sector development that can deliver higher levels of productivity, value added, high-quality employment, etc. that are aligned with the international division of labour.

It is evident that the industrial strategy is separate and distinct from other policy initiatives with a focus on small and medium-sized enterprises (SMEs), Competitiveness, Innovation, etc. The value adding elements of the new industrial strategy are that it will be specifically focused on the manufacturing sector (compared with the previous document, which was horizontal in nature) and is embedded the new economic policy of the Government of the Republic of Macedonia, namely the Economic Growth Plan (EGP), which is focus on the productive / manufacturing sector and which will benefit from significant levels of funding. Furthermore, this strategy draws on lessons of the previous experience of implementing the previous industrial policy, embeds the policy framework within the initiatives and funding available in the EU and Western Balkans, which is important, while also being essential in the context of the country´s efforts to become a future member of the EU.

Therefore, analysis focused on the following two issues:

- The policies, strategies and institutions connected with industrial policy (Chapter 2);
- The nature of the manufacturing sector, leading to an analysis of the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis (Chapter 3).

The analyses contained in Chapters 2 and 3 set the context for the industrial strategy with a focus on the manufacturing sector:

- The vision, targets, strategic objectives and priority measures are presented in Chapter 4;
- The implementation framework, including coordination, consultation, reporting, monitoring and evaluation are presented in Chapter 5.

The first Action Plan for the implementation of the Industrial Strategy with a focus on the manufacturing sector is presented in the Annex 2, covering the period up to 2020. Annex 1 presents statistical information in connection with the analysis of the manufacturing section presented in Chapter 3.

2. Industrial Policy, Strategies and Institutions

This chapter sets out the reasons for the increasing policy focus on industrial policy in general and the manufacturing sector in particular. It sets the context by examining the EU / international perspective and the reasons for the centrality of manufacturing. The analysis then turns exclusively in the actual Republic of Macedonian policy framework, not least the advent of the Economic Growth Plan (EGP). It then sets out the main current and future institutions that connect with industrial policy. This forms the context for an explicit focus on the manufacturing sector, including the key trends and challenges that it faces.

2.1 Industrial Policy: recent developments

2.1.1 European Union (EU) and Industrial Policy

Industrial Policy Framework

Industrial policy at EU level is essentially the provision of framework conditions for enterprise development and innovation to make it an attractive region for industrial investment and job creation.

The European Commission´s (EC) communications illustrated in the Box below, together with the latest one (2017, see below), amount to a consistent and growing policy commitment on the part of the EU to the central importance of industry in creating jobs and growth and mainstreaming industry-related competitiveness across a variety of policy areas.

Box 2: EC Industrial Policy Milestones (5th phase)

- Commission Communication 'Industrial Policy: Reinforcing Competitiveness' (COM(2011) 0642) called for deep structural reforms, coherent and coordinated policies across the Member States, pointing out several key areas such as smart regulation, access to finance, single market, etc.
- Commission Communication 'A Stronger European Industry for Growth and Economic Recovery' (COM(2012) 582/3) focused on four pillars to promote industrial competitiveness: investments in innovation, better market conditions, access to finance and capital, and human capital and skills. regarding investment in innovation, the focus is on six priority actions: advanced manufacturing technologies for clean production; key enabling technologies; bio-based products; sustainable industrial and construction policy and raw materials; clean vehicles and vessels; and smart grids.
- Commission Communication 'For a European Industrial Renaissance' (COM(2014) 0014) stressed that Europe needs to urgently lay the basis for post-crisis growth and modernisation. To achieve this, Member States were invited to recognise the central importance of industry for creating jobs and growth, and to mainstream industry-related competitiveness concerns across all policy areas.

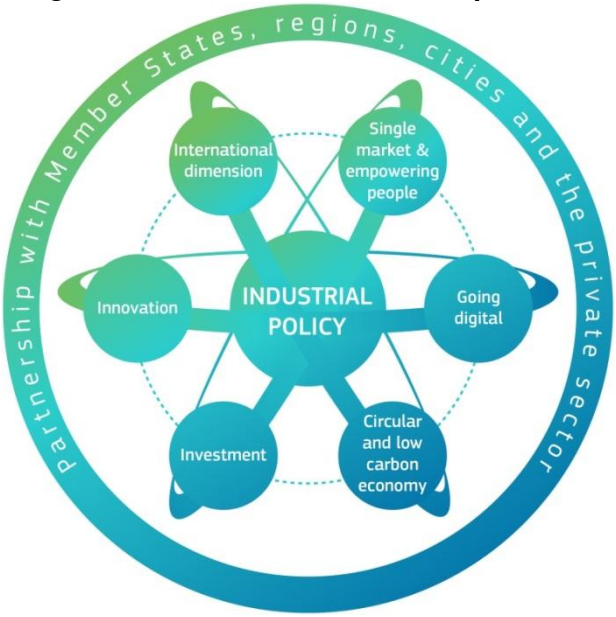
Source: EU Industrial Policy: Assessment of Recent Developments and Recommendations for Future Policies, 2016

There is evidently an increasing EU emphasis on industrial policy, one which is also increasingly focusing on the critical role played by the manufacturing sector in terms of stimulating innovation, export, productivity, value added, R&D, good jobs, wages, etc. Almost every fourth private sector job in the EU is in industry, often highly skilled, while each additional job in manufacturing creates 0.5-2 jobs in other sectors.

The EC/EU released the latest IP communication (Investing in a smart, innovative and sustainable Industry COM(2017) 479) last year. The latest Communication outlines, the directions of the EU´s industrial policy and seeks to empower industries to create jobs and growth that defend its regions and workers most affected by industrial change and that reinforces and protects Europe's leadership role, competitiveness and technological cutting-edge. This approach reiterates the previously defined principles (see Box above) and emphasises the single market, upgrading industry for the digital age, low-carbon and circular

economy, innovation, investment and internationalisation, as illustrated in the Diagram below. The latest challenges are not just faced by EU member states; they also apply to Republic of Macedonia and will need to be taken into consideration, in part to enable to absorb EU development funds effectively.

Diagram 1. Holistic Vision of European Industry



Source: Investing in a smart, innovative and sustainable Industry (2017)

The importance that the EU attaches to industrial development is reflected in the target it has set, namely that *manufacturing in EU countries should reach 20% of GDP by 2020*. However, at 15.1%, the contribution of manufacturing to EU GDP has continued to decline and the target for 2020 will almost certainly remain elusive.

The EC has also developed sector-specific action plans and smart legislation that support key industrial sectors including: chemicals; automotive; tourism; textiles, fashion and creative industries; raw materials, metals, minerals and forest-based industries; mechanical engineering; electrical and electronic engineering; the food and drink industry; healthcare; biotechnology; aeronautics and maritime industries. Clearly, these depend on the specificities of countries and regions, using the principle of smart specialisation, something which is also being promoted in the Western Balkans and Republic of Macedonia too.

Smart Specialisation

"Smart Specialisation" (see box below) is an increasingly important EU tool allowing states and regions to concentrate investments on their competitive advantages and to encourage the creation of cross-European value chains.

Box 3: Smart Specialisation

The notion of smart specialisation establishes a link between regional policy and the Innovation Union of the EU 2020 agenda. It is a strategic approach to economic development through targeted support for research and innovation and was announced in the 'Innovation Union' flagship initiative of the Europe 2020 Strategy as the key action of Cohesion Policy in the field of innovation. The legal basis for smart specialisation is Regulation (EU) 1301/2013 of the European Parliament and of the Council of 17 December 2013, which provides the following definition:

"Smart specialisation strategy means national or regional innovation strategies which set priorities to build competitive advantages by developing and matching research and innovation own strengths to business needs to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts. A

smart specialisation strategy may take the form of, or be included in, a national or regional research and innovation (R&I) strategic policy framework. Smart specialisation strategies shall be developed through involving national or regional managing authorities and stakeholders such as universities and other higher education institutions, industry and social partners in an entrepreneurial discovery process".

The development of "research and innovation strategies for smart specialisation" has been proposed as a pre-condition for countries and regions to maximise the impact of EU investments. The idea is to focus on what regions already do best and do it even better by combining existing innovation from underlying regional strengths and assets (e.g. existing competitive advantages). It is not necessarily about specialisation, but about helping to create innovation that may end-up being linked to an existing industrial structure and which focuses on a few priorities, thus creating sufficient critical mass to make a difference. More than EUR 40 billion is to be channelled into Smart Specialisation from community funds, leveraging funds from the public sector and the private sector.

Source: EU Industrial Policy: Assessment of Recent Developments and Recommendations for Future Policies, 2016

Smart specialisation is a tool for concentrating economic investment in areas where the country/region has a critical mass of knowledge, capacities and competences and where there is innovation potential for placing country/region within global markets and thus enhancing recognition. The smart specialisation principles are illustrated in the Table below.

Table 1. Smart specialisation principles

Smart Growth	Education (encouraging people to learn, study and update their skills); Research/innovation (new products/services generate growth, jobs & address social challenges Digital society (using information and communication technologies).
Sustainable Growth	Building a competitive low-carbon economy that makes efficient, sustainable use of resources; Protecting the environment, reducing emissions and preventing biodiversity loss; Developing new green technologies and production methods; Introducing efficient smart electricity grids; Harnessing EU-scale networks to give firms (e.g. manufacturing) a competitive advantage; Improving the business environment, in particular for SMEs; Helping consumers make well-informed choices.
Inclusive Growth	Raising Europe's employment rate (more and better jobs); Helping people of all ages manage change through investment in skills and training; Modernising labour markets and welfare systems; Ensuring the benefits of growth reach all parts of the EU.
Economic Governance	Reinforced economic agenda with closer EU surveillance; Action to safeguard the stability of the euro area; Action to repair the financial sector.

Source: EC (2011) "Europe 2020"

The EC has also developed the Smart Specialisation Platform (www.s3platform.jrc.ec.europa.eu) with themes such as on advanced manufacturing, circular economy, Key Enabling Technologies (KETs – see below), digital transformation/industry 4.0 (see below), etc. S3 is basically a strategic approach to economic development through targeted support for research and innovation.

Therefore, the focus of smart specialisation tends to be on national and regional strategies to promote innovation, rather than on industrial policy or manufacturing *per se*, though it is necessary to take it into consideration in this strategy and the related action plan.

Emerging Platform or Key Enabling Technologies

The above are important trends. They must be linked to emerging science and engineering developments arising from the research and innovation base, which are expected to gain relevance in industrial / manufacturing systems in the future (see Box below). The emerging platform / enabling technologies are likely to play an increasingly prominent role in enabling the production-related solutions and concepts.

Box 4: Emerging Platform or Key Enabling Technologies

- Photonics: including scanning, sensing and imaging; information, communication and networks; screens and displays; advanced lighting; photonic energy systems; and laser systems.
- Biotechnology: including biopharma; tissue engineering/regenerative medicine; synthetic biology; and bio-inspired manufacturing using self-assembly.
- Nanotechnology: including carbon nanotubes; nanocomposite structural materials; nanoelectronics; nanotechnology-based coatings; nanoparticles; and nanotagging.
- Microtechnology: including micro-tooling manufacturing and micro-systems in machine tools and products.
- Information and Communication Technology in manufacturing systems: including intelligent mechatronic systems for automation and robotics (e.g. self-adapting components) and advancement of grid computing for manufacturing.
- Advanced materials: including advanced composites and "metamaterials".

Source: UNIDO

The developments presented in the Box above are not comprehensive but do identify the emerging international trends, with an emphasis on "platform" technologies, which are expected to underpin future manufacturing capabilities in a broad range of manufacturing industries, enabling the next wave of high value products and production technologies. Their influence will be pervasive and provide the basis for the development of new industries and business models in the future, all with the potential of inducing structural change (High Level Group on Key Enabling Technologies, 2011). They are also relevant for new or improved environmental and energy technologies.

The EU has identified six Key Enabling Technologies (KETs) as being particularly important. These KETs have potential applications in multiple industries and could help tackle major societal challenges. They are the areas in which the EU has the scientific and technological strength to become a global leader but risks falling behind in the commercialisation of KET-based goods. KETs are a fundamental part of the EC's manufacturing revival strategy. They have earmarked funding (e.g. Horizon2020) and are prominent in the Industry 4.0 debates in member states. While the KETs might be different in the Republic of Macedonia, the debate on issues such as KETs and smart factories has to be initiated.

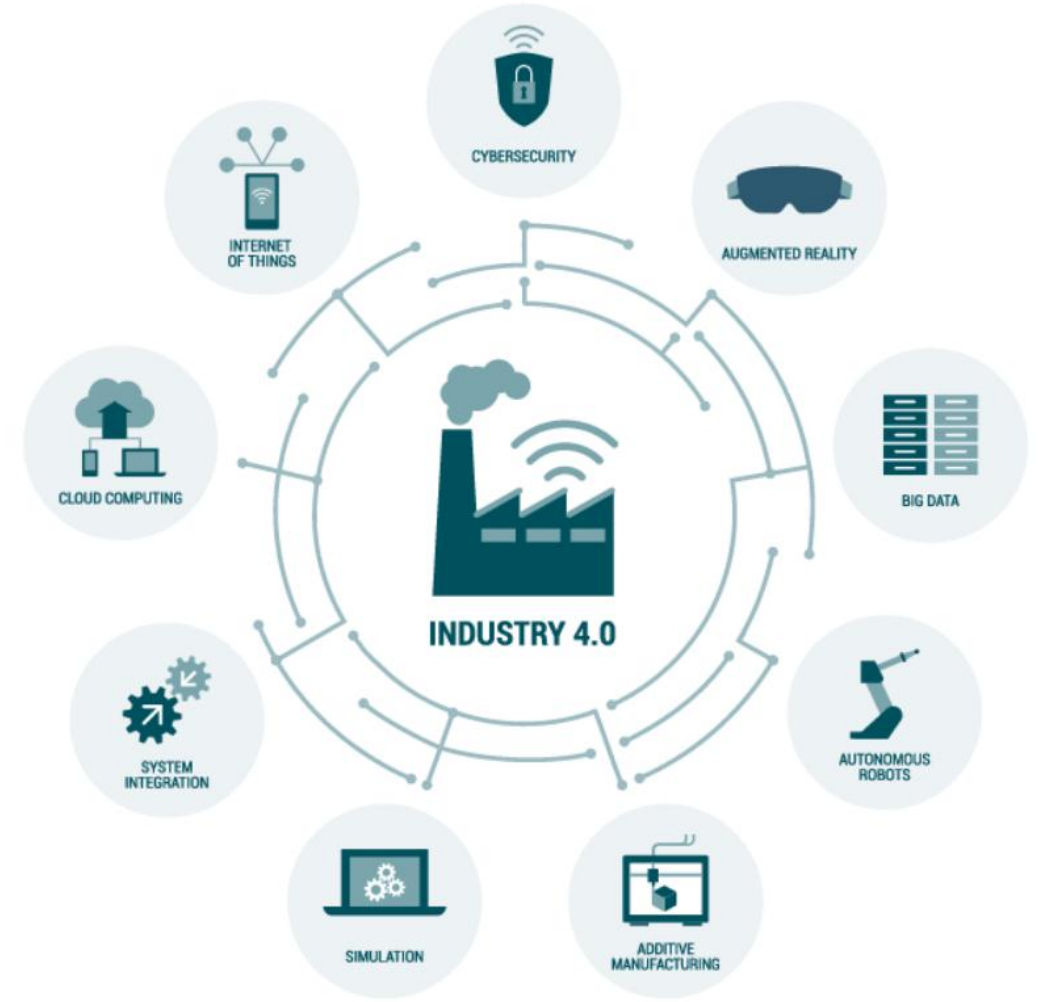
Digitisation, Industry 4.0 and Factory 4.0

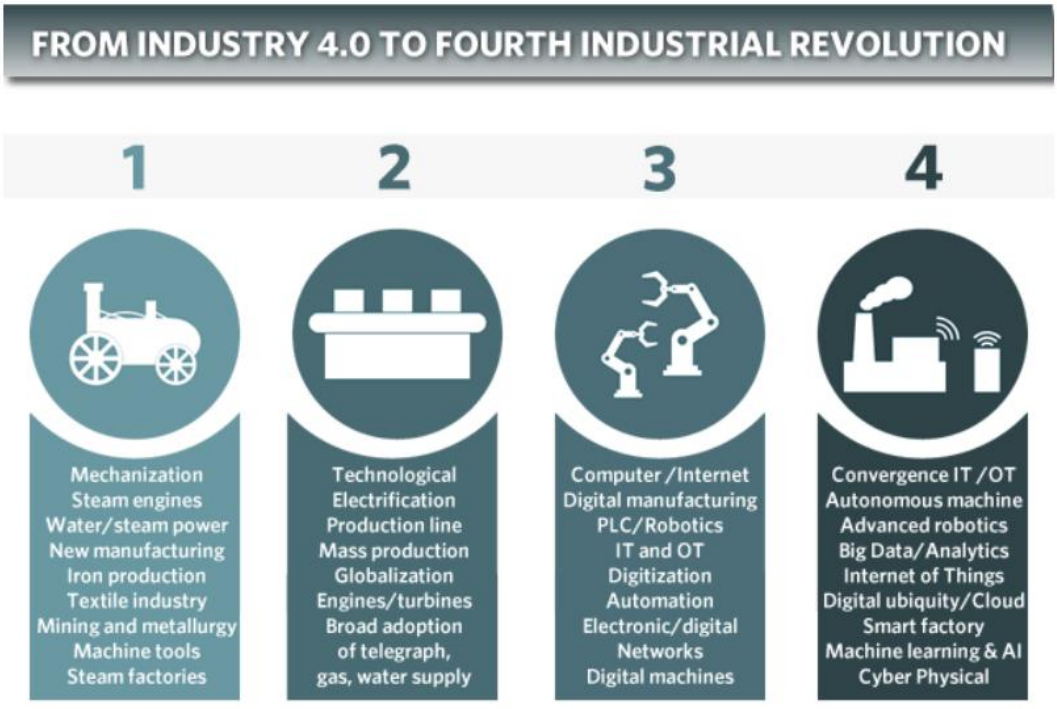
"Industry 4.0", "Factory 4.0", "factory of the future" and "smart factory" are the terms used to refer to a new factory model which is the successor to the first three major evolutionary phases qualified as revolutions, namely mechanisation, industrialisation and automation. The principle of the 4th Industrial Revolution (or Industry 4.0) is that by connecting machines, work pieces and systems, businesses are creating intelligent networks along the entire value chain that can control each other autonomously, as illustrated in the Diagram below.

The Fourth Industrial Revolution creates the basis for the "smart factory". It seeks to leverage differences between the physical, digital, and biological sphere by integrating cyber-physical systems and the Internet of Things (IOT), big data and cloud computing, robotics, artificial-intelligence based systems and additive manufacturing. Compared to previous industrial revolutions, this one evolved at an exponential, not linear pace. It has the potential to raise (or lower) globe income levels and quality of life for all with implications for various groups:

- Business: it drastically modifies customer expectations, product enhancement, collaborative innovation and organisational forms. New technologies make assets more durable and resilient, while data and analytics change the way they are maintained;
- Government: new technologies increasingly enable citizens to engage with governments, policy makers can gain tools to increase their control over the population. Legislators must collaborate closely with civil society to be able to address the challenges that will arise;

Diagram 2. Four Industrial Revolutions and Industry 4.0





- People: one of the greatest challenges concerns privacy, the notion of ownership, consumer patterns and how we devote resources to develop existing and new skills.

The EU recognises the importance of Industry 4.0 and supports digital industrial platforms for the integration of different key digital technologies into real-world applications, processes, products and services. For example, the Digitising European Industry initiative is supporting Public-Private Partnerships (PPPs) that develop future digital technology building blocks such as robotics, smart sensors, big data and mobile communication.

During 2018-20, investment worth €300 million will flow in support of strategic next-generation platform building and large-scale pilot projects focused on the following areas:

- Digital manufacturing platforms for connected smart factories;
- Agricultural digital integration/service platforms for rural economies;
- Smart hospital and smart/healthy living at home;
- Interoperable smart homes and big data solutions for energy;
- Smart construction.

Circular Economy, Green Industry / Manufacturing and Green Public Procurement

The EU has placed emphasis on the development of a “Circular Economy”, namely one that balances economic development with environmental and resource protection. This puts emphasis on the most efficient use and recycling of its resources and environmental protection. A circular economy features low consumption of energy, low emissions of pollutants and high efficiency of resource use throughout the economic activity. It involves applying cleaner production in companies, eco-industrial park development and an integrated resource-based planning structure for development in industry, agriculture and urban areas.

“Green Industry” is industrial production and development that does not come at the expense of the health of natural systems or lead to adverse human health outcomes. Green Industry is aimed at mainstreaming environmental, climate and social considerations into the operations of enterprises. It provides a platform for addressing global interrelated challenges through a set of actionable approaches and strategies that take advantage of emerging industry and market forces. Broadly speaking, “Green Manufacturing” involves the re-design of products, production systems and business models, as well as extended producer responsibility in the form of take-back or reversed supplies, resource efficient and clean production, remanufacturing and recycling on a much more significant scale than hitherto.

There are sound benefits for enterprises to get involved in Green Industry/Manufacturing. For most industries, increasing resource efficiency in production is not about environmental or sustainability concerns, as such. Rather, it has become a key factor determining economic competitiveness, growth and profitability. Since resource inputs represent an important cost of production for industries, efficiency improvements can be significant in gaining competitive advantage. Reductions in production costs can also result in lower prices for consumers, while also stimulating customer loyalty (see also Section 3.2 below).

Green Manufacturing is thus a core component of a Circular Economy (i.e. managing the life cycle of natural resources, from extraction through the design and manufacture of products, to what is considered as waste is essential to green growth and part of developing a resource-efficient, circular economy where nothing is wasted) and can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses, little or no waste or pollution, as well as stronger corporate image. A related tool for transitioning to Green Industry in the manufacturing sector is green public procurement, which is also promoted by the EU.

2.1.2 The Centrality of Manufacturing

Another important consideration, prior to discussing the Macedonian institutional context, is to note that there is growing recognition, partly connected with the issue of smart specialisation, of the pre-eminent importance of the manufacturing sector in general and in CEFTA countries (Hunya, 2017, CEFTA Investment Report, pp.61-63) such as Macedonia.

There is wide acknowledgement of the centrality of the manufacturing sector to economic development. It is seen as being critical: it raises competitiveness levels, in increases productivity compared with other sectors, it contributes to tradeable goods, it delivers quality, well paid employment and it delivers dense linkages with other parts of the economy (Stöllinger, et al. 2013). Another noteworthy feature of the sector is that manufacturing processes often rely on service sector inputs which means that it helps the latter sector to thrive, while also having a carrier function for services which may not be tradable or exportable without being embedded in manufactured products.

The latest CEFTA Investment Report (2017) for South East Europe (SEE) argues that: *"A growing manufacturing sector in CEFTA economies would boost productivity, increase the size of the tradable sector, create more and better paid jobs, and have positive spill-over effects for other sectors of the economy."* (p.61)

The rationale for a focus on manufacturing is particularly noteworthy in the CEFTA region:

- Manufacturing is underdeveloped, as reflected in low output and export;
- Weak manufacturing means high trade deficits, modest intra-CEFTA trade flows and limited demand for services and R&D;
- The process of deindustrialisation is continuing, though recent trends are positive;
- Manufacturing is a major source of technological progress since firms are more likely to undertake R&D investments;
- Manufacturing is the main source of innovation and technological progress;
- Related to issue of innovation, the level of productivity growth (e.g. total factor productivity) in the manufacturing sector is higher than in the rest of the economy;
- Manufacturing industries produce highly tradable output, which combined with the increasing services intensity of manufacturers means that the sector assumes an important "carrier" function for services and the economy benefits as a result.

Research strongly suggests that the manufacturing sector remains a key engine of growth for developing countries, particularly those with a higher level of human capital. The EU has also highlighted that the manufacturing industry: *"… has a strong spill-over effect to other sectors - additional final demand in manufacturing generates around half as much additional final demand elsewhere in the economy"* (European Competitiveness Report 2013).

2.2 Industrial Policy in Macedonia

The original Industrial Policy of the Republic of Macedonia 2009-2020, prepared by the Ministry of Economy (MoE) and adopted by the Government in June 2009, was a national strategic document for enhancing the competitiveness of industry and the economy in general. The policy focused on five areas of intervention as the key pillars for enhancing the competitiveness of endogenous industry, namely:

- International cooperation and support for Foreign Direct Investment (FDI): the main measures include promotion of international cooperation between key economic actors; strengthening of the professional network for co-operation among business partners; exchange of knowledge and experience; obtaining and upgrading management, marketing and other business skills among enterprises; attracting qualified labour for the

establishment and promotion of innovative businesses in the economy; and attracting Foreign Direct Investment (FDI);
- Applied research, innovation and development (R&D): the main measures include increase public and private R&D investment; incentivise the co-operation among industry, science, research and public institutions; develop technology infrastructure and technological industrial development zones; incentivise the creation of new products and services; enhance the application of new technologies, as well as the protection of intellectual and industrial property rights;
- Development of eco-friendly products and services to enhance sustainable development the main measures include public awareness activities; “green public procurement”; training; research and development of new eco-friendly products and services; setting up of sustainable infrastructure related to the use of industrial resources; support for eco-certification;
- Enhancement of SME and entrepreneurship development: the main measures include support the establishment of new enterprises through the creation of a favourable business climate; support life-long learning programmes on entrepreneurship; introduce new financial instruments for fast-growing innovative SMEs that comply with state aid rules;
- Collaboration of companies in clusters and networks: the main measures include support awareness raising and trainings for companies; support cluster/network analysis and development strategies; accelerate the introduction of supply chain partnerships; initiate networks of R&D institutions, technological centres and enterprises.

In addition to the Industrial Policy 2009-2020 that this document replaces and supersedes, there is a variety of policies, strategies and action plans which are active in the Republic of Macedonia, including the:
- Competitiveness Strategy;
- Innovation Strategy;
- Small and Medium-sized Enterprises Strategy;
- Entrepreneurial Learning Strategy;
- Women Entrepreneurship Strategy;
- Education Strategy;
- Energy Efficiency Strategy;
- National Economic Reform Programme.

Below we summarise the key strategies and plans. It is important for the industrial strategy to note the policy emphases that already exist and to avoid duplicating activities that are already being implemented or planned in other strategic documents. It is also important for this strategy to identify its particular policy niche, which is to address the priority needs of the manufacturing sector within the context of the Economic Growth Plan, which represents the new overarching framework for Industrial Policy and directly influences this strategy. This is discussed in detail after the presentation of the main policy initiatives below.

2.2.1 Competitiveness Strategy

The Competitiveness Strategy 2016-20 aimed to create a framework for the effective use of the Instrument for Pre-accession Assistance (IPA II) funding from the EU. It was an initiative led by the Cabinet of the Deputy Prime Minister´s Office for Economic Affairs (DPMEA) and covered all the key themes connected with competitiveness, including:

- A simpler and more stable business environment;
- A more entrepreneurial and productive SME sector;
- A more dynamic export sector;

- A more attractive environment for inward investors;
- A more skilled and entrepreneurial labour force;
- A reinvigorated industrial policy;
- A higher volume of finance for the enterprise sector.

The Competitiveness Strategy 2016-20 was designed as an "umbrella strategy" and anticipated receiving significant funding. However, its implementation has been affected by the fact that only a fraction of the expected resources is available. Because of this and that few of its measures have been implemented, certain measures with an emphasis on manufacturing, for example in connection to internationalisation/export and industrial policy, have incorporated into this strategy.

2.2.2 Innovation Strategy

Innovation is a key driver of economic growth and the development of an innovation policy is considered as one of the cornerstones of economic development. The document articulates a vision of driving competitiveness and economic development, based on knowledge and innovation, thereby creating high value employment and prosperity for citizens through four strategic objectives:

- Enhancing the business sector's propensity to innovate;
- Strengthening human resources for innovation;
- Creating a regulatory environment which will be supportive to innovation;
- Increasing knowledge flows between innovation actors.

A World Bank loan is making strides in helping the implementation of this strategy, including funding and supporting the implementation of the Fund for Innovations and Technological Development and the (new) National Technological Transfer Office (see Institutions below). Another important institutional development is that Science Technology Park that is envisaged under the third Pillar from the EPG. The action plan connected with the strategy is in the process of being revised.

2.2.3 Small and Medium-sized Enterprises (SME) Strategy

The National SME Strategy (2018-2022) is being approved by the Government. Its vision is that "competitive Macedonian SMEs drive inclusive economic growth and the creation of more productive and decent employment" and contains the following strategic objectives:

- Conducive Business Environment: to create a conducive business environment in which entrepreneurship and investment is encouraged;
- Productive and Competitive SME Sector: to help SMEs in Macedonia become productive and competitive participants in European and other international markets;
- Dynamic Entrepreneurship and Innovation Ecosystem: to drive Macedonia's economic competitiveness through a more entrepreneurial and innovative SME sector.

The new SME Strategy is aligned with the EU´s Small Business Act (SBA) and within each of strategic objectives, it identifies 12 programmes of support.

2.2.4 Strategy for Development of Women Entrepreneurship

The Strategy for Development of Women Entrepreneurship 2017-2020 is in the process of being approved. The long-term vision to "Achieve the goal of women's involvement in entrepreneurial activity depending on various factors to become a force that contributes to the development of the entrepreneurial climate and the economy." The strategy is aimed at economic strengthening of women by creating favourable business climate and providing

support for development of their entrepreneurial potential, which will contribute to the development of existing and opening of new enterprises, creating new jobs and thus strengthening the overall economy. The strategic priorities are to:

- Create a favourable business environment for development of women entrepreneurship;
- Provide system support for the development of women entrepreneurship;
- Create the infrastructure for support and development of women entrepreneurship;
- Deliver promotion, networking and advocacy.

2.2.5 Entrepreneurial Learning Strategy

The Ministry of Education and Science (MoES) created the first Entrepreneurial Learning Strategy, with the assistance of the European Training Foundation. The strategy aims to:

- Improve the employability skills of young people leading to increased youth employment;
- Create possibilities for everyone to be equipped with entrepreneurial competences;
- Create a life-long entrepreneurial learning system;
- Strengthen entrepreneurial spirit via life-long learning throughout the education system.

The goal of the strategy is to contribute to an increase in the number of SMEs (including young and women entrepreneurs) with a strong ability to compete in the wider EU markets; increase the number of new innovative companies; and, to subsequently decrease unemployment rates to less than 25%. The responsibility for strategy and action plan lies with the Ministry of Education and Science and is being delivered by the ELS Steering Committee comprising relevant ministries and other stakeholders.

2.2.6 Energy Efficiency Strategy

The MoE has also created the Energy Efficiency Strategy 2010-2020, whose strategic objectives are:

- Safe energy supply;
- Sustainable economic development;
- Economic competitiveness.

The main focus on the strategy, as far as the manufacturing sector is concerned to modernise the energy infrastructure and build a gas pipeline; increase the amount of clean energy use; and generated R&D investments and promote energy efficiency technologies.

In addition to the strategy, and in compliance with the Treaty establishing the Energy Community, the country also has an obligation to prepare the National Energy Efficiency Action Plans (NEEAP), the latest of which is valid until 2018. The NEEAP establishes the national indicative goal for final energy savings and performance, including for the manufacturing sector.

2.2.7 Education Strategy 2018-2020

The MoES´s Education Strategy was adopted in January 2018. It covers the following educational issues: preschool, primary, general secondary, vocational education training (VET), higher education, research and innovation, adult education, life-long learning (LLL) and informal learning. Each chapter addressed issues such as achievements, weaknesses, priorities and outcomes that are expected because of implementation. The priority measures are set out in the related action plan and all chapters embed cooperation with private sector, to ensure more effective linkage between the education system and the labour market. Two themes are particularly noteworthy:

- Adult Education and LLL: the strategy notes the lack of linkage between adult education providers and actual needs of labour market, as well as the need for more information and analysis, which would benefit all sectors, including the manufacturing one;
- VET: the development of a modular approach in VET curricula will deliver greater flexibility and customisation to the expectations of students / adults and linkage to the labour market demands. It also foresees the creation of a more efficient and effective VET system of 98 schools. Regional VET Centres of Excellence will be created and equipped with the latest equipment/technology, and will be open to VET/university students, unemployed and the business community to invest in their employees.

The Education Strategy is expected to impact positively on all sectors, including industry / manufacturing.

2.2.8 Economic Reform Programme

The Economic Reform Programme (ERP) covers the period 2018-2020 and is updated on a three-year rolling basis. It sets out the planned reforms to the medium-term macroeconomic and fiscal framework, along with sector reforms required for competitiveness and growth. It pays attention to industrial policy and assesses the impact of previous practices focusing on attracting FDI, creating competitiveness and supporting certain branches of the manufacturing sector and notes that the IP is in the process of being revised. The ERP focuses on the following priority measures until 2020 as a part of EDP:

- Measure 9: Supporting activities to attract FDI and investments by domestic companies;
- Measure 10: Support for Investments;
- Measure 11: Improving the competitiveness of domestic companies for new markets.

According to the Annex to the ERP (Table 10. Matrix of policy commitments), in the region of EUR 150 million is expected to be invested in the above measures by 2022.

A further initiative that could be added above is the Economic Growth Plan (EGP), however, this is such an important initiative that it will discussed separately in the next section.

To conclude, the analysis in the preceding section reinforces the point that industrial policy is very broad and covers many themes and topics. The fact that a multiplicity of policies, strategies, roadmaps, programmes, etc. exist in the general ambit of industrial policy reinforces the necessity for this strategy to have a specific focus (i.e. the manufacturing sector), to avoid potential policy overlaps and institutional conflicts.

2.3 The Economic Growth Plan (EGP)

The Economic Growth Plan (EGP) is a document that gives new impetus for growth of the industry sector, focusing on supporting investments by companies. The main principles, exemptions and Pillars of the EGP are illustrated in the Box below.

Box 5: The Economic Growth Plan: the new industrial policy support framework

The key EGP **principles**:

- Firms applying for the measures of the industrial policy on stimulating investments and competitiveness of the Macedonian economy must meet the basic **eligibility criteria**:
  - They must have income growth in the preceding year compared to the average of the last 3 years;
  - They must have growth in employees in the preceding year compared to the average of the last 3 years.
- All firms in the Republic of Macedonia are eligible to apply for the measures, with the following **exceptions**:
  - Public enterprises;
  - Companies operating in licensed activities;

- Lawyer's offices, auditors, accounting firms, etc.;
- Enterprises that are beneficiaries of agricultural subsidies;
- Enterprises that are beneficiaries of concessions;
- Commercial banks, insurance companies, funds, etc.

The **activities** of the EGP provide support according to three pillars:

Pillar 1: All Enterprises: investment

- Creating new jobs;
- Establishing and enhancing cooperation with Macedonian suppliers;
- Establishing technological development and research departments;
- Investment projects of significant economic interest for Macedonia;
- Increasing capital investments and incomes;
- Acquisition of companies facing difficulties;

Pillar 2: All Enterprises: internationalisation

- Companies increasing their competitiveness in new markets;
- Winning new markets and increasing sales;

Pillar 3: SMEs

- Fast growing SMEs ("gazelles");
- Further support to micro enterprises;
- Improving innovation in SMEs;
- Professional upgrade and practice for newly-employed young people;
- Preparing the legal bases for development of venture capital.

The Economic Growth Plan is underpinned by the **Law on Financial Support of Investments** (2018) for the first two Pillars, as well the Programme of Work of FITR for the third Pillar.

The EGP represents a major new policy development with a focus on manufacturing. It is:

- Comprehensive: it supports investments, employment, internationalisation and innovation;
- Based on national treatment: it does not distinguish foreign and domestic firms;
- Success oriented: it targets enterprises that have demonstrated success in the recent past;
- Not SME-oriented: most measures are not dependent on the size of the enterprise, though there are specific measures for micro and SMEs (Pillar 3);
- Not dependent of foreign support: it allocates significant state funding for the achievement of the new policy objectives.

The Law on Financial Support of Investments (2018) regulates the types of financial support for investments, the amount of financial support, the conditions, the manner and the procedure for granting financial support to the business entities that will invest in the Republic of Macedonia. It defines the types of financial support that the business entities can receive, as well as the amounts involved. The procedure for obtaining financial support is designed to be transparent, simple and accessible by all business entities in the Republic of Macedonia. The law also determines the competent bodies, as well as the institutional form (i.e. inter-ministerial commission that will verify the conditions for obtaining financial support). The Law covers the first and second EGP Pillars, whereas the third EPG Pillar falls within the activities of the Fund for Innovation and Technological Development.

The EGP is expected to fund EUR 30 mio. per annum for the next five years (EUR 150 mio.). This amounts to a major new framework for industrial policy, with a focus on production / manufacturing. As such, the EGP is the overarching policy framework for this strategy, which reinforces the manufacturing sector focus, therefore, many of the measures presented in the Strategic Objectives (see Chapter 4 below) are derived directly from the EGP.

2.4 Key Relevant Institutions

Given its horizontal nature, various institutions are relevant to the implementation of industrial policy in general and thus this strategy. The key institutions include the following:

- Cabinet of the Deputy Prime Minister for Economic Affairs (CDPMEA): has overall coordination responsibility for the diverse areas that fall within economic affairs, including the Economic Growth Plan;
- Ministry of Economy (MoE): has policy responsibility for various areas of direct relevance to strategy, such as industrial policy, investment, SMEs, export, trade, energy, etc;
- Ministry of Education and Science (MoES): has policy responsibility for various areas of relevance including: research and development (R&D), innovation, higher education, smart specialisation, etc.;
- Ministry for Environment and Physical Planning (MoEPP): has responsibility for various aspects of sustainability, climate change, circular/green economy, etc.;
- Agency for the Promotion of Entrepreneurship (APPRM): has implementation responsibility for SME development and entrepreneurship;
- Agency for Investment and Export Promotion (InvestMacedonia): has implementation responsibility for Foreign Direct Investment (except the parts that are the responsibility of the Ministers Without Portfolio and Directorate of Technological and Industrial Development Zones – see below) and export promotion. It will also be involved in Pillars 1 and 2 of the EGP;
- Directorate for Technological and Industrial Development Zones (DTIDZ): has implementation responsibility everything to do with the TIDZs, including state aid and aftercare. There are 15 TIDZs, 8 of which are in operation and others are in the pipeline pending government approval (Skopje III, Kumanovo and Lipkovo). It will also be involved in Pillars 1 and 2 of the EGP;
- Macedonian Bank for Development Promotion: has responsibility for lending for development purposes (e.g. energy efficiency and renewable energy sources, SMEs, etc.), credit insurance (e.g. export) and factoring;
- Fund for Innovations and Technological Development (FITD): has responsibility for funding innovation, commercialisation of innovation, technology transfer, start-ups, spin-offs, business accelerators, etc. It also has responsibility for Pillar 3 of EGP.

Other institutions are also worth noting, all of which influence general industrial policy:

- Universities (public and private): there are 6 public and 18 private universities;
- Macedonian Academy of Sciences and Arts (MANU): is the preeminent academic institution with various active programmes of research;
- Clusters: around 30 (MoE database) but most operate as business associations, working with varying degrees of effectiveness (L. Vodeb, 2016, Cluster Evaluation Report);
- Incubators/accelerators: business incubators and private sector accelerators exist. Further accelerators are planned such as by the Fund for Innovations and Technological Development.

Several new institutions are planned to be created, including:

- National Technological Transfer Office (NTTO): is expected to become the main partner for technology transfer and enhancing technological and innovation potential;
- Science and Technology Park (STP): is being created with a focus on technology transfer;
- Industrial and Green Zones (IGZs): three Industrial Zones have been created and the first Green Zone is in the process of being created.

In order to implement the strategy and action plan, the following key institutions will play an important role, as will be discussed in detail in Chapter 5: Implementation and Coordination:

- MoE´s Industrial Department: overall coordination (inter-ministerial, donor, stakeholder), monitoring, reporting and evaluation;
- Sector Working Group for Competitiveness and Innovation: inter-ministerial coordination.

The content of this strategy and related action plan has been discussed and agreed with the key relevant institutions discussed above.

2.5 The Focus of the Industrial Strategy

Therefore, industrial policy is increasingly on the government agenda in the EU generally and the Western Balkans region specifically. Industrial Policy tends to be broad and all-encompassing, however, there is a growing understanding of the central roleplayed by the manufacturing sector. In the Republic of Macedonia itself, key issues are evident which reinforce the need for the industrial strategy to focus on the manufacturing sector:

- There is a need to revise and update the industrial policy/strategy;
- The preceding industrial policy was broad and generic. An assessment of its impact demonstrated partial impact but also weaknesses, such as the need for the need to be linked with the EPG, to avoid overlaps, to secure greatly increased state funding, to supplement state funding with donor/IFI funding and secure effective leadership, coordination, public private dialogue, reporting, monitoring and evaluation of the new strategy and action plan.
- There is a high density of national strategies covering the field of competitiveness, innovation, etc. so there is no longer policy scope for another horizontal strategy;
- There are many institutions in the field of competitiveness, innovation, FDI, etc., It is important for the new strategy to be focused to avoid overlaps, though some are unavoidable and can add value, if well-coordinated;
- The framework of the new EGP emphasises production/ manufacturing specifically.

Therefore, there is a strong basis for this strategy to focus on the manufacturing sector, since this is critical to growth, productivity, high quality jobs, innovation, export, circular economy, etc. Such a focus is consistent with the extensive efforts made in the last decade of successfully attracting of Foreign Direct Investment (FDI) to the industrial zones (TIDZs), which has succeeded in raising the profile and image of the country while also counteracting the deindustrialisation evident in the Western Balkans region.

The next Chapter examines the manufacturing sector trends and issues globally, in the EU, in the Western Balkans region and in the Republic of Macedonia, as a further basis for determining the content on the new strategy and action plan.

3. The Manufacturing Sector: Trends and Issues

This chapter analyses the manufacturing sector in depth, as it is the policy focus on this strategy. The first part presents the general trends influencing the manufacturing sector globally, including in Europe. The second part discusses the process of deindustrialisation and the more positive recent manufacturing developments in the Western Balkans. The third part analyses the data on the manufacturing sector and sub-sectors that exists for the Republic of Macedonia and compares it with a set of competitors. These content and conclusions of this chapter, as well as the preceding one, lead to an overview of the strengths, weaknesses, opportunities and threats (SWOT analysis), which paves the way for the Industrial Strategy with a focus on Manufacturing, presented in the subsequent chapter.

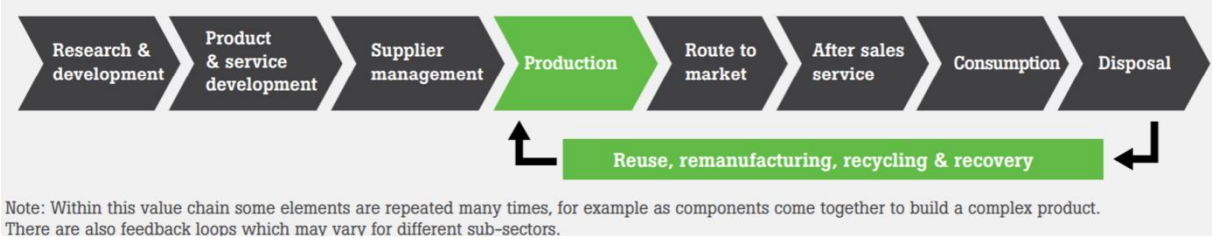
3.1 Manufacturing Matters

The fact is that manufacturing matters and it matters in a manner which much be acknowledged by policy-makers because it impinges directly upon both the present and future economic prospects of the country, hence the reason for this focus in this strategy, which will work in combination with the other related strategic initiatives already underway.

The distribution of products exported from developing countries has changed significantly over the last 20 years. Whereas in the past, basic commodities accounted for 75% of global exports, nowadays an estimated 70% of developing countries' exports are manufactured goods. Electronics, machinery, automobiles, chemicals, clothing, furniture, etc. make-up the lion´s share of world trade in manufactured goods. However, a significant portion of this trade involves not the end product itself but the various component parts that are traded in the supply chain of manufacturing products. As such, global demand for manufactured goods comprises not only consumer demand for end products but also demand for component parts, primarily by other industries, forming global supply chains.

Manufacturing is traditionally viewed as a production process whereby raw material are transformed into physical products through inputs such as people and other resources. However, the evidence is that physical production is merely at the centre of a much wider manufacturing value chain (Marsh, 2012, The New Industrial Revolution: Consumers, Globalisation and the End of Mass Production), as illustrated in the Diagram below.

Diagram 3: Simplified Model of the Manufacturing Value Chain



Source: The Future of Manufacturing, UK

Manufacturers are increasingly using global, regional and national value chains to generate new and additional revenue, with production playing a central role in allowing other value creating activities to occur. Seeing manufacturing in this sense has triggered renewed interest in the potential of manufacturing to address economic, strategic and societal challenges. Studies illustrate the central importance of manufacturing for the trade balance, improved productivity, economic, environmental and social sustainability and the development of production-related services. The role of production and emerging technologies to tackle some of the key challenges today, such as climate change, are well recognised, though there are variations in emphasis in differences countries and regions,

reflecting national strengths and interests of dominant industries within the economy. In the USA, the emphasis is on the future role of manufacturing for technology development, creation of new industries and national security, whereas in the EU, attention is mostly paid to the role of manufacturing as a driver of economic recovery and to capturing economic value in the form of production-related jobs.

Even though the manufacturing sector has declined in importance in most EU countries, there is recognition of the benefits that a stable or growing manufacturing sector conveys:

- Manufacturing is a key driver of productivity;
- Manufacturing is the key source of R&D and innovation activity;
- Manufacturing is a major driver of overall economic growth;
- Without a healthy manufacturing sector, it is difficult to balance the trade account;
- Manufacturing is a key driver of employment growth;
- Manufacturing is a key source of high-paying jobs at many different skill levels;
- Manufacturing and services sectors are increasingly inseparable and complementary.

These significant potential benefits necessitate a systematic approach to supporting the manufacturing sector in the future.

3.2 Global Issues Affecting the Manufacturing Sector

The preceding analysis stressed four points. Firstly, that the previous industrial policy was too broad and lacked consistent political and financial resources for effective implementation. Secondly, that both the policy and institutional environment has changed a great deal, making it essential to focus the industrial strategy (as opposed to the broader industrial policy) to ensure effective implementation and use of limited finds. Thirdly, that the new government elected in mid-2017 has a much greater emphasis on manufacturing than previously, as evidenced by the approved Economic Growth Plan and Law. Fourthly, manufacturing is increasingly seen as one of the most critical sectors to focus on, as far as economic development is concerned.

Manufacturing is in a state of flux. Before discussing the situation in the country, it is important to briefly set-out the overarching trends and issues affecting the manufacturing sector globally, as all countries, Macedonia included, cannot but be influenced by them. The Box below is informed by UNIDO (Emerging trends in global manufacturing industries) and presents an overview of high-level, non-sector-specific trends and drivers affecting global industrial systems, whose effects are emerging but will drive further change in global manufacturing activity in the coming years.

Box 6: Emerging Platform or Key Enabling Technologies

Trends:
Globalization:
- Offshoring and outsourcing.
- Emerging regions such as China, India and Brazil, Turkey, Indonesia, Russia, etc.

Sustainability:
- Environment/pollution.
- Social pressures (e.g. artificial intelligence, robotics, etc.).
- Economic pressures (consumption of scarce resources e.g. energy and water).

Demographics:
- Ageing population.
- Changing patterns of international demand (e.g. emergence of middle and upper classes in the developing countries.

Urbanisation:
- The flow of people from rural areas and smaller towns to major cities.
- Deceleration of rural population growth.

Threats to global stability:
- Risk reduction and increased network resiliency.

Accelerating product life cycles:
- Accelerating rate and pervasiveness of technological innovation.
- Emerging science and engineering developments (e.g. Key Enabling Technologies).

Changing consumer habits:
- Increasing prosperity will drive consumption of consumer products / individualised products and services.

External industrial policy trends:
- Long-term public investments to support manufacturing (e.g. R&D, KETs, etc.).

Enablers of Manufacturing Competitiveness:

Distributed manufacturing:
- Dynamic collaboration across complex supply chains.
- Agile supply chains.
- Transparent provision of information on products and processes.

Rapidly responsive manufacturing:
- Adaptive, responsive and robust manufacturing.
- Flexible production systems and supply chains flow.
- Rapid product realisation.

Complex manufacturing:
- Affordable, high-performance production tools.
- Interaction of technologies requiring interdisciplinary cooperation.
- Improvements in the usability of advanced technology (e.g. digitalization).

Customised manufacturing:
- Affordable customised production (e.g. additive manufacturing / 3D printing).
- Customisation for local and global competition.
- Product usability for groups with special needs.
- Production for the world's population.

Human-centred manufacturing:
- Human focus (unique role as innovators and decision-makers).
- User focus.
- Demographically balanced factories (e.g. age structure, gender, migration, etc.).

Sustainable manufacturing:
- Sustainability value-based enterprises.
- Efficient and effective manufacturing.

Innovation-receptive manufacturing:
- Open innovation manufacturing.
- Facilitating user-centred innovation.
- Preparing for social innovation.

Source: UNIDO

3.3 Manufacturing Sector in the Western Balkans

The Western Balkans States (WBS) have undergone a major economic and political transformation in the past 15-20 years. The conflict-ridden 1990s resulted in a severe economic collapse in the first phase of transition which was reflected in a steep precipitous decline of industrial output precipitated by the break-up of Yugoslavia and the armed conflicts of the early 1990s. Deindustrialisation was the consequence. Since then, substantial reform and rebuilding of economies has occurred, as they opened-up to global trade and FDI to attract foreign capital and know-how. They became increasingly export-oriented, expanded the role of the private sector, privatised many former State-Owned Enterprises (SOEs) and streamlined regulations stifling enterprise development, while also building institutions, such as commercial banks and competition agencies, to strengthen the market system. The WB countries have been rewarded with robust economic growth, a significant rise in incomes and living standards and much greater macroeconomic stability (World Bank, 2015, The Western Balkans: 15 Years of Economic Transition).

At the same time, poverty fell sharply both in absolute numbers and depth. While in absolute terms everyone became better off, rapid growth brought uneven benefits and large increases in inequality. The biggest flaw in the WBS economic model has been the chronic underutilisation of human resources. In 2008, at the tail end of the growth spurt, the unemployment rate in the WBS averaged more than 20% and employment levels of 40-45% on average since 2000, were 10% lower than in the NMSs and especially low among women and the young. In recent years, the WBS economies have resumed growth. The medium term economic outlook for the WBS looks quite positive, including for Macedonia.

3.4 Macedonian Manufacturing Sector

Having discussed the global trends and issues in relation to manufacturing and the general situation, including recent economic performance, FDI and manufacturing in the Western Balkans states, the analysis focuses specifically on the national Macedonian manufacturing context, using the international and national data available on different dimensions, including:

- Manufacturing Gross Output;
- Manufacturing Gross Value Added;
- Index of Industrial Production;
- Index of Industrial Productivity;
- Export of Manufacturing Products;
- Manufacturing Foreign Direct Investment (FDI);
- Manufacturing: Macedonia in International Comparison.

There is growing international consensus that industry should have policy priority in the development of national economy. Within the industrial sector, stimulating the development of the manufacturing sector is seen as being one of the most important drivers of economic growth, technical progress, productivity, innovation, etc. However, industry is a broad concept. According to the International Standard Industrial Classification (ISIC) Revision 3 industry corresponds with divisions 10-45 (United Nations Statistics Division, 2013) and includes manufacturing, construction and electricity. In this section, the term industry will refer to the National Classification of Activities (NKD Rev 2) of the country and cover the following three sectors: A Mining and quarrying, B Manufacturing and C Electricity, gas, steam and air conditioning supply. The focus of the analysis presented is manufacturing sectors and sub-sectors.

3.4.1 Manufacturing Gross Output

Industrial gross output is a useful economic indicator measuring the gross output of each sector, the purchases of intermediate inputs from other industries and value-added measures inform us of the contribution of an industry or sector to GDP. For industries such as manufacturing, the total amount that is produced and sold as intermediate inputs to other industries are important components of the final products sold in the economy. Additionally, the growth of industrial output over time has a positive transmission effects on trade, transport and communications, which collectively also contribute to the economic growth.

The country´s industrial output shows significant oscillations within industrial sub-sectors during a ten-year period resulted from domestic economic policy and changes in demand at the external markets (see Table A1 in the Annex).

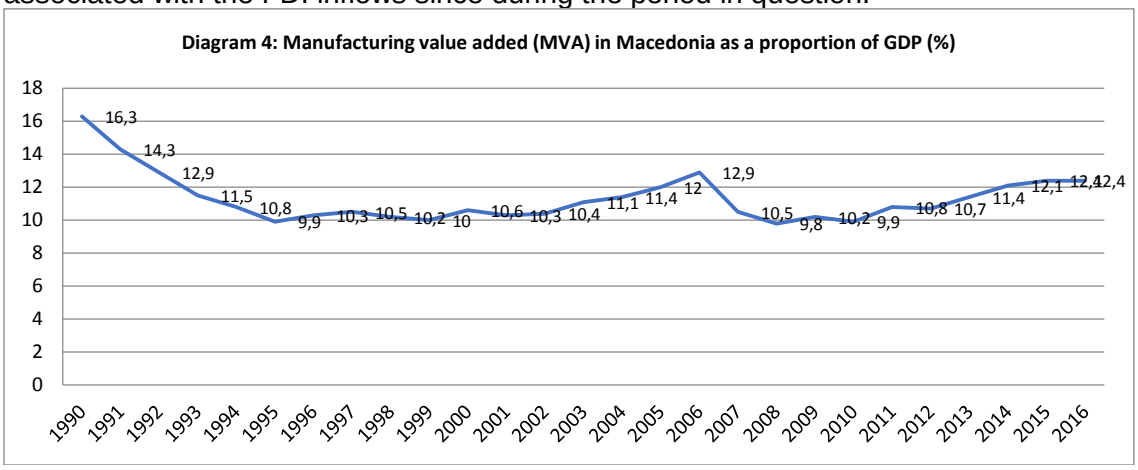
The most dramatic changes occurred within the manufacturing sector whose gross output in some sub-sectors exhibited dramatic decline, such as the manufacture of coke and refined petroleum products sub-sector whose output plunged from 22645 million MKD to only 55 million MKD. By contrast, a significant boost was evident in the manufacture of machinery and equipment sub-sector, whose gross output increased 66 times from 896 million MKD in

2005 to 58.746 million MKD in 2014. Other sub-sectors with a relatively steady increasing trend in gross output include the manufacture of electrical equipment, of furniture, rubber and plastic products and food products.

3.4.2 Manufacturing Gross Value Added

Gross value added is the basic element of GDP and represents the balance between gross output and intermediate consumption and the value added of certain sub-sectors, thus indicating its contribution to GDP. The participation of a specific branch in the value added provides valuable information not only on the state of industry in the reporting period but also on the intensity with which each of the branches develops, indicating the orientation of its future structure.

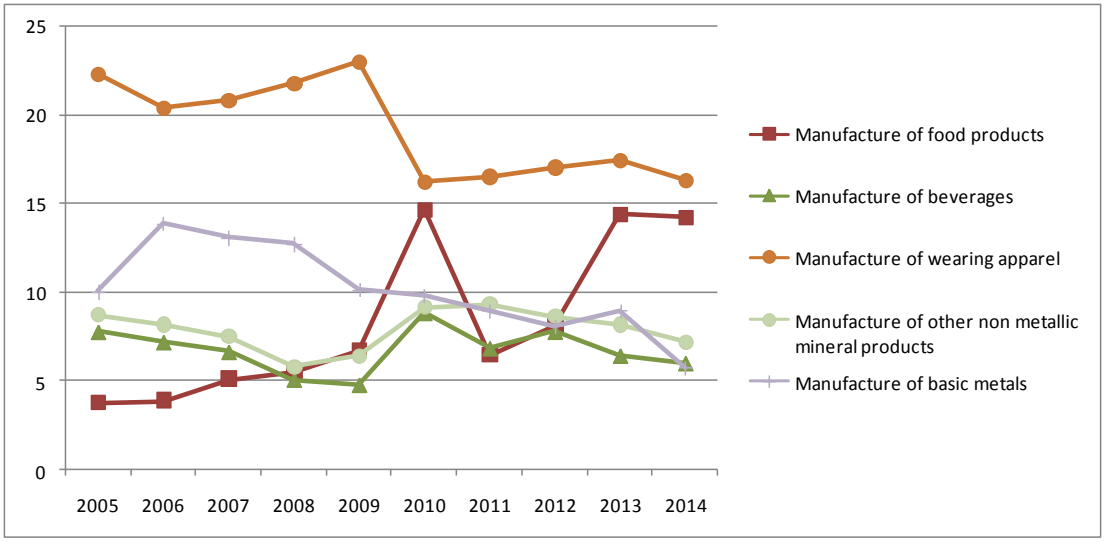
The situation with respect to manufacturing value added (MVA - based on UNIDO statistics) is illustrated in the Diagram below. The trend is that since the 1990s, the MVA has been on a downward path except for a peak in 2006 and gradual recovery since 2008, possibly associated with the FDI inflows since during the period in question.



Source UNIDO https://stat.unido.org/SDG

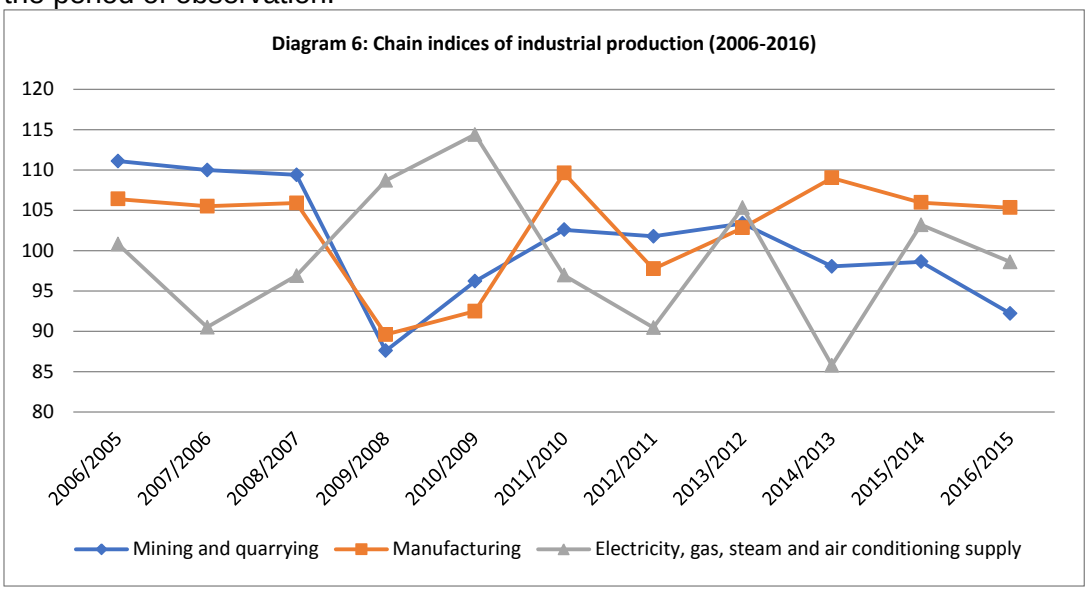
Table A2 of the Annex shows that In the Manufacturing sector, five sub-sectors contributed the most in the creation of added value of the sector, as illustrates in the Diagram below:

Diagram 5: Contribution of main manufacturing sub-sectors in value added (2005-2014 in %)



3.4.3 Chain Index of Manufacturing Production (CIIP)

A chain index is an index in which the value of any given period is related to the value of its immediately preceding period, resulting in an index for the given period expressed against the preceding period (= 100). The Diagram below and Table A3 of the Annex shows that industrial production in last decade has oscillated significantly within individual sectors and sub-sectors, but no sub-sector experienced continuous growth in industrial production during the period of observation.

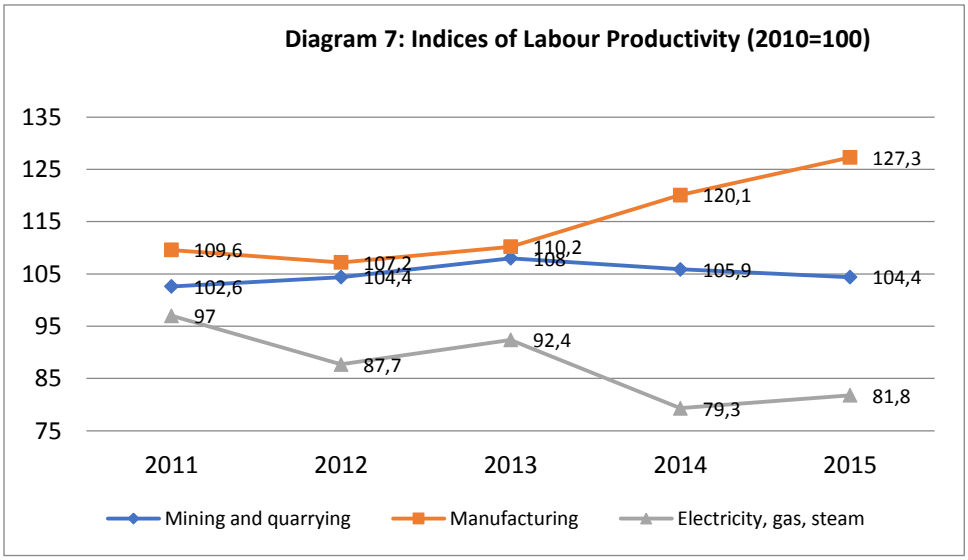


The largest individual contribution was made by the manufacturing sector of industry given the domestic and foreign export-oriented facilities. The boost in industrial production in some sub-sectors was supported by FDI flow in this sector. Considering the structure, it is notable that the index of industrial production for Manufacture of motor vehicles, trailers and semi-trailers reached 1,494% in 2014 (factories for vehicle and vehicle parts in the TIDZs). Even in 2016, the increase was 52,2%.

The favourable changes in manufacturing industry also reflect the increased Manufacture of machinery and equipment, whose average was 24%; in 2016, production in this sector increased by 22%. Certain sub-sectors with high average growth in the eleven-year period, such as Manufacture of furniture, recorded growth of 14,4% and Manufacture of other transport equipment a growth of 11%. At the same time, they experienced a reduction in production of 3,6% and 1,3% in 2016 respectively. A decline in the average growth was recorded in various sub-sectors, the biggest being in the Manufacture of coke and Refined petroleum products, where production has been decreasing since 2010.

3.4.4 Index of Industrial Productivity

Production growth is not the same as productivity growth. Labour productivity is the most common Partial Factor Productivity (PFP) measure and is usually measured as the volume of output per hour worked. The Diagram below shows that a recent upward trend in manufacturing labour productivity, compared with other industrial sectors.



Labour productivity is presented as a ratio of the index of total volume of industrial production and the index of employees as per Table A4 of the Annex. Compared to 2005, the biggest increase in labour productivity in 2012 was recorded in Manufacture of other transport equipment followed by Repair and installation of machinery and equipment and Manufacture of machinery and equipment. The same trend in labour productivity continued in the next years in the Manufacture of other transport equipment, Manufacture of machinery and equipment, but also productivity indices were significant in 2015 compared to 2010 in sub-sectors such as Manufacture of motor vehicles, trailers and semi-trailers (209) and Manufacture of paper and paper products (203). The statistics show a tendency of decreasing labour productivity in 2015 in the sub-sectors of Manufacture of coke and refined petroleum products, Mining of coal and lignite and Manufacture of fabricated metal products, except machinery and equipment.

A decrease in productivity is typically followed by a decrease in real gross wages. However, it is important to note that some sectors of the economy have traditionally had low productivity growth but are vitally important for the whole economy, for example Manufacture of leather and related products. This could be because such sub-sectors within the textile industry are labour intensive. In more developed countries, where production is automated, the labour factor productivity is larger. Except for selective productivity measures, there is multifactor productivity, which refers to the productivity because of the engagement of all the production factors (capital, labour, energy, material, etc.). This metric is most appropriate to measure productivity, but its limitation lie in the lack of data required for the calculation.

The fact that productivity may have increased during a certain period may be mainly due to the decline of the employees in those sub-sectors. Additionally, as indicated in the World Competitiveness Report (2015), the other factors that influence labour productivity include an inadequately educated workforce and a poor work ethic. On the other hand, a productivity increase could arise from investment in the new technologies and other positive spill-overs such as transfer of knowledge arising from FDI. This means that the impact of productivity growth over export growth comes through the channel of productivity influenced by FDI (e.g. implementation of new technologies, transfers of know-how, introduction of new management skills and expertise, etc.). Productivity is clearly an important policy factor for the future.

Higher levels of innovation are necessary to accelerate productivity growth in Macedonia. Firms perform below regional benchmarks on innovation indicators, including improvement of products and services, introduction of new production or service delivery processes, and

collaboration with universities on innovative activities. For example, about one third of Macedonia's merchandise exports is composed of agriculture, minerals and metals. Furthermore, most agricultural exports are unprocessed items, such as apples, peaches and plums. Although manufactured goods dominate goods exports, they remain at the lower end in skill-technology intensity and quality. Macedonian firms are 2.8 out of 7 (110th out of 138 countries) in the 2017 Global Competitiveness Report on competitive advantage, which is below the 3.6 average among aspirational peers. On capacity for innovation, it ranks a 4 out of 7 (82nd out of 138 countries), below the average of 4.4 among aspirational peers. It also ranks below aspirational peers on the quality of local suppliers, the sophistication of production processes, and the use of marketing, as well as indicators related to the quality of scientific research institutions and university-industry collaboration in research and development (World Bank, 2018).

Production processes and technology adoption appear to be limited among firms, which also hampers their productivity and innovation potential. Limited coordination between the private sector and research institutions and limited funding for research and development affect the potential to develop innovative products. Analyses also identify a need to optimise production according to "lean manufacturing" and continuous improvement principles. Only 8.9% of firms in the Republic of Macedonia used technology licensed from foreign companies (2013), compared to an average of 20% among aspirational peers. In the 2017 Global Competitiveness Report, the Republic of Macedonia ranks below aspirational peers in the availability of latest technologies, the extent to which FDI brings new technologies into the country, and the extent to which firms adopt the latest technologies (World Bank, 2018). Therefore, there is a need for a much stronger focus on technology transfer, extension and absorption in the future, with a manufacturing focus.

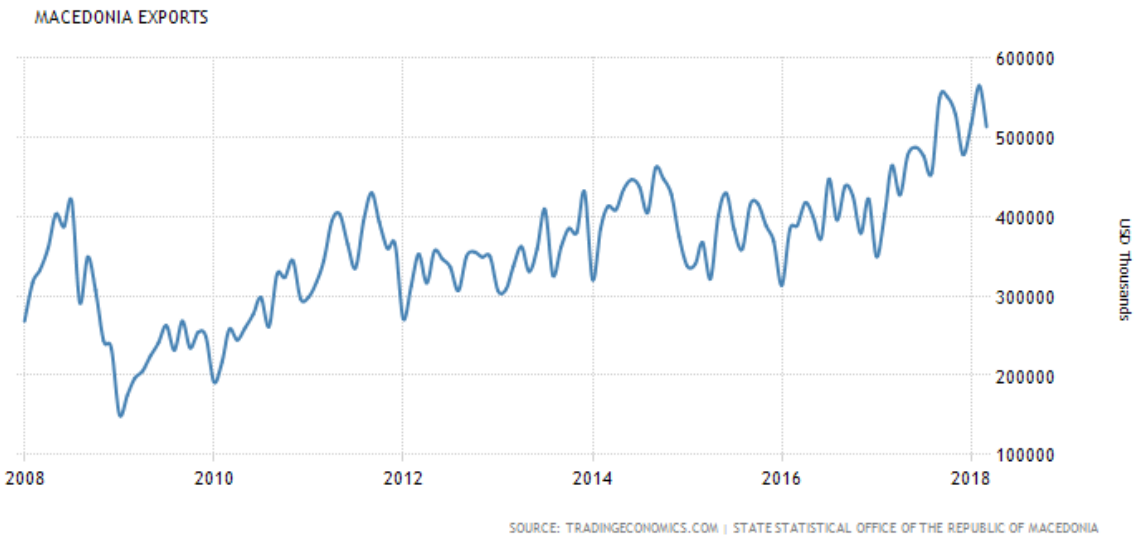
Another factor influencing productivity and innovation in general is human capital. Three issues are worth noting. Firstly, Macedonian firms suffer from low investment in managerial skills training and technical and sales skills, which are essential for developing contracts with foreign investors. Managers also often lack soft skills (e.g. networking, public speaking, negotiation) and knowledge of business concepts (e.g. monetization and business development) to attract funding for and run a business. Secondly, the stock of skills in the economy is not adequate for the jobs offered, despite high educational attainment. Half of manufacturing firms (STEPS survey 2017) report skills gap among their current employees (76% of automotive; 58% other manufacturing; 54% food products; 53% textiles; 42% ICT; 41% logistics, etc.). This is indicative of the inadequacy of skills in the economy for the demands of a modern economy. Other results from the same survey also point in the same direction. Among the firms that reported problems related to labour constraints to find employees, skills were identified as the most significant obstacle. Inadequate training and lack of experienced workers are more important problems than average wages or cost of social security and labour regulations. Thirdly, there is a mismatch between the skills being taught and the market needs. The Vocational Educational Training (VET) system is characterised by narrowly defined occupational profiles but the demand of skills has been moving away from routine, cognitive activities, toward new economy skills that include non-routine skills such as the ability to learn new things independently and the ability to communicate, among others. This has policy implications for the VET system, as well as for the higher education system, where greater interchange between firms, students and academics is needed, linked to the need to reduce the levels of migration and brain drain.

3.4.5 Export of Manufacturing Products

Table A5 of the Annex shows that the export volume has increased from 1.918 million EUR in 2006 to 4.088 million EUR in 2015, totalling 28.972 million EUR for the decade. The exceptions to this positive trend were especially during 2009, 2010 and 2012, when exports

decreased primarily because of the negative effects of the global economic crisis. The upward trend is illustrated in the Diagram below.

Diagram 8: Macedonian Exports (2008-2018)



The decline of economic activity in most neighbouring nations, the post-recession situation in Europe, the crisis in the eurozone, the debt crisis, the decrease in FDI and the increase in energy prices combined to seriously affect the economy. The economic slowdown in EU countries, the main recipients of Western Balkans exports, weakened demand and led to a reduction in investment. The effects of these trends were evident in the country.

The export structure of the economy is dominated by textile products and metal. The gradual recovery of export demand and favourable trends in prices of metals in the global markets, contributed for continuation of the trend of economic recovery in the country. This means that the export performance of domestic companies is largely conditioned by the developments of external demand and global prices, though the increase in export of goods was also a result of the increased export potential of the country.

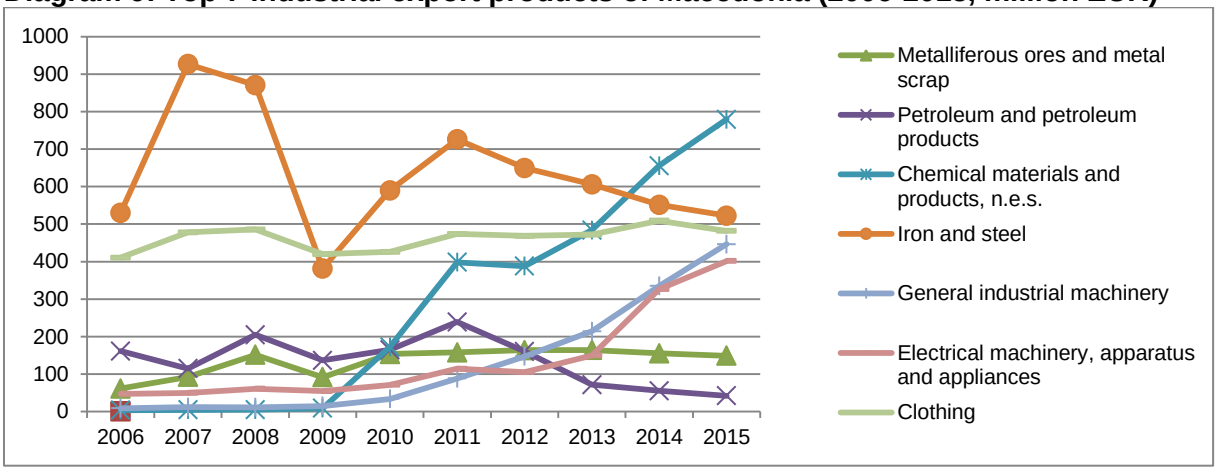
Export growth was accompanied by a change in the structure of the export towards products with higher value added, in line with the production and export of companies located in the TIDZs. Because of the new capacities in the economy, the export structure also improved, gradually increasing the share of products with higher value-added on the export side, mainly chemical products and machinery and transport equipment.

The data show that seven products (see Diagram below) accounted for over 66,5% of the total country's export, indicating that the country´s export structure is highly concentrated. Two groups of products have the highest total value in export during the decade: Clothing (part of textile industry) and Iron and steel. At the same time, these two groups of traditional industrial export products have recorded a decreasing trend in export since 2011, with a slight decrease in Textiles versus faster decline in Iron and steel, generating exports worth 465 million EUR and 412 million EUR in 2016 respectively. In recent years, the trends in the export of Iron and steel have been influenced by unfavourable trends in the international market of Metals and the fall in prices.

Despite high total export values (accumulated in previous years), there was an even more pronounced downward trend in the export of Mineral fuels and lubricants. They have seen permanent reduction on the export side in recent years, which mainly reflects the change in

the business orientation of oil refinery, which is in foreign ownership. The increase in exports is mainly due to Machinery and transport equipment and Chemical industry products, which reflects the impact of the new production facilities in the TIDZs. The Chemicals and related products, with a total value of 2.900million EUR, has recorded upward export trends since 2011 and had the highest relative share (19%) in the country´s export in 2015, which was even higher in 2016 (21% of total export). The General industrial machinery and electrical machinery, apparatus and appliances were the next group of industrial products with a growing trend in the volume of export since 2013, achieving 12% and 11% of total exports in 2016. Even though the metal industry was severely affected by the global economic crisis, it still played an important role in export. This sector exported Metalliferous ores and metal scrap worth 1.340 million EUR over ten years, which amounts to about 5% of the total country's export during the decade.

Diagram 9: Top 7 industrial export products of Macedonia (2006-2015, million EUR)



The relatively undiversified export basket makes the economy highly vulnerable to external shocks. This was illustrated during the recent global crisis, where the main transmission channel of the crisis was via foreign demand. The literature on export structure and performance shows that export diversification has a significant positive impact on exports.

The country´s export is not merely undiversified, it can also one of the least sophisticated in the region. Export Sophistication (EXPY) index measures export sophistication and is calculated as the weighted average of the level of sophistication of products exported. Estimating the level of technological sophistication in a country's export portfolio gives an indication of that country's economic development. The metal industry used to be the biggest exporting industry in the country (with a share of 25% in total country's export in 1995) but it has faced a lot of problems in recent years but it still retains comparative advantages and is characterised as medium diversified industry (55 products were exported with comparative advantages in 2014). The analysis of industrial complexity demonstrate that the metal industry has a capacity for further product diversification by building new capabilities for production of more complex products.

An analysis of Eurostat data indicates that Manufactured goods are the main type of goods traded with the EU: in 2016, they made up 83% of all EU exports. Three categories of manufactured goods are important, namely Chemicals, Machinery and vehicles and Other manufactured goods with shares of 18%, 42% and 23% respectively. Regarding EU imports, the share of manufactured goods was somewhat lower than for exports (69%). The shares for the categories Machinery and vehicles (32%) and Chemicals (11%) were lower than in exports, while the share for Other manufactured goods (26%) was a little higher than in exports. Machinery and vehicles is the most important individual product group in

international trade with the EU, accounting for 43% of total EU exports and 32% of total EU imports in 2016. The main three categories of imported products are Electrical machinery (EUR 215 billion), Telecommunications equipment (EUR 193 billion) and Road vehicles (EUR 151 billion).

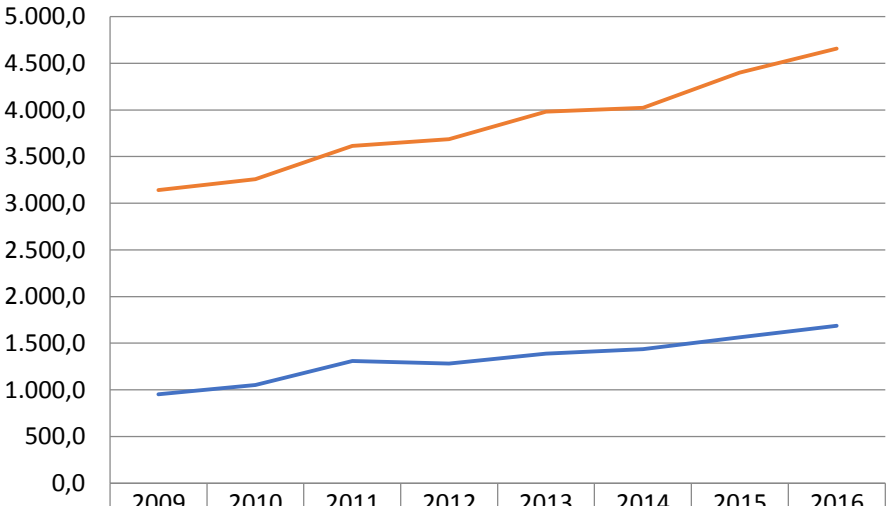
According to the final data of the State Statistical Office (External trade by enterprise characteristics, 2015), more than 89% of the total external trade in 2015 was carried out by enterprises engaged in both trade flows. The external trade surplus was generated mainly by industry enterprises belonging to the, while the deficit was mainly from the trade sector. Micro enterprises dominated the structure of external trade by number of enterprises (52.7%), accounting for 40.5% of the value of external trade in the Trade sector. Large enterprises, despite their insignificant participation in the structure by number of enterprises (3.0%), generated 74.2% of the value of external trade in the Industry sector. Moreover, about half of the total export and import value was concentrated on the top 100 enterprises, however, more than 50.0% of the external trade value was concentrated in the top 10 enterprises. The highest volume of export was registered in the Skopje Region, 53.1%, and the enterprises from this region also had the highest share in imports at 68.6%. These findings reinforce the urgent need for policy initiatives designed to broadening the export base.

The same analysis shows that the structure of exports is dominated (71.3%) by enterprises exporting their goods on the EU market and the Industry sector had the highest share of the number of enterprises (44.4%) and generated value (90.1%). The EU stands out as the most attractive market on the import side as well. In the value structure, enterprises from the Industry sector importing from the EU market had the highest share at 54.6%. These findings indicate that the policy emphasis should be on the EU market, as well as the neighbouring countries.

3.4.6 Manufacturing Foreign Direct Investment (FDI)

The Macedonian economy has benefited from Foreign Direct Investment (FDI) and has become increasingly recognised as a location for manufacturing, especially automotive parts and apparel manufacturing. It also has had strong export performance. This provides a sound basis for building on the manufacturing foundation. This is sorely needed, not least because the manufacturing sector still only accounts for 5% of the enterprises in the country (WB, 2016, Strengthening Competitiveness, Foreign Investment and Exports in Macedonia). The Diagram below shows that the overall levels of FDI since 2009 have recovered from the effects of the economic crisis and is on an upward trend. The manufacturing element of FDI represents roughly one-third of the overall FDI and is also experiencing a growth trend.

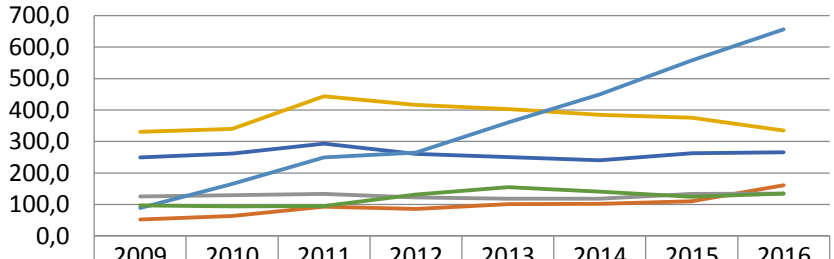
Diagram 10: FDI in the manufacturing sector compared to total FDI in Republic of Macedonia (2009-2016) in Mill Euro



	2009	2010	2011	2012	2013	2014	2015	2016
MANUFACTURING	953,4	1.053,0	1.308,8	1.281,5	1.388,9	1.435,8	1.563,7	1.685,6
TOTAL	3.141,4	3.256,0	3.615,1	3.685,5	3.980,0	4.023,6	4.400,1	4.657,3

Within the overall manufacturing sector, while most sub-sectors have experienced modest growth, the vehicle and other transport sub-sector has experienced rapid growth for almost a decade.

Diagram 11: FDI in specific manufacturing branches in Republic of Macedonia (2009-2016 in MIl Euro)



	2009	2010	2011	2012	2013	2014	2015	2016
Food products, beverages and tabaco products	249,7	261,6	293,0	261,1	250,3	240,4	263,0	265,5
Textiles & wood activities	52,2	63,6	93,0	85,9	101,1	101,6	109,8	160,5
Petroleum, chemicals, pharmaceutical products, rubber & plastic products	125,5	129,3	134,1	122,6	118,5	118,0	133,2	134,7
Metal & machinery products	331,0	339,5	444,0	416,3	403,0	385,0	375,3	334,8
Vehicles & other transport equipment	88,4	165,1	249,8	264,5	360,7	449,9	557,6	655,9
Total of other manufaturing	97,3	93,9	95,0	131,1	155,3	140,9	124,9	134,1

Changes in the export structure over time can also correspond with the level of FDI. This connection is evident from Table A5, especially in the Metal sector, followed by Textiles and Mining. During 2009-2015, foreign capital was mainly invested in the Food industry and Motor vehicles, trailers and semitrailers, where it could be expected to contribute to greater

export diversification but until 2015, the products from these sub-sectors were not the most common in export. The data from the period 2009-2015 cannot confirm definitively the connection of FDI and the export capacity of the economy.

Examining the FDI inflows during 2006-2008, only two industrial sub-sectors show a strong connection with export performance, namely the Metal and Mining sectors. Foreign investments in Refined petroleum products were accumulated in the years preceding 2008 and significantly contributed to export until 2012, resulting in a high average value in the ten-year period.

The most important determinant of export is foreign demand, combined with the scope of the country to satisfy it with products that meet the required international standards. Foreign demand is also a relevant input for consideration regarding sector specialisation, considering existing resources and capacities of the country to satisfy such demand. In this respect, an additional component that needs to be analysed is the demand from the most important foreign markets, which in the case of Macedonia is the EU market.

It is widely accepted that FDI induces economic growth and higher export by increasing employment, productivity and technological progress, particularly in developing countries, but the relationship between FDI, export and economic growth is not clear. Studies on the long-term relationships between these variables deliver contradictory results but generally, no significant relation has been observed with the trend from export to FDI and from FDI to GDP.

Furthermore, Macedonia's FDI is based on investment incentives and creation of Technological Industrial Development Zones (TIDZ), as well as branding / promotion as well as efforts to improve the business environment. The government has granted EUR 225 million in investment incentives to 25 foreign investors employing a total of 20,000 workers (2016). While the benefits of FDI are significant in terms of job creation, integration into regional and global value chains, and increased export sophistication, there is evidence that FDI in Macedonia has generated only limited upstream linkages with domestic firms and created "enclaves" of highly productive and integrated firms within the TIDZs. For example, purchases by international investors from domestic firms totalled EUR 48 million (end-2016) or just 1% of the annual exports. Many foreign investors have chosen to locate relatively low-value, labour-intensive activities and some activities have a narrow supply base and offer limited opportunities for increased linkages with domestic firms, such as assembly of auto parts from imported components (World Bank, 2018, Seizing potential for a brighter future: Systematic Country Diagnostic Concept Note).

The above suggests a need for strengthening the links between the TIDZs and the domestic economy. Furthermore, a transparent investment strategy focused on levelling the playing field for all firms could be more effective in attracting FDI and increasing domestic investment. Tax incentives are generally not the biggest factor for investors in making location decisions; rather, investors often select Macedonia due to its low-cost environment and its proximity to EU markets. Incentives are only one factor of many, including labour costs, operating costs, trade and transportation costs, and the perceived quality of the rule of law. In addition to national treatment that does not distinguish national from foreign investors, there is evidence that government aid to firms needs to be made more transparent (World Bank, 2018).

3.4.7 Manufacturing: Macedonia in International Comparison

The United Nations Industrial Development Organization (UNIDO) publishes the Competitiveness Industrial Performance index (CIP) to measure countries' industrial

development as per Box below. Table A6 illustrates how Macedonia compares internationally.

Box 7: UNIDO´s Competitiveness Industrial Performance index (CIP)

The CIP comprises six variables representing three different dimensions.

The first dimension describes the *capacity of a country to produce and export* and has two variables:

- Manufacturing value added per capita (MVA per capita), which considers the added value;
- Manufacturing export per capita (MX per capita), which gives information on the export of manufactured goods.

The second dimension refers to *technology* and has two variables:

- Share of manufacturing value added in GDP, which gives information on the capacity of a country to transform goods;
- Share of Medium and High-tech value added in total manufacturing value added, which gives information on the technological advancement in a country´s manufacturing.

The third dimension looks at the *impact of the countries in total world manufacturing* and has two variables:

- Share of manufactured exports in total merchandised exports, which gives information on the participation of manufacturing products in total export;
- Share of Medium and High-tech exports in total merchandised exports, which gives information on the complexity of exported products.

Manufacturing value added (MVA) per capita provides an insight into an economy's industrialisation potential, since manufacturing not only produces essential commodities for domestic consumption and export but also provides new technologies for other sectors of the economy. Based on the UNIDO Development Report (2016), in 2013, the dominant global manufacturing industries were Food and beverages (12,0%), chemicals and chemical products (11,7%) and Machinery and equipment (8,5%). Between 2000 and 2013, eight manufacturing sectors registered an increase in their MVA share worldwide, from a combined 39,7% to 46,6%. Significant increases were recorded in the manufacture of Radio, television and communication equipment; Basic metals, Chemicals and chemical products and Motor vehicles, trailers and semi-trailers. Decreases were observed in 14 manufacturing sectors from a combined 60,3% in 2000 to 53,4% in 2013, including traditional industries such as Textiles, Wearing apparel, Fur and Wood products and paper and Printing. The manufacture of fabricated metal products and machinery and equipment also witnessed decreases in the share of the manufacturing structure. This may have potential long-term policy implications.

Manufactured exports (MX) per capita capture the ability of a country to produce goods competitively and to keep pace with technological change. Data on manufactured exports indicate international efficiency, other things being equal, and reveal structural trends. But data for large economies are biased by large internal demand and incentives towards domestic markets. The country´s MVA per capita slowly increased during 2005-2014; at the end of 2014, only Bosnia and Herzegovina and Moldova had lower MVA per capita. A more positive situation is illustrated by Manufacturing export per capita, which significantly improved over time, which means that the country´s position is between middle-income countries and better than in Serbia, Turkey or Russia.

The share of medium and high-tech industries in a country's MVA captures the technological complexity of manufacturing. Economic development generally entails a structural transition from resource-based and low-tech activities to medium- and high-tech activities. The more complex the production structures of a country become, the higher the opportunities for learning and technological innovation at sectoral and inter-sectoral levels. Medium- and high-tech manufacturers add greater value than low-tech manufacturers and contribute considerably to MVA.

The change in the manufacturing structure is most evident in the shift of industry towards more technologically complex products. The share of medium- and high-tech industries in MVA is not only low, it is the lowest compared with the levels in other middle-income countries, such as Ukraine. Also, the level of this indicator over the ten-year period indicates that the technological complexity of Macedonian products has not significantly improved. Medium and high-tech manufactured exports´ share in total manufactured exports shows much better indicators which imply that export structure is composed of more sophisticated products comparing with other middle-income countries in Europe, leading the country to the second position with a share of 55% in 2014, after Romania (56%).

Based on these indicators, two addition composite indicators are worth examining:

- Industrial Exports Quality: the average of the following two sub-indicators: [1]
    - Medium- and high-tech manufactured exports´ share in total manufactured exports (MHXsh), capturing weight of technological complexity of export;
    - Manufactured exports´ share in total exports (MXsh), capturing manufacturing's weight in export activity.
- Industrialisation intensity (INDint): the average of the following two sub-indicators:[2]
    - Medium- and high-tech Manufacturing Value Added share in total manufacturing, capturing technological complexity of manufacturing;
    - Share of MVA in GDP (MVAsh) capturing manufacturing's weight in the economy.

Contrary to the previous index, and despite improvements during the observed period, the industrialisation intensity index of the country (0,25 in 2014) was between the lowest in the group of middle-income countries and slightly higher than in case of Moldova. Given its focus on industrial competitiveness and structural economic variables, the CIP provides country rankings that tend to remain relatively stable over short periods of time. The reason for this is that the processes of technological learning are cumulative and take time to evolve. Consequently, the CIP value of the country has only improved by a mere 0,01 over the ten-year period. Despite this small improvement, the overall CIP rank for the country dropped by 9 positions (from 81st to 92nd) during the same period.

Manufacturing is still the most important recipient of technological progress in economies. Accordingly, during the same period, the Medium- and high-tech manufactured export´s share in total manufactured exports of the country improved from 20% to 55%.

Comparing with other European countries belonging to the middle-income group of European countries, the country has a better CIP position than only two others, namely Moldova and Bosnia and Herzegovina, but significantly lower than countries such as Turkey. Due to its small population, the manufactured export per capita is significantly higher than in many other European countries, but this not the case regarding manufactured value-added per capita. The country is second (after Romania) among the middle-income European countries with the highest medium- and high-tech manufactured exports share in total manufactured exports (55%). Consequently, the share of medium and high-tech activities in manufacturing export index is 0,59. Also, it is the country with the highest manufactured export share in total exports (92%), as well as having a share of manufactured exports in total exports index of 0,94 among the selected countries.

[1]The export quality indicator tends to capture what countries export, but not how and to what extent they contribute to the production of the exported goods. The lack of an adequately disaggregated technological classification of exported goods aggravates this problem.

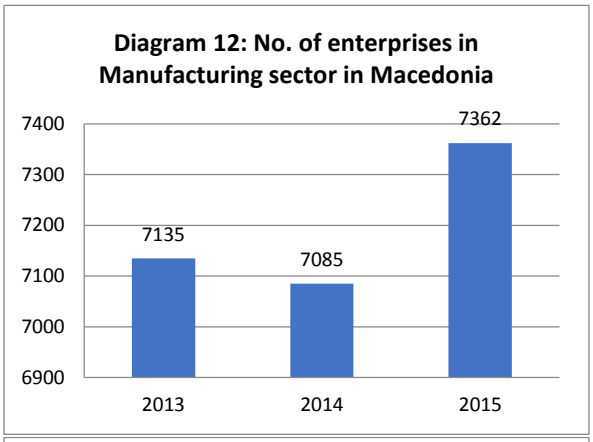
[2]The creation of this composite indicator responds to the need to capture the contribution of the manufacturing sector to total production as well as the technological complexity of manufacturing industries. However, this composite indicator does not capture the sometimes very significant technological differences within each technological category.

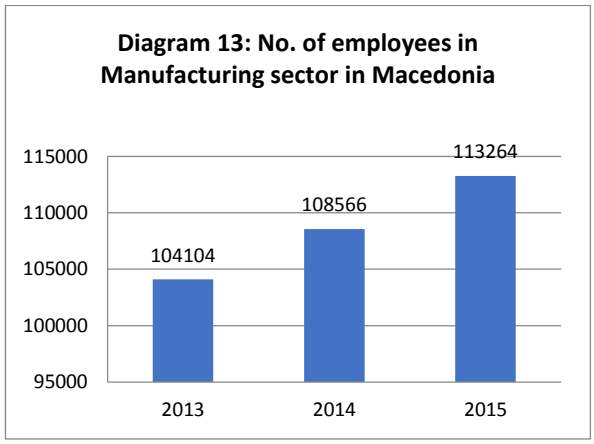
Compared with the other counties in Table A6, it has the highest Industrial export quality index (0,77) but the lowest share of MVA in GDP index (0,32). All these indicators imply that the country has a much better manufacturing export performance than value-added performance. In addition, in cases where a large discrepancy between a country's industrial capacity and its manufactured export capacity in favour of the latter is diagnosed, an exploration of how more value-added can be captured domestically can be warranted. In such cases where the indicators presented above show the capacity to export greatly exceeding the capacity to produce, this might signal low local value addition in productive activities, for example because the country's industry is mainly engaged in assembly activities. From a policy perspective, this may require industrial policy intervention which boosts industrialisation and production of medium- and high-tech manufactured goods which increase the share of sophisticated, value adding products.

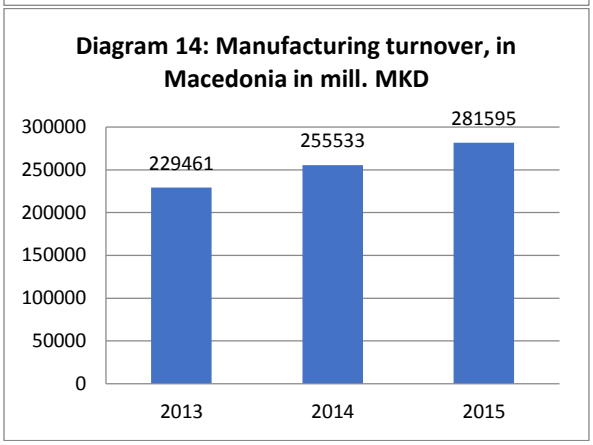
3.5 Enterprises and the Manufacturing Sector

It is important to also examine the manufacturing enterprise structure in the country.

Table A9 of the Annex shows the recent trends in terms of enterprises, employees and turnover. A growing tendency is recorded in manufacturing industry in all observed indicators with exception of number of enterprises, which declined between 2013 and 2014. Generally, the number of manufacturing enterprises, employees and turnover is growing, as illustrated in the Diagrams below.







However, the next Diagram illustrates the point that the manufacturing enterprises are skewed in size. Approximately 80% are micro firms, 13% are small, 4% medium and less than 1% large. This suggests that policy emphasis should be particularly directed at the small

and medium category, consistent with the approach of targeting limited state funds and capacities.

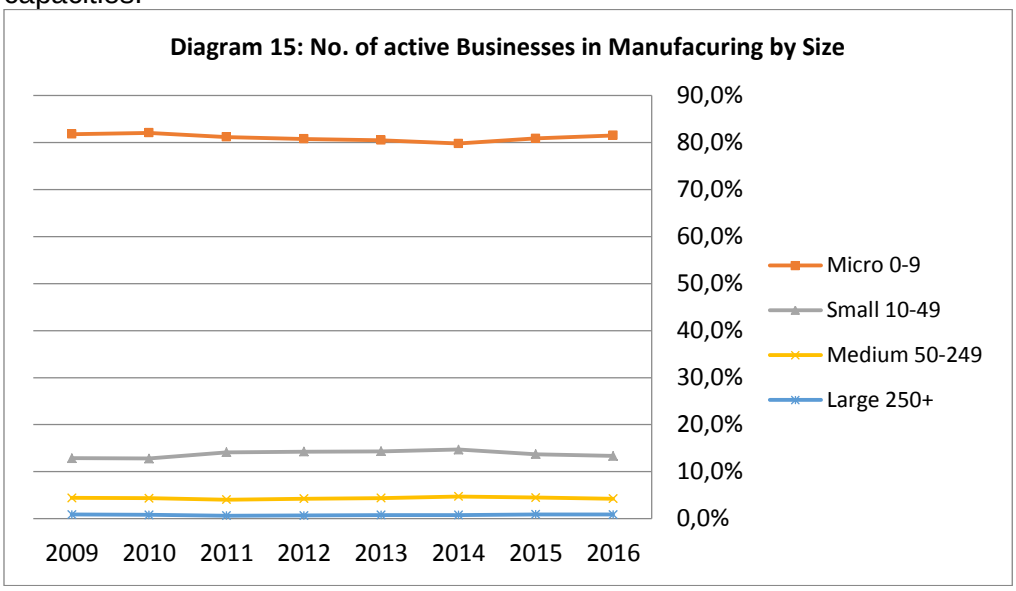


Table A9 of the Annex shows that the manufacture of food products, together with Manufacture of fabricated metal products and Manufacture of wearing apparel are sub-sectors with significant number of employees, enterprises and turnover in 2015. The Food industry has the highest number of enterprises and turnover in 2015, while the wearing apparel is the sub-sector with highest number of employees.

Table A10 of the Annex illustrates the situation in terms of external trade. The manufacture of Beverages and Tobacco were only two sectors with higher number of enterprises engaged in export than import in 2014-2015. However, Manufacture of other non-metallic mineral products, Manufacture of motor vehicles, trailers and semi-trailers, and Manufacture of wearing apparel are sector that saw the biggest export in same period and export higher than import.

The final table (A11 of the Annex) focuses on import and export volumes. It should be noted that Wearing apparel, sector of basic metals, industry of machinery and equipment and chemical products are sub-sectors of manufacturing industry with significant export during observed period. The exception is the sector of basic metal which import more than it exports.

3.6 SWOT Analysis: Manufacturing Sector

Based on preceding analysis the next Table (overleaf) provides a synthesized review of the Strengths, Weaknesses, Opportunities and Threats that are currently evident in Macedonia in relation to industry generally and manufacturing specifically.

To conclude, the analysis presented in this chapter has focused on the manufacturing sector as the principal orientation of the future industrial strategy. It has reviewed the global manufacturing trends and issues, as well as the role expected to be played by KETs. It has presented the regional Western Balkans perspective in relation to industrial issues and presented the threat of continuing deindustrialisation, while recognising the positive trends that the country has experienced in terms of FDI in the manufacturing sector. The chapter analysed the available national statistics such as gross output, export, FDI, value added, productivity, etc. with a manufacturing sub-sectoral analysis, concluding with positioning the

country vis-a-vis international comparators and the manufacturing enterprise structure. Finally, it presented a SWOT analysis based on the preceding analysis. This paves the way for the main chapter, focusing on the vision, strategic objective and targets, including the measures that will be implemented in the future.

Table 2: Manufacturing Sector: Strengths, Weaknesses, Opportunities and Threats

Strengths	Weaknesses
• Tradition and knowledge in the field of manufacturing • Strong tradition in food and beverage, textiles, chemicals and metals sectors • Flexibility of production, tailor made and small batches • Products and services good quality to price propositions • Improving business environment (WB Doing Business) • Business friendly corporate tax regime • Stabilisation and Association Agreement with EU and Candidate Country for EU accessing status • Member of World Trade Organisation • Central European Free Trade Agreement (CEFTA) agreement and other Free Trade Agreements • Favourable geographical position/proximity to EU • Good road transport connectivity (E75) • Decade of intensive country marketing for FDI • Eight active TIDZs and more in the pipeline • Good standard of education and technical literacy • Availability of EU/donor financial support for industry • Attractive and well-funded state aid package	• Price currently the primary driver of competitiveness • Import dependence for raw materials & volatile prices • Very high dependence on 7 export products for (67%) • High share of primary and low technology products • Obsolete technologies for manufacturing processes • Relatively low expenditure in public and private R&D • Underdeveloped R&D and innovation capabilities • Insufficient linkages between industry / FDI and SMEs/other sectors of economy • Insufficient linkages between SMEs/industrial sectors and science and research institutions • High number of SMEs with low absorptive capacity for innovation adoption and technology transfer • Focus of innovation is on broadening products and services rather than increasing quality or market share • Limited cluster and value chain development • Low level of engagement in green manufacturing • Insufficiently developed road and railway infrastructure • Few specialist financial instruments / venture capital • Relatively poor education system
Opportunities	**Threats**
• Country recognition and relatively high inflow of FDI • International positioning in manufacturing sectors • Growing and well-established network of TIDZs • Network of Economic Advisers in many countries • EU integration and use of pre-accession instruments for industrial development (e.g. Horizon 2020, IPA) • New industry-oriented programmes and incentives • Development of medium and high technology sub-sectors / products / services with higher value added • Scope to support export / internationalisation • Scope to focus on products with higher value added • Scope to develop Public Private Partnerships • Scope for better use of Intellectual Property Rights • Scope to introduce new production technologies • Scope to develop financial opportunities for access to capital for medium and high technology sectors • Scope for engagement in green industry/manufacturing • Scope for value chain/cluster/accelerator development • Increased institutional capacity to support R&D, innovation and technology transfer • Increasing application of EU norms and standards • Extensive diaspora, many with links to country • Climatic and soil advantages	• Relatively unstable political environment • Slow EU/NATO accession process • Slow structural reform process • Slow alignment of education system to labour market • Low administrative capacity to absorb EU funds • Low level of public and private investment in R&D, innovation and manufacturing • Disconnect between education system / TVET system and labour market needs • On-going migration of qualified labour force • Low coordination of policies, strategies, funds, etc. • Frequent changes in legislation and tax system • Neighbouring countries with lower labour cost threaten textiles and other manufacturing sub-sectors • Lack of support to SMEs/industry/export for a decade

4. Industrial Strategy

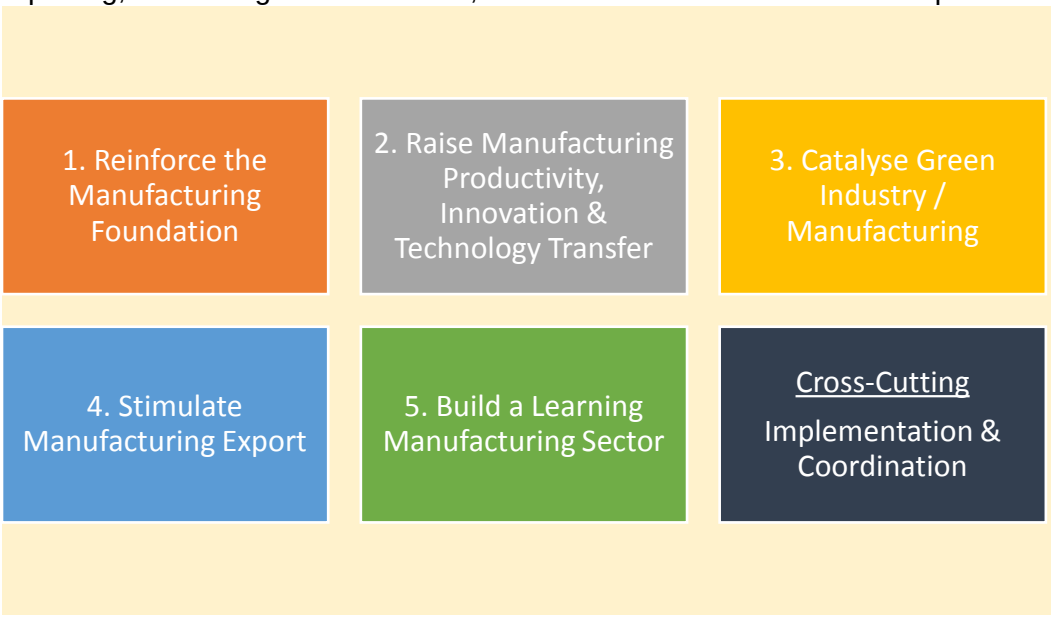
The preceding analysis set out the situation in terms of industrial policy and the reasons why the focus of the strategy is on supporting the manufacturing sector. There are strong policy reasons for doing so and the preceding chapter concluded with a SWOT analysis based on the manufacturing sector. This chapter takes the strategy to the next level. It sets out the overall vision, the targets to be achieved in connection with the vision, the main strategic objectives, as well as a cross-cutting strategic objective. The focus is on setting out the measures that will be focused on during the implementation period, as well as the rationale for focus on those measures. The lessons of the previous Industrial Policy include the fact that the country has limited state funding to support the strategy, there are limited institutional and other capacities and thus that the aim should be to achieve a focused number of achievable measures within each of the strategic objectives. In all, the strategy identifies targets, five strategic objectives and 38 measures, as well as a cross-cutting strategic objective with a further 6 measures. All the measures to be implemented during the period 2008-2020 are set out in the related Action Plan presented in Annex B and includes the deadlines, responsibilities, Key Performance Indicators (KPIs), etc. The final Chapter of the strategy sets out the implementation arrangements, such as coordination, dialogue, funding, monitoring, reporting and evaluation tools.

4.1 Vision

"To promote **industrialisation** by stimulating the growth and development of the **manufacturing** sector in order to boost **productivity**, create **good jobs**, **raise incomes** and strengthen **human capital,** while addressing the challenges of the **circular economy**."

4.2 Strategic Objectives

The Vision is to be achieved through a focus on the five Strategic Objectives, including a cross-cutting objective covering horizontal issues such as coordination, consultation, reporting, monitoring and evaluation, which are essential for effective implementation.



4.3 Targets

Targets form the basis for the future monitoring and evaluation (M&E) of the impact of the strategy. For targets to be meaningful, they must be aligned to the vision and the strategic objectives. They should ideally be "SMART" (namely, Specific, Measurable, Actionable, Realistic and Time-based). The Specificity relates to the interrelationship between the high-level vision and the strategic objectives, and the measures/activities that are required to achieve them. Measurable and Actionable relate to specific metrics since the desired outcome must have a set of defined measurements. The metrics aim to assess improvement in industry and manufacturing and are quantifiable in terms of the baseline situation at the starting and end points of the strategy. They must also be realistic; although governments typically wish to set a challenge, this must be counterbalanced by what is possible to achieve, otherwise the implementers may disengage. Finally, every target needs a time-based deadline to keep implementation focused.

The attainment or otherwise of the strategy´s vision is to be assessed against both the overall and specific targets set out below.

Overall targets:

Indicator	Baseline	Target for 2027
1. Increased manufacturing as % of GDP	12.2% in 2016	14%
2. Increased industrial competitiveness GCI[3]	Rank 56; Scale 4,39; in 2015	Rank 50
3. Global Competitiveness Index[4]	Rank 81/144 Score 0,026; in 2016	Rank 73
4. Increase manufacturing output value	4.452 Mil Euro in 2015	10.000 Mil Euro
5. Increase export of manufacturing products	4. 472.Mil EURO export in 2017	8.000 Mil Euro
6. Increase manufacturing value added (MVA)	1.067 Mill Euro in 2015	2.000 Mil Euro new

Strategic objective targets:

1. Reinforce the Manufacturing Foundation:

Indicator	Baseline	Target for 2027
1.1 Increase the number of companies in manufacturing sector	7. 967 in 2016	9.000
1.2 Increase the number of employees in manufacturing sector	137.615 in 2016	155.000
1.3 Increase the turnover of manufacturing sector	4.738 Mil Euro in 2016	8.000 Mil Euro
1.4 Increase % of manufacturing GDP in Total GDP	12.2% in 2016	14%
1.5 FDI in manufacturing[5]	1.685,6 Mill Euro in 2016	3.000 Mil Euro

2. Raise Manufacturing Productivity, Innovation and Technology Transfer

Indicator	Baseline	Target for 2027
2.1 Increased manufacturing productivity per employee	8.620 Euro in 2016	12.000 Euro
2.2 Global innovation index[6]	Value 35.4; Rank 61/127	Rank 55
2.3 European innovation Scoreboard[7]		

[3] The Global Competitiveness Index 2016–2017 Rankings
[4] http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf
5 Stock of Direct investments in Republic of Macedonia - by activity, December 31, 2016 - by NBRM
6 https://www.globalinnovationindex.org/gii-2017-report#
[7] https://www.rvo.nl/sites/default/files/2017/06/European_Innovation_Scoreboard_2017.pdf

Summary Innovation Index - MK relative to EU	44,2 in 2016	Rank 60
2.4 Firm level technology absorption WEF[8]	Value 4.2; rank 105/139 in 2016	Rank 95
2.5 Increased medium and high tech MVA in total VA[9]	0.15 in 2015	0.25

3. Catalyse Green Industry and Green Manufacturing

	Baseline	

Indicator	Baseline	Target for 2027
3.1 Green regulation	No EU compliant green regulation	EU fully compliant green regulation
3.2 Industrial pollution monitoring system	No pollution monitoring system	Established and operational industrial pollution monitoring system
3.3 register of companies with implemented ISO systems	No recoding of implemented ISO systems	Established and operational register of companies with implemented eco systems as 50501, 14001, 14064, 14069, 14044 and other
3.4 Number of companies with Integrated Pollution and Control Permits	No companies with IPCP	Integrated Pollution and Control Permits obtained by all large and medium size manufacturing companies in the country
3.5 Green industrial zones Light manufacturing zones LMZ	No green industrial zones in 2018 3 Light manufacturing zones in 2018	GIZ - 5 LMZ - 10

4. Stimulate Manufacturing Export

Indicator	Baseline	Target for 2027
4.1 Increased total manufacturing export value	4.472 Mil Euro in 2017	8.000 Mil Euro
4.2 Increased % of manufacturing export in total export	89.3% in 2017	92%
4.3 Medium and High-tech manufactured	0.59 in Y 2015	0.65
4.4 Improved structure of exports according to broad economic categories[10]	intermediate goods 58,50% consumption goods 26,80%	intermediate goods 30% consumption goods 50%

5. Build a Learning Manufacturing Sector

Indicator	Baseline	Target for 2027
5.1 Average gross salary by employ in manufacturing sector	489 Euro in 2017/Dec	750 Euro
5.2 Gross domestic expenditure on R&D (GERD)[11] as a percentage of GDP	0.4% in 2015	3%
5.3 Business Expenditure on R&D (BERD) expenditure	9.8 Mil Euro in 2016	25 Mil Euro

8 http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf - page 131
9 http://stat.unido.org/database/CIP%202017
10 http://www.stat.gov.mk/Publikacii/PDFSG2016/13-NadvorTrg-ForeignTrade.pdf
11 http://uis.unesco.org/en/country/mk?theme=science-technology-and-innovation

As previously discussed in Section 2.2, there are various strategic documents covering industrial policy in one form or another (e.g. competitiveness, innovation, SMEs, etc.) but none focuses on the manufacturing sector *per se*, other than this document. Furthermore, for this strategy to achieve greater success than previously, it must be realistic to implement within the current institutional and other capacities, as well as the funding available. Finally, the strategy did not start from a blank sheet of paper; the measures presented below are guided by various factors, including the government´s overall policy framework (especially the Economic Growth Plan), the existing strategies (e.g. Competitiveness, Innovation, etc.), the existing and planned MoE activities (Competitiveness Programme covering industry, SMEs and clusters), the EU funding programmes, etc. The emphasis is thus not simply on establishing a new policy basis and set of measures to support the manufacturing sector but to also "nudge" existing programmes and other activities to better serve the development and growth of what has been identified as the most crucial sector in the economy in terms of its future economic prosperity, namely manufacturing.

Strategic Objective 1 – Reinforce the Manufacturing Foundation

There is already a good foundation for supporting manufacturing in the country and it has experienced successes in attracting manufacturing FDI and developing its industrial zones. However, there is a need to reinforce the manufacturing foundation that exists, while also developing new orientations, such as value chain development. There are eight main levers by which the manufacturing sector can be further developed and supported in the next phase of implementation, namely: determining the manufacturing sub-sectors with greatest potential to target (smart specialisation), maximising the impact of the Economic Growth Plan through monitoring and evaluation, developing a more consistent focus on manufacturing through FDI promotion, stimulating both domestic and foreign direct investment, further developing the network of the Technological Industrial Development Zones (TIDZs), strengthening manufacturing clusters, establishing manufacturing value chains and creating the basis for venture capital / mezzanine funding. There are related tools that connect with these, such as business incubators, accelerators, etc. which are being developed through other initiatives, such as the SME and Innovation strategies.

Measure 1.1: *Identify and target support to priority* ***manufacturing sub-sectors****, through smart specialisation.*
Rationale: this strategy is focused on the manufacturing sector. However, over time, it is important to develop more discrete targeting of activities to focus on the higher value-adding sectors and activities to allow the country to build on the unique capabilities and comparative advantages that exist in the country. The presence of these sectors and activities is what can secure productivity growth and build external competitiveness, recognising that while these activities may be in the manufacturing sector, they may still entail service characteristics such as ICT. The government is in the process of developing a national smart specialisation strategies. In this context, there is an urgent need to also identify the manufacturing sub-sectors that offer the greatest existing and emerging potential of generating niches, productivity gains, export potential, etc. This would enable the funds and capacities to be better targeted in the future, based on the principle of smart specialisation (see Section 2.1.1 above). This measure involves performing quantitative (surveys, national and internationals statistics) and qualitative (e.g. focus groups with relevant enterprises and business associations) analyses, as well as consultations with business stakeholders to identify manufacturing sub-sectors to be promoted, as well as guide future policy activities, including deployment of support and resources at the sub-sector level.

Measure 1.2: *Maximise the capacity of the* ***Economic Growth Plan (EGP)*** *to be effective.*
Rationale: as discussed in detail in Section 2.3, the new Economic Growth Plan (EGP) will have an annual budget of EUR 30 mio. (EUR 150 mio. over for five years) and represents the overarching framework for the future competitiveness policy, with a focus on industrial /

manufacturing / production. The programme comprises two main types of initiatives. Firstly, programmes for all enterprises, as follows:

- Support to create new jobs (labour market initiative covered in Employment Strategy);
- Establishing and enhancing cooperation with Macedonian suppliers (Measure 2.4);
- Establishing technological development and research departments (Measure 5.2);
- Investment projects of significant economic interest for Macedonia (Measure 1.4);
- Increasing capital investments and incomes (Measure 1.4);
- Acquisition of companies facing difficulties (Measure 1.4);
- Companies increasing their competitiveness in new markets (Measure 4.4);
- Winning new markets and increasing sales (Measure 4.3);

Secondly, programmes for SMEs, regardless of sector, but with a technological orientation, which in practice means that most investment will be directed at the manufacturing sector:

- Fast growing SMEs ("gazelles") (Measure 2.3);
- Additional financial support for micro firms (Measure 5.7);
- Improving innovation in SMEs (Measure 2.2);
- Professional upgrade and practice for newly-employed young people (Measure 5.3);
- Preparing the legal bases for development of venture capital (Measure 1.8).

As part of the EPG, the Law on Investment Support has been approved. The individual initiatives contained in the EPG are fully embedded and integrated into the various strategic objectives of this document (see above for reference to relevant measure). Given the centrality of the EPG and the amount of state and other funding involved, it will be essential to monitor and evaluate implementation regularly to secure the maximum effectiveness and impact possible.

Measure 1.3: *Focus **Foreign Direct Investment (FDI)** policy on the manufacturing sector.*
Rationale: during the last decade, the country has been systematically promoted through significant effort designed to attract FDI. The preceding analysis shows that the Republic of Macedonia has been rewarded with relatively high levels of FDI inflows, including in the manufacturing sector, much of which has flowed to the Technological and Industrial Development Zones (TIDZs – see Measure 1.5 below), as well as brownfield locations, including the automotive, textile and garments sub-sectors among others. The main weakness in FDI efforts lay in the fact that there was a variety of FDI players, a lack of effective coordination and a lack of explicit manufacturing sector focus, though in reality much of the effort was directed towards this sector as a whole. This measure is designed to ensure that the future FDI efforts are refocused explicitly on the manufacturing sector, including the sub-sectors to be identified by Measure 1.1 above (national / regional smart specialisation strategies), especially for the greenfield TIDZ sites, in order to target and coordinate the FDI activities more precisely, so as to address the vision of raising the level of manufacturing contribution to the economy, with a focus on higher value adding, R&D and green investments that add to productivity and positive spill-overs in the economy. The increased manufacturing targeting will be combined with greater transparency and effectiveness in the processing and coordination of state aid for FDI through the creation of a single management body.

Measure 1.4: *Stimulate **investment** (EGP measures 1.4, 1.5 and 1.6).*
Rationale: Whereas in the past the country focused strongly on foreign direct investment (FDI), the new Economic Growth Plan policy framework attempts to stimulate investment in general through three measures:

- Support for Investment Projects of Significant Economic Interest: firms that invest in projects of significant economic interest will be exempted, as per the Law on State Aid, from income tax on wages (10 years); income tax (10 years); grant up to 10% of the

planned investment up to 61,500,000 MKD (1,000,000 EUR) (3 years); grant per employee with wages of at least 18,000 MKD per position created (4 years);

- Support to Increase Capital Investments and Incomes: financial support for firms which generate initial or additional investments will be eligible for 10% of the investment in new machinery, equipment or premises / land necessary for the activity up to 61,500,000 MKD (1,000,000 EUR);
- Support for Acquisition of Companies facing Difficulties: this measure supports firms that invests in the assets of another company after bankruptcy/liquidation procedures, following renewal of the manufacturing process. Investors will receive a rebate of 10% of the value of the investment in machinery and liabilities connected with the bankruptcy or liquidation procedure up to 61,500,000 MKD (1,000,000 EUR).

It is expected that the measures highlighted above will lead to national treatment which does not distinguish between domestic/foreign investors, greater transparency in the award and processing of state support and ultimately lead to higher levels of investment in the economy.

Measure 1.5: *Develop the* ***Technological and Industrial Development Zones (TIDZs)*** *with a manufacturing focus.*
Rationale: the previously discussed successes in attracting FDI in the manufacturing (as well as other sectors) are to a large extent directly connected with the establishment of the network of TIDZs and the incentives available within them. A consistent part of the Government's strategy for over a decade has been (in addition to attracting FDI - see above) the establishment of Technological Industrial Development Zones (TIDZs) in Skopje (2 zones with 19 tenants), Stip (3 tenants) and Tetovo (1 tenant). The network has been extended to other locations such as Strumica (1 tenant), Prilep (3 tenants), Struga (1 tenant), Kicevo (1 tenant), as well as two industrial zones (one in Kosel - 1 tenant - and another being prepared in Kratovo). Other TIDZs are also in the pipeline such as Radovis, Delcevo, Vinica, Berovo, Rankovce and Gevgelija, thought the priority is to focus on fully utilising the first eight TIDZs (a third is under preparation in Skopje). Investors in the TIDZs benefit from tax holidays for up to 10 years for both profit tax and personal income tax for employees. Other incentives exist, such as VAT and customs duties exemptions, together with other incentives in relation to construction land utility tax and developed infrastructure. The Law on TIDZs requires the zones to facilitate economic activities focusing on manufacturing, R&D and IT (with the exclusion of some activities, such as weapons, non-high-tech apparel, agriculture, etc.). This measure supports the continuing expansion of the TIDZs and reinforces the attraction of manufacturers, including in existing strengths (e.g. automotive), as well as R&D and IT to increasingly focus on capital rather than labour intensive investment and the development of modern technologies and the application of green manufacturing technologies (see also Strategic Objective 3).

Measure 1.6: *Further development of* ***industrial clusters*** *with a focus on innovation and competitiveness.*
Rationale: the development of clusters has been a consistent policy objective for the best part of 20 years in the country and the MoE has a database of 30 clusters that it has / is currently supporting. However, a recent assessment of the clusters initiatives (L. Vodeb, 2017, Cluster Evaluation Report) concluded that relatively few clusters conform to the international definition or expectations. They are mostly performing as business associations, rather than focusing on innovation, competitiveness, R&D and other collaborative activities normally expected of clusters, though a few are actively engaged. Cluster development is a long-term process and each cluster has its specific development needs. The policy approach to support clusters is to develop an integrated programme for different types of clusters (immature, mature, in transitions, etc.), addressing their specific development needs. Consequently, this measure will re-design the existing cluster programme and to develop demonstration industrial/manufacturing clusters as a best practice of innovation clustering

through a “Pilot Integrated Cluster Programme for Immature Clusters” involving a mixture of capacity building, awareness raising, consultancy and grant funding designed to strengthen innovation and competitiveness. It will also support companies operating in sectors within the smart specialisation strategy (see Measure 1.1 above) to develop and implement new business models to enhance integration of SMEs in Global Value Chains.

Measure 1.7: *Support the establishment of **value chains** with a manufacturing focus and link firms to global value chains.*
Rationale: physical production is at the centre of a much wider manufacturing value chain, as illustrated in the Diagram 3 above. Therefore, manufacturers are using global, regional and national value chains to generate new and additional revenue, with production playing a central role in allowing other value creating activities to occur. However, other than a few of examples, such as in food processing, policy support for the analysis and development of value chains has been conspicuously absent, with almost all effort concentrating on cluster development (see 1.6 above). This measure will identify and support manufacturing value chain development with a close link with the existing TIDZs, since this offers an opportunity to link domestic firms to national, regional (Western Balkans and EU) and wider global value chains. This measure will complement others, such as Measure 2.4: Strengthen linkages between TIDZ firms and domestic manufacturers.

Measure 1.8: *Creating Conditions and Preparation of Legal Bases for Development of **Venture Capital** for manufacturing firms (EGP measure 3.5).*
Rationale: part of the process of reinforcing the foundation for manufacturing concerns the issue of obtaining venture capital to lubricate the wheels of investment in technological projects. Venture capital is currently notable primarily for its absence. This measure involves the Fund for Innovations and Technological Development (FITD) adopting a decision to establish a Fund of equity and mezzanine finance, as well as the Government adopting a decision to fund the investment. The legal basis (bye laws) for the fund for equity and mezzanine finance will need to be created. Once established, the fund for equity and mezzanine finance will support investment activities relating to the preparation and realisation of projects for technological development, taking into consideration the degree to which the applications shall contribute to developing new or significantly improved product, service and/or working processes. The measure will fund up to 25% of the value of the applicant’s own funds up to 30,000,000 MKD (487,800 EUR) per application.

Strategic Objective 2 – Raise Productivity, Innovation and Technology Transfer

The previous strategic objective aims to reorient policy and support on manufacturing in general, as well as particular sub-sectors. The second strategic objective focuses on the three key issues that are critical to enable to country to achieve its vision, namely raising productivity, innovation and technology transfer/absorption in the manufacturing sector. The five main levers by which the manufacturing sector will be supported are the establishment of various institutions focusing on technology transfer, such as the National Technology Transfer Office (NTTO) and the Science and Technology Park (STP), raising the levels of innovation among manufacturing SMEs, supporting fast growing enterprises (gazelles), addressing a long-standing policy gap, namely strengthening the link between the international firms located in the TIDZs and domestic manufacturing firms and beginning the process of identifying and supporting the most relevant manufacturing Key Enabling Technologies (KETs) and smart factories in the country.

Measure 2.1: *Strengthen the institutional base for **Technology Transfer / Extension / Absorption** in support of the manufacturing sector (various EGP Measures).*
Rationale: an increase in both business and technological sophistication of local suppliers, in addition to raising competitiveness, productivity and well-paid employment, will also help to facilitate backward linkages with FDI/TIDZs and stimulate exports. Technology transfer is the

process of converting scientific and technological state of the art advances (Intellectual Property) into marketable goods or services so involves a transfer between academia and industry of any activities aimed at transferring knowledge or technology that may help either the company or the academic institution to further pursue its activities. Technology / industrial extension is assistance to firms to improve competitiveness, especially among manufacturing SMEs. Extension services involve external assistance to firms to facilitate improvements in their use of technology and stimulate innovation to enhance competitiveness. A related concept concerns technological absorption, which is the acquisition, development, assimilation and utilisation of technological knowledge and capability by a firm. Technology transfer, extension and absorption rates in Macedonian firms need to be prioritised and manufacturing enterprises will be supported via several institution building initiatives:

- The Fund for Innovation and Technological Development (FITD) will continue to support technological extension and absorption among SMEs via implementation of the "Absorption of TT" (technology extension) initiative;
- The National Technology Transfer Office (NTTO) will be established either as a separate institution or as part of the FITD (to be determined). It will play a key role in the conversion of the results of research into competitive products and processes and will steer research towards industry needs. The NTTO will advise industry in Macedonia on technology and intellectual property (IP) licensing and technology import and will integrate the innovation activities of Macedonia with EU programmes, serving also as the focal point for international cooperation in technology transfer;
- Science and Technology Park (STP): will be established by bringing together various faculties in Skopje (Technology and Metallurgy, Electro Technical, IT and Mechanical) and enterprises to undertake R&D and TT. In the first phase it will focus on 2 sub-sectors (IT and agriculture or medicine). In the second phase this will be expanded to 3 others (possibly garments design, tourism, etc.). The feasibility work, including assessment of locations, selection of sub-sectors, equipment, human capital, etc. will be completed in 2018, including the management and business plans. The STP is expected to be established during 2019-2020;
- Technology Transfer Centres (TTC): consideration will be given to Technical Faculties to establish TTCs and equip them with the latest equipment in appropriate premises and with skilled personnel to support collaborative digitisation of industrial processes and other joint projects involving industry / SMEs to transfer knowledge and technology. It will have three main components: construction and/or refurbishment of premises purchase of equipment and capacity building.

Measure 2.2: ***Raise innovation levels*** *among enterprises (EGP measure 3.3)*
Rationale: the notion that innovation is essential for firms´ long-term survival and success is widely recognised. A survey of technology issues in firms (Technology Potential and Needs of Macedonian Companies, 2015) in sub-sectors having the greatest technological and innovation potential (i.e. agriculture, food processing, green energy including waste management, energy-saving construction materials, chemistry, pharmaceuticals, metallurgy, mechanical engineering, automotive industry, ICT, etc.) found that 38% had both product and service innovation and 66% had at least one of the two types of innovation. Nine percent of companies stated that they had patents, most being owned by large firms (17%), followed by medium (11%), micro (9%) and small (8%). This represents a sound basis for innovation policy to build upon. Specifically, in terms of innovative SMEs, support is needed in terms of the process of commercialisation of research and access to laboratories and research equipment. These are important areas in which the Fund Innovation and Technology Development (FITD) and the future NTTO will provide assistance, such as access to funding, providing expertise, as well as linking companies with relevant universities and research institutions, where the survey found that there is very little cooperation between firms and universities. The Economic Growth Plan will support the development and application of innovative solutions within companies, regardless of size, by covering up to 70% of the direct

costs up to 20,000,000 MKD (325,200 EUR) per applicant. The investment activities include: development and introducing new products or services, improvement of the existing products or services, new fashion collections, industrial design or redesigning the products, new packages and marketing plans (market analysis, competitors' analysis, product research, sales, etc.), improvement of the existing or introducing new manufacturing processes.

Measure 2.3: Support Fast Growing SMEs ("Gazelles") with technological development *(EGP measure 3.1).*
Rationale: through the EGP, financial support will also be provided to "Gazelles" for technological development of the companies, covering 30% of the direct costs of investment. This will be achieved through public calls to finance investments in, for example, European technical regulations regarding product safety; preparations for quality certificates; analysis, preparation, acquiring and protecting of industrial and intellectual ownership rights and implementing information systems. In addition, this measure will support various green initiatives including: improvement of the energy efficiency; consulting of protection of the environment and preparation and establishing waste management systems.

Measure 2.4: *Strengthen linkages between* ***foreign investors and domestic manufacturers*** *(EGP measure 1.2).*
Rationale: there is a need to systematically develop local manufacturing capacities to link with the increasing number of manufacturing Multi-National Corporations (MNCs), regardless of whether they are located within the TIDZs or not. Several FDI companies have established cooperation with universities/faculties and some firms are developing supply linkages with some domestic producers. However, further developments in terms of linkages with FDI companies are constrained by low firm-level productivity, skills, business sophistication, etc. Backward linkages with local companies remain limited, restraining employment gains, net export growth, know-how sharing, innovation, technology transfer and other spill-over effects from FDI. The pilot Supplier Development Programme (SDP) has been tested with 5 automotive firms and can be applied to a much larger group of manufacturing companies. Also, the Faculty of Mechanical Engineering is piloting a linkage project (15 firms, 5 supported in detail) with practical cooperation good practice examples. The aim of this measure is to further stimulate partnerships among foreign manufacturing companies operating in Macedonia and local manufacturing SMEs. This measure will allow companies to receive financial support for business cooperation with domestic suppliers, as measured based on the percentage of the procurement of production inputs from the suppliers in TIDZs. Such firms can receive financial support up to 1% of the value of the total procurements if they procure at least 15% of production inputs from suppliers registered in Macedonia up to 18,450,000 MKD (300,000 EUR) per applicant.

Measure 2.5: *Identify and support manufacturing* ***Key Emerging Technologies*** *(KETs) and* ***Smart Factories*** *(Industry 4.0 and Factory 4.0).*
Rationale: many countries are discussing two fundamentally important and connected issues: the 4th industrial revolution/smart factories (directly connected with digitisation and establishment of cyber-physical systems) and Key Emerging Technologies (KETs). The manufacturing trends, the 4th Industrial Revolution and the rise of KETs, including potential for new disruptive technologies previously discussed (see Section 3.2 above) are developments which are expected to underpin the future manufacturing capabilities in a broad range of industries, catalysing the next wave of high value products and production technologies, as well as providing the basis for the development of new industries and business models, including inducing new energy and environmental technologies. The EU has identified six KETs as being important (i.e. micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials, photonics and advanced manufacturing technologies). However, the debate on the specific KETs that make sense in the Macedonian context and economy has not yet started. This measure will seek to determine the

implications of KETs and smart factories and assess the priorities in the context of the Macedonian economy through the establishment of a technical Working Group. The KETs Working Group will make recommendations for the development of targeted instruments of state support, including making maximum use of existing EU funds (e.g. Horizon2020). A donor funded project will be development to implement the recommendations of the technical Working Group.

Strategic Objective 3 – Catalyse Green Industry and Green Manufacturing

The third strategic Objective, Catalyse Green Industry and Green Manufacture, represents a major departure from the previous strategy. Greening an enterprise or an industry is not a one-off action but a continuous process of incremental and radical changes that lead to improving performance. The conditions that promote the greening of industries cannot be achieved by a single policy instrument. Greening of industries involves ensuring that all industries, regardless of sector, size or location, continuously raise their environmental performance. This includes commitment to reducing the environmental impacts of processes and products by using resources more efficiently, phasing out toxic substances, substituting fossil fuels with renewable energy sources, improving occupational health and safety, taking increased producer responsibility and reducing the overall risks. There is a growing and diverse sector that covers all types of firm and technologies aimed at contributing to reducing negative environmental impacts or addressing the consequences of various forms of pollution. This includes material recovery, recycling, air pollution control, waste management and treatment, as well as companies that transport waste. The approach promotes sustainable patterns of production and consumption - patterns that are resource and energy efficient, low-carbon, low waste, non-polluting, safe, and which produce products that are responsibly managed throughout their lifecycle. This strategy focuses specifically on SMEs in the manufacturing sector and the eight main levers by which the manufacturing sector will be catalysed to support Green Industry/Manufacturing include: introducing green regulation, green public procurement, helping firms to embed sustainability in their business plans, developing Industrial and Green Zones, greening supply chains through certification, raising resource / energy efficiency and lowering carbon / increasing cleaner manufacturing production, as well as stimulating remanufacturing and 3D printing/manufacturing.

Measure 3.1: *Undertake* ***Green Regulatory Reform****.*
Rationale: regulatory reform paves the way for green manufacturing industries to innovate and compete on a fair basis. Policy action is required, for example, to enable efficiency improvements in energy use through the greater use of cleaner technologies. International experience shows that market interventions can encourage the development of Green Industry. Regulatory requirements can influence energy efficiency (see Measure 3.6) and accelerate take-up of best available cleaner technologies and practices in industries which will in turn enable them to meet environmental emission and discharge standards., This will enable industries, including in TIDZs (see Measure 1.5 and Green Zones see Measure 3.5 below) to move towards a closed-cycle manufacturing paradigm through materials recycling, recovery and reuse schemes. Regulatory and control mechanisms have started to be used in the industrial sector to promote principles such as Polluter Pays and Extended Producer Responsibility (EPR) to encourage large manufacturers and their supply chains to favour closed-cycle manufacturing and more efficient take back systems for remanufacturing and recycling (see also measures 3.7 and 3.8 below). This measure will deepen the Green regulatory environment through the initiation of policy debates and awareness raising among business associations and businesses in relation to the different policy options for the manufacturing sector such as: polluter pays principle (already applies); Extended Producer Responsibility (already applies); and application of EU directives (e.g. Energy Efficiency). The green regulatory reform itself will focus on energy, including a new Energy Law (general framework) and Energy Efficiency Law, as well as the legal basis for the establishment of the Fund for Energy Efficiency to lubricate the financial costs of refurbishment/new equipment. The new laws will require close to 50 new/revised Rulebooks. Some of the Rulebooks will impinge directly upon the manufacturing sector, such as a Rulebook for Industrial Sector, is expected to allow companies to choose whether to implement ISO 50001 or perform energy audits in the industrial sector. The green regulatory reform will also involve the creation of a long term strategy on climate action and law on climate action, as well as an Industrial Control of Emissions from Industry Law, all of which will impact on the industrial sector.

Measure 3.2: ***Green Public Procurement*** *for high impact goods and services*.
Rationale: public procurement accounts for about 12% of the GDP and can be an important facilitator of sustainable trade if it works to foster environmentally sound developments. By using their purchasing power to choose environmentally friendly goods, services and works,

public authorities can make an important contribution to sustainable consumption and production. Sustainable or Green Public Procurement (GPP) is a voluntary instrument that can play a key role in the transition towards a circular economy, as it can boost demand for resource/energy efficient, durable, recyclable, repairable products, and promote new business models based on offering functionalities and services instead of selling products. GPP also allows local and national authorities to set examples and standards to follow for businesses, industries, etc. The new Public Procurement Law will be revised to incorporate rules allowing sustainable / environmental / green development considerations, including the necessary manuals and capacity building for contracting authorities. The proposed new Law on Energy Efficiency will also introduce a mandatory obligation for procurement requirements specifically in relation to energy efficiency.

Measure 3.3: *Embed* ***sustainability as a core business strategy*** *for manufacturers.*
Rationale: there is considerable advantage in encouraging manufacturers to take the initiative in developing solutions to the problems that policy-makers wish to solve, such as helping individual enterprises to embed sustainability as a business strategy, including setting environmental benchmarks voluntarily. Businesses can develop a competitive advantage by integrating environmental and social considerations (e.g. CSR) into their business models/operations leading to improved business performance to spur innovation and to improve economic results. Green manufacturing can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses, little or no waste or pollution, reduced energy consumption and improved corporate image. This measure will support the integration of sustainability within SMEs core business strategies through co-financing. See also Measure 2.3 Support Fast Growing SMEs (“Gazelles”) with technological development, which supports improvement of the energy efficiency; protection of the environment and preparation and establishing waste management systems.

Measure 3.4: *Support industry-led* ***green manufacturing initiatives*** *(greening value chains).*
Rationale: there is a broad range of industry-led voluntary initiatives that can be supported by the MoE, MoEPP, Energy Agency and other institutions to promote efficiencies and environmental improvements. The initiatives that can be supported through grants / co-financing, as well as information and know-how include: the introduction of ISO 14001 (Environmental Management Systems), ISO 9001 (Quality), ISO 18001 (health and safety), ISO 50001 (energy management), etc. As part of an environmental management system (EMS), Multi-National Companies are adopting green supply chain standards, such as requiring their suppliers to use a certified EMS. The EU EcoLabel helps to identify products and services that have reduced their environmental impact throughout their entire life cycle, allowing consumers to make informed choices and rewards manufacturers that choose to design products that are durable and repairable, promoting innovation and saving resources. The Eco-Management and Audit Scheme (EMAS) is the official European environmental management instrument that helps organisations improve their environmental performance and demonstrate their efforts to implement "reduce, reuse and recycle” practices. Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) are tools that measure and inform customers about the environmental impact of products and organisations - their approach of assessing life-cycles is the essence of the circular economy. This measure will thus support manufacturers, especially SMEs, looking to export to the EU and elsewhere, by co-financing consultancy and certification costs.

Measure 3.5: *Develop the* ***Industrial and Green Zones (IGZs)*** *with a manufacturing focus.*
Rationale: the government recognises the importance of greening industry and has undertaken a comparative international good practice analysis (2012) which resulted in the Law on Industrial and Green Zones (2013). The IGZs seek to attract investment into green industry/manufacturing, leading to products being awarded green eco labelling, eco-friendly

production, etc. A distinction is made between Industrial Zones, which are mostly focused on light industry, and Green Zones, which apply much stricter rules in accordance with the Law on Environment (each manufacturer is obliged to demonstrate their environment protection plans in accordance with this law), with a focus on renewable production, organic production, etc. to minimise environmental pollution and apply energy saving and/or less polluting technologies. IZs have been established in Bitola (Zabeni) and Veles (Mamutchevo, Karaslari). In collaboration with USAID consultants, the MoE has visited 21 municipality in 8 planning regions to assess the scope for establishing IGZs. Almost all local authority spatial plans include the possibility of creating IZs. Several municipalities have been able to meet the environmental requirements to create GZs. No Green Zones have been established and this measure will seek to reform and streamline the Law on Industrial and Green Zones and finalise the GZ feasibility work, leading to the creation of at least one GZ as a pilot project.

Measure 3.6: *Stimulate* ***resource / energy efficiency and low carbon / resource efficiency / best available techniques*** *in the manufacturing sector.*
Rationale: manufacturing is responsible for around 35% of global electricity use, about 20% of CO^2 emissions, over 25% of primary resource extraction and up to 17% of air pollution-related health damage (UNEP Green Economy, 2011). As industrial production expands, it puts increased pressure on energy supplies. Developing countries have the potential to leapfrog inefficient technologies by adopting cleaner production programmes, particularly those that provide support to SMEs, many of which serve global value chains. Bypassing less efficient, more expensive and more polluting technologies and industries, and moving towards more sustainable and advanced ones, could enable developing countries to produce goods at a lower cost due to less energy use. Overall, this technological leapfrogging would, in the long term, provide SMEs with a price and a green advantage in the export sector (see Box below). See also Measure 2.3 Support Fast Growing SMEs ("Gazelles") with technological development, which supports improvement of the energy efficiency; protection of the environment and preparation and establishing waste management systems.

Box 8: Enhancing resource and energy efficiency

- Resource efficient and cleaner production: this requires a holistic system-based approach to decouple economic growth from accelerated environmental degradation and resource use via environmental and energy management systems; product life cycle optimization and process optimization; the development and uptake of clean technologies (e.g. renewable energy technologies); improved resource use, decreased pollution, waste minimization and zero waste strategies; and closed loop systems and industrial symbiosis;
- Energy efficiency in industry: this involves a systematic and focused approach on continually improving energy performance and productivity and reducing environmental and climate change impact through the implementation of energy management system standards, the optimization of energy systems (steam, motors, compressed-air, etc.), energy efficient design and cost-effective, incremental technological innovation;
- Low carbon and/or climate resilient production: this involves the use of innovative approaches for enterprises and value-chains to mitigate climate changes through the increased use of renewable energy. These approaches prevent carbon loss from value chains, and prompts process changes, the elimination of non-energy greenhouse gas (GHG) emissions, besides improving the ability of industries to adapt to the impacts of climate change;
- Clean energy for productive uses: this involves promoting renewable energy and technological solutions to meet the energy needs of local industries, particularly in rural areas, and to sustainably address the issue of energy poverty.

Source: UNIDO

This measure will support installations in the manufacturing sector to enhance resource / energy efficiency and cleaner production through technical assistance, access to finance and capacity building. Some of the activities have already been discussed in Measure 3.1 above) such as a new Energy and Energy Efficiency Law. A key development is the establishment of the Fund for Energy Efficiency which will finance and support resource / energy efficiency and low carbon / cleaner production in the manufacturing sector. Furthermore, as part of the process of obtaining Integrated Pollution Prevention and Control (IPPC) permits, enterprises must submit Energy Efficiency Plans, but these are currently not prepared or audited. The

capacities of MoEPP will be strengthened by training the IPPC permit writers to audit these in the future. This includes the development of the methodology for the Energy Efficiency Plans and strengthen capacities by training the manufacturing sector to prepare Energy Efficiency Plans.. Furthermore, the UNIDO/Regional Environmental Centre will implement industrial/manufacturing energy efficiency projects to demonstrate their viability and cost-effectiveness in the Macedonian context, as well as train and qualify private consultants and industry in-house energy manager/engineers/technicians on energy management systems implementation in compliance with ISO 50001, industrial steam systems and compressed-air systems assessment and optimisation, thus enabling them to provide their services directly to firms and building sustainable in-house expertise to manage energy in day-to-day production and business operations.

Measure 3.7: *Supporting SMEs with* ***Remanufacturing****.*
Rationale: remanufacturing is the process of bringing used products and individual product components to a 'like new' functional state by recovering a substantial proportion of the resources incorporated into a used product in its first manufactured state at low additional costs, thus reducing the price of the resulting new product. Remanufacturing is preferable to material recycling or manufacturing new products; by reducing greenhouse gas (GHG) emissions from product manufacturing or disposal, it alleviates the depletion of natural resources, helps reduce global warming and enhances chances of safer handling of toxic materials. Remanufacturing requires smaller capital investments than manufacturing operations since no new parts are produced and most of the work has already been undertaken by the original equipment manufacturer (if it can be disassembled and cleaned and its components can be repaired or replaced, so that the original function and performance level are kept), so there is a significant potential market. Remanufacturing offers potential for new national business ventures within transition economies and new export opportunities. Given the minimal financial and material input into production, remanufacturing services provide lower prices to consumers, typically 30-40% less than comparable new products. Remanufacturing is becoming significant in areas such as motor vehicle components, compressors, electrical and data communications equipment, office furniture, vending machines, photocopiers and laser toner cartridges, agricultural equipment, etc. It can be a useful tool alongside clusters, TIDZs, etc. Through this measure, a study will be performed on the TIDZs and their potential for supporting remanufacturing activities (a major obstacle is that strategies for extending the useful life of manufactured products hinge on cooperation with original equipment manufacturers but there are incentives for them to build obsolescence and replacement into their business model) leading to policy recommendations to be implemented in the future, such as support to start-ups and co-financing of equipment.

Measure 3.8: *Support SMEs with* ***Additive Manufacturing / 3D Printing****.*
Rationale: additive manufacturing is the process by which physical objects are joined together and developed, usually layer upon layer, based on a digital prototype design (also known as 3D printing or 3D manufacturing). It forms part of the "digitalization of manufacturing" and is a relatively new manufacturing process that could lead to the greening of international supply chains, also allowing scope for innovating and participating in the development of a growing international market. The ability to design a product in one country and transmit it to another for output promises to level at least a part of the global labour market and to unlock the creativity of inventors and entrepreneurs all over the world. The process of 3D manufacturing converts raw materials such as metal, ceramic, plastic, etc. more directly to finished products, avoiding many of the intermediate steps. Managed properly, fewer materials are needed and waste can be minimised. Moreover, since 3D printing allows products to be designed and printed with local materials (including recycled materials), transition economies can reduce their reliance on expensive material imports. In addition, they can create their own, more appropriate products domestically and reap the

profits from production. As the technology underpinning 3D manufacturing improves, the cost of 3D printers (including their input materials) decreases. This relatively new manufacturing process has the potential to dramatically impact traditional manufacturing models by reducing or eliminating assembly lines and supply chains, as 'final' products are produced in a singular process. It also de-globalises the production and distribution of products by moving the production process closer to the customer. Other advantages include: eliminating inventories, reducing the carbon footprint and energy utilisation, decreasing packaging waste, etc. While potentially leading to a decrease in production jobs, the digitalisation of manufacturing is expected to increase demand for professional services such as designers, engineers, technicians, programmers and other occupations. This re-orientation of the manufacturing sector towards "professional service provision" has the potential to shift certain manufacturing processes back to transition economies, requiring countries to partially re-focus their manufacturing sectors towards the provision of services and enhance the education of skilled labour. This measure will support SMEs with 3D Printing/Manufacturing, especially start-ups, through grants and co-financing.

Strategic Objective 4 – Stimulate Manufacturing Export

Policy responsibility for export rests with the Ministry of Economy and export promotion is the responsibility of the Agency for Foreign Investments and Export Promotion (InvestMacedonia). However, there has been relatively little active export support in general, let alone a manufacturing focus, in recent years. Nevertheless, Macedonia's exports have grown and become more sophisticated but at about 50% of GDP (2016), it remains below the 70-80% levels achieved by other small transition economies in Europe, so there is scope to improve performance. The focus of the future activities to stimulate manufacturing export / internationalisation will involve nine policy levers including developing an export capability (MoE/strategy), strengthening economic diplomacy abroad, winning new markets and increasing sales, increasing competitiveness in new markets, increasing the number of export ready SMEs, supporting internalisation through standards, creating an export point of contact and integrating sources of export information to help current and future exporters.

Measure 4.1: *Institutional Strengthening of* ***Export Policy*** *with a focus on manufacturing.*
Rationale: the MoE has policy responsibility for export, however, the last such strategic document was prepared in 2010 and with the expansion of InvestMacedonia´s role into export promotion, it focused its activities on trade matters. Since neither institution is taking responsibility for export, the export orientation is currently in a policy vacuum. The requirements of CEFTA, EU accession, Stability and Association Agreement, etc. are extremely demanding: there are opportunities as well as threats which the country and its firms must respond to. InvestMacedonia will establish a stronger Department/Unit to deal with export promotion. The MoE is responsible for policy and will coordinate the implementation of an Export Strategy with a focus on manufacturing. The new export strategy will be linked to the national smart specialisation (see Measure 1.1. above) and identify the sub-sectors, products, countries, etc. to be targeted to enable InvestMacedonia (export promotion – see below) and the Ministry of Foreign Affairs (MoFA economic diplomacy – see below) to be more coordinated and so more effective. The MoE will ensure that the strategy is approved and will allocate the resources for implementation, working closely with InvestMacedonia and MoFA. This measure includes a review of the current Export Department in InvestMacedonia (budget, staff, responsibilities, information and contact services, with an explicit link to the economic diplomacy, etc.); co-financing for SMEs to participate in targeted fairs, expos, B2B and similar events; financing for promotional activities; support to Made in Macedonia; capacity building for manufacturing SMEs in relation to aspects of export, in connection to various other measures listed below.

Measure 4.2: *Strengthen FDI and export through* ***economic diplomacy****.*
Rationale: there is a need to strengthen the economic capacity of the network of diplomatic representations and consulates abroad with a focus on the Ministry of Foreign Affairs'

(MoFA) Economic Diplomacy through its diplomatic staff, which have a formal responsibility to promote export. There is a need to recruit the new Economic Promoters ideally on permanent contracts to ensure sustainability, using the experience of InvestMacedonia with the job descriptions, performance targets, evaluation criteria, etc. There is a need to raise the capacity of the MoFA´s economic diplomacy staff (economic diplomatic staff/ambassadors (about 170), economic promoters (about 20 – to be employed) and Economic Diplomacy Department (about 15) to develop the necessary knowledge and skills to assist the targeted manufacturing sub-sectors/products/countries (see export strategy in Measure 4.1 above) to penetrate foreign markets, by providing information on the local business environment; generating business opportunities in foreign markets; assisting companies in making business contacts; participating in economic fairs; promoting the Macedonian economy as a location for manufacturing FDI; searching for business opportunities via Macedonian living abroad (e.g. Diaspora); and liaising closely with InvestMacedonia.

Measure 4.3: *Support for* ***Winning New Markets & Increase in Sales*** *(EGP measure 2.2).*
Rationale: this measure will assist companies committed to winning new markets and managing to generate an increase in the sales in the new markets. Such companies will be eligible to receive financial support amounting to 20% of the costs incurred in penetrating new markets up to 1,845,000 MKD (30,000 EUR) per firm. The activities to be supported include: participation in fairs abroad; business missions; B2B in foreign markets; costs used to certify the products according to the requests on the foreign markets; and costs for building capacities for marketing in foreign markets (preparation of promotional material, catalogues, brochures, website design, etc.).

Measure 4.4: *Support to* ***Increase Competitiveness in New Markets*** *(EGP measure 2.1).*
Rationale: another measure is available through the EGP to support increased competitiveness in new markets, such as in the Western Balkans region, in reflection of the fact that exports to neighbouring CEFTA countries represent only 12.5% of Macedonia's total exports, whereas about 80% is directed to the EU. Firms that manage to increase their competitiveness in new markets will receive financial support to cover 10% of the investment costs used to accomplish this increase.

Measure 4.5: ***Manufacturing Export Readiness*** *Support Programme.*
Rationale: export is a risky and costly venture for small businesses, which may discourage engagement in export activity. There is a considerable gap in the system as manufacturing enterprises that have export potential but are not yet "export ready" have few means of obtain support at present, other than the EGP and the Swiss Import Promotion Programme. This measure involves broadening the narrow export base of the country by identifying 300 especially selected manufacturing SMEs with export potential (targeted by experience; productivity levels; technological innovation; R&D activities; skills intensity and ICT capacities with a focus on manufacturing). "Investment readiness" support will be provided to the targeted manufacturing SMEs in the form of technical assistance and capacity building, as well as financing for export readiness issues (e.g. standards, health and safety, marketing, business planning, technology, branding, labelling, packaging, product testing, certification, contracting, customs, logistics, marketing, information and analysis, etc.).

Measure 4.6: *Leverage manufacturing export through* ***international standards****.*
Rationale: one of the major barriers to exporting for SMEs in Macedonia is achieving the standards that have been established for goods and services in most international markets. Most products are made to specific standards that help to ensure that the products are: safer - reducing accidents and saving lives; better quality - improving levels of customer service; and easier to use - by ensuring that products and services are accessible to all consumers. Standards matter to everyone and it is imperative that all SMEs in the country, especially manufacturers, address this important issue. As standards are mostly voluntary, consumers

can feel confident that organisations choosing to use them take issues such as safety, accessibility and customer service seriously. There is a need to raise awareness of the critical importance of creating "high quality, high standard products" consistent with international standards that are recognisable, trusted and valued in both the domestic and international markets. This measure will include financial and technical assistance for targeted manufacturing SMEs, in relation to International Organisation for Standards (ISO), Hazard Analysis and Critical Control Points (HACCP), HALAL standards, Good Manufacturing Practice (GMP), Innovation Management in the automotive industry (TS16949, being finalised), etc. (see also environmental/green standards discussed in measure 3.4 above).

Measure 4.7: *Establish an **Export Point of Contact**.*
Rationale: many SMEs complain that the cost of obtaining relevant marketing data, analyses and reports is prohibitively expensive, and beyond their budget capabilities. InvestMacedonia is interested in providing such information to potential exporters but currently lack the financial resources to contract with the important export data providers. Support to access this information and to make it readily available to potential exporters, regardless of the sector, is needed. Registers are needed with export data providers (e.g. Euromonitor), to provide data, analysis and dissemination support for SMEs. There is also a need to establish a single point of contact about exporting at InvestMacedonia; support/promote local enterprises in international markets; work in close collaboration with MoE, InvestMacedonia, Economic Diplomacy, Enterprise Europe Network (EEN), etc. thus assisting domestic enterprises to export with information, analyses, signposting, etc.

Measure 4.8: Integrate ***Export Promotion Information***.
Rationale: enterprises, especially SMEs that are considering exporting or have started the process of exporting, require a good source of information about the EU and Western Balkans markets, since together they account for 92.5% of Macedonia's total exports. Although much export information is available, it is often fragmented and takes time and effort to access. There is a need for an integrated electronic source of such information for Macedonia. The MoE will revise and improve its main source of information to SMEs. The competitiveness portal (www.konkurentnost.mk) will be re-designed, integrated with e-Services and ensure that the key sources of export information are readily accessible including InvestMacedonia (www.investinmacedonia.com), Customs Administration (www.customs.gov.mk) for customs procedures, excise, customs tariffs, value and origin, intellectual property, prohibition and restrictions, customs debt and guarantees, Authorised Economic Operator process), etc., Macedonian Bank for Development Promotion (http://www.mbdp.com.mk) for export credit financing such as working capital), etc., European Trade Desk (www.trade.ec.europa.eu/tradehelp) (import procedures, product requirements, import duties, taxes, rules of origin, statistics, etc.), Enterprise Europe Network (www.een.mk / www.een.ec.europa.eu), CEFTA (www.cefta.int) and other relevant sources such as the chambers, business associations, regional export network, etc. This will be combined with statistical data on import and export trends, products, etc. The integration of existing sources of export information and data will be a step forward in facilitating greater exports on the part of enterprises, especially SMEs.

4.9: *Support to the **Export Accelerator** for SMEs*
Rationale: the establishment of an export accelerator for SMEs is being financed by the EU to enhance the competitiveness of SMEs with a focus on stimulating the export of the food processing industry and to help SMEs to internationalise by increasing export opportunities and capacities. About one third of the exports is comprised of agriculture, minerals and metals but most agricultural exports are currently unprocessed items or semi-processed products, such as apples, peaches and plums. Recent statistics show that Macedonia is one of the biggest exporters of unprocessed or semi-processed food products and, at the same

time, one of the biggest importers of finalised food products (CEFTA region). The participating SMEs that are members of Organisation of Employers of Macedonia will receive expert support in the preparation of export procedures, documentation and other related export activities (analyses, new markets, contacts with distribution networks, etc.). The Export Accelerator for SMEs will deliver business analysis of export opportunities on the targeted regional markets for export of processed food products, training for export of SMEs and technical readiness, new skills and knowledge for export; an interactive web platform for export and mobile application; and demonstration projects for export of selected processed food products. Through practical support for export of specific products, SMEs will gain new skills, knowledge and information to increase competitiveness. After the 24-month period of implementation, consideration will be given to extending the work, both for the food processing industry and possibly other priority manufacturing sub-sectors (see Measure 1.1 above).

Strategic Objective 5 – Build a Learning Manufacturing Sector

In a globally competitive manufacturing environment which is characterised by volatility, new technologies, changing market trends and consumer tastes, building a learning manufacturing sector will play an important role in firms' competitive success, supporting their ability to develop, maintain and exploit dynamic core competencies, as well as leveraging resources and know-how. Enterprises, especially manufacturers, use learning as a source of heterogeneity and of sustaining competitive advantage. Technological learning prevents firm competencies from become outdated and its products/services from becoming obsolete, so it positively influences firm performance. There are eight main levers by which the manufacturing sector can be further developed and supported in knowledge, skills and capacities, namely to access skills, funds and support through EU funds, to implement in-house technological and research departments, to support SMEs to upgrade the skills of young people, to strengthen cooperation between universities and manufacturers, to raise awareness of the Circular Economy, Green Industry / Manufacturing and Closed-cycle Manufacturing, to establish a pilot MakerSpace and to leverage high quality, specialist expertise to support domestic manufacturing SMEs.

Measure 5.1: *Increase manufacturing access to* ***EU competitiveness and innovation funds***.
Rationale: there is a need to improve access to know-how for the development of innovative manufacturing SMEs. There are significant resources available via a multiplicity of EU funding streams (IPA II, Eureka, Eurostars, COSME, HORIZON2020, ERASMUS for young entrepreneurs, FP9, etc.), but these are typically not absorbed effectively by Candidate Countries, including Macedonia, as the process of applying for EU competitiveness and innovation funds becomes ever more complex and competitive. This measure will facilitate more effective access to EU funds and support with a focus on manufacturing SMEs, universities, civil society and government. The emphasis will be on the provision of technical assistance to support training of a network of consultants on complex EU applications, guidance and support to firms with EU applications, preparation of good practice examples/dissemination, contracting, monitoring, evaluation and reporting. This is expected to increase the absorption of EU funds while also developing a local EU applications skill base.

Measure 5.2: *Establish and strengthen* ***technological and research departments*** *(EGP measure 1.3)*
Rationale: technological development and research and development are key determinants of new knowledge acquisition, assimilation, transformation and utilisation for firms (i.e. the learning or the absorptive capacity of firms). But according to major international competitiveness studies, low levels of expenditure on R&D, innovation, technological readiness and business sophistication are notable weaknesses in the Macedonian economy. Many manufacturing SMEs still do not understand the potential of technology development

and research. Therefore, through the Economic Growth Plan, financial support will be provided for establishing departments, centres or other institutional structures for sustainable research and development projects engaging highly-qualified staff. The assistance will cover applied industrial research to gain new knowledge and skills for development of new products, production processes or services or to significantly improve the existing products, production processes and services. It will cover 50% of the costs of research up to 61,500,000 MKD (1,000,000 EUR) per beneficiary, including 30% of the value of the newly purchased equipment in the development department for instruments and equipment, buildings and land, research, technical knowledge, patents and consulting services, industrial projects and other operational costs (e.g. materials, purchases, etc.).

Measure 5.3: *Support to SMEs for* ***Professional Upgrade and Practice*** *for Newly-Employed Young People (EGP measure 3.4).*
Rationale: the issue of upgrading the skills of young people is an urgent one, given their disproportionate unemployment rate. This EGP measure will offer financial support for the technological development of companies by covering up to 30% of the costs for training and professional upgrade of newly-employed young people. Under its terms, enterprises will be supported with up to 30% of the direct costs up to 1,000,000 MKD (16,260 EUR) per applicant. The funds will be allocated on a competitive basis, considering how the project application will contribute to developing new or significantly improved product, service and/or working processes.

Measure 5.4: *Strengthen the* ***links between Universities and manufacturing firms****.*
Rationale: this measure is complementary to, and links with the measure 5.2 above. It seeks to fill the gap in the system between academic learning and the actual work-place. Graduates possess the latest academic knowledge but are often lack understanding of the requirements of industry and the practicalities of working in such an environment. On the other hand, manufacturing SMEs are often not well connected with the latest technological and engineering developments, which might help them to adapt, innovate and maintain competitiveness. A firm´s skills can become outdated, its products obsolete and its future uncertain if there is lack of interaction with the external environment. A number of activities would improve the current situation, including reforming the regulatory environment where necessary to establish the following: industrial PhDs sponsored by the new funds (see also measure 3.1) and private sector; enable doctoral R&D leave of absence to work in firms for 1-2 years with right to return to engineering faculties (requiring reform of the Law on Higher Education); enable firms to pay for research assistants to work in company and in faculties (few days per week and use labs for R&D; enable managers to undertake practical work (1-3 months) in similar companies in developed countries to about technologies, business/organisational models, etc. This would supplement measures such as by FITR to support expenses for training, so SMEs can send people to be trained and Measure 5.3 to assist young people to be trained.

Measure 5.5: ***Awareness Raising and Training*** *on Circular Economy, Green Industry/Manufacturing, Closed-cycle Manufacturing, Energy Efficiency & Clean Production.*
Rationale: going green is increasingly not merely an option but an urgent necessity for manufacturing firms to remain competitive and gain advantages over their rivals, not least if they wish to export (see Strategic Objective 4). The fact is that Macedonian manufacturing SMEs are still relatively uninformed of the potential threats, as well as the benefits offered by the concepts such as Circular Economy, Green Industry / Manufacturing, etc. The role of information provision, awareness raising, education, training and capacity building should not be underestimated, and it is essential for the government to engage with business associations and other institutions such as UNIDO/REC, EEN, etc. to systematically address this gap in the coming years though a structured programme in Skopje and beyond. The focus will be to develop a practical Awareness Raising and Training programme to enable

industry actors to learn more about the Circular Economy, Green Industry / Manufacturing, Closed-cycle Manufacturing, Energy Efficiency, Clean Production in general and with particular focus on specific types of green processes, methods and technologies most relevant for the Macedonian industry and economy. Awareness raising is also required for funds/credit line managers about the need to integrate the circular economy as a criterion for financing industry projects.

Measure 5.6: *Establish a **MakerSpace** to encourage a maker mindset.*
Rationale: a MakerSpace (also called FabLab, Techshop or HackerSpace) is a collaborative work space inside a school, library or a dedicated public/private facility such as the Science and Technology Centre for making, learning, exploring and sharing that uses a range of no, low, medium and high-tech tools. These spaces are open to children, adults and entrepreneurs and have a variety of maker equipment such as 3D printers, laser cutters, Computer Numerical Control (CNC) machines, soldering irons, sewing machines, Lego pieces, etc. It enables the development of a maker mindset of creating something out of nothing and exploring interests, helping to prepare those who need the critical 21st century skills in the fields of science, technology, engineering and mathematics (STEM). They provide hands-on learning, help with critical thinking, as well as skills including electronics, 3D printing, 3D modelling, woodwork, coding, robotics, etc. Makerspaces can foster entrepreneurship and are increasingly utilised as incubators and accelerators for business start-ups. A MakerSpace will be developed, in partnership with a higher education institute / Science and Technology Park, to test the idea and determine whether a network could be developed throughout the country.

Measure 5.7: ***Technical Expertise for Domestic SMEs*** *(financial support for micro firms – EGP measure 3.2).*
Rationale: This measure will help micro firms to develop and grown. It is part of the EPG and the aim is to support micro enterprises with financial support for technological development of the companies by covering 30% of the direct costs in investment projects up to 5,000,000 MKD (81,300 EUR) per applicant. This will be achieved through competitive public calls for proposals to support investment activities such as: technical support by foreign experts for preparation of mid-term and long-term strategic / business plans; training for mid-term planning of the business (three years business plan); establishing business connections and business cooperation with foreign investors and domestic companies; enhancing the organisational structures for growth; specialised management trainings; trainings for recognising developing talents (future leaders); trainings for planning and costs control; procurement; software for organisational structure and performance or operational processes to increase productivity and/or planning processes. In addition, the following type of activities and costs will be supported: European technical regulations regarding product safety; preparations for quality certificates; analysis, preparation, acquiring and protecting of industrial and intellectual ownership rights and implementing information systems. Furthermore, this measure will support various green initiatives including: improvement of the energy efficiency; consulting of protection of the environment and preparation and establishing waste management systems.

Measure 5.8: ***International Experts for Domestic Companies*** *with a focus on manufacturing.*
Rationale: most SMEs encounter various problems during their evolution which may be resolved through in-house expertise or by engagement of external business consultants. However, some business situations require a customised or specific solution, which may not be readily available or affordable. Organisations such as the International Executive Service Corps (IESC), and Voluntary Service Overseas (VSO), Senior Expert Services (Germany), PUM (Nederland), ASEP (Austria), Swiss contact (Swiss), etc. can connect such firms with the know-how that they need to overcome those problems and thrive. The above

organisations can provide solutions in the fields of trade, finance, ICT, Public Private Partnership, technology, industry standards, marketing, etc. thus enabling manufacturing SMEs to improve their competitiveness by, for example, deploying appropriate equipment and technologies. In addition, it may be necessary to look beyond these organisations and engage the services of senior experts from EU countries. Each expert would have a specific assignment related to an identified problem (e.g. to improve the quality of a product or a process) and will deliver a realistic solution through on-site visits or off-site. This measure will assist 300 manufacturing SMEs by providing expertise from senior experts from advanced economies. The main objective is to increase their competitiveness, improve the quality of products and processes, create and maintain jobs, as well as an increase the turnover and profits of the businesses. Domestic manufacturing SMEs co-finance the mission costs (e.g. accommodation, food, local transport) as a demonstration of their commitment.

Cross-cutting Objective – Implementation and Coordination

There five Strategic Objectives discussed above are the focus of the strategy. However, for the strategy and the action plan must be implemented effectively, good practice dictates that six cross-cutting activities be performed, namely perform inter-ministerial coordination, donor coordination, public private dialogue, regular monitoring and reporting, intermittent mid-term and end term evaluation, and coordination of strategy as well as applications for funding.

Measure 6.1: ***Inter-ministerial Coordination****.*
Rationale: The strategy involves a variety of state institutions cooperating to implement the Action Plan set out in Annex B. The Ministry of Economy´s Department of Industrial Policy will oversee the overall process and coordinate the implementation of the strategy and associated action plans. This coordination process will involve regular (quarterly meetings) of the Sector Working Group for Competitiveness and Innovation, which will meet to ensure the effective coordination of the strategy. Any delays, bottlenecks, and other implementation issues will be discussed and resolved through the regular meetings.

Measure 6.2: ***Donor/IFI Coordination****.*
Rationale: Many of the measures contained in the strategy and action plan will be implemented with state funds. However, a significant portion of the measures contained in the approved action plan require donor/IFI support to supplement the national resources. In compliance with the principles of donor funding embodied in the Paris Accord and the Accra Agreement, the Ministry of Economy will convene regular (quarterly) donor/IFI meetings to ensure effective donor coordination and mobilisation of funds to implement the strategic priorities approved by the government and contained in the action plan.

Measure 6.3: ***Public Private Dialogue*** *with stakeholders.*
Rationale: it is not only government institutions and donors/IFIs that are actively implementing the strategy and action plan. In addition, numerous other universities, NGOs, chambers, and private sector bodies are responsible for specific measures. Therefore, the MoE will also meet regularly (quarterly) with the wider industry and manufacturing stakeholders.

Measure 6.4: ***Monitoring and Reporting****.*
Rationale: the strategy and action plan can only be implemented effectively is if it is regularly monitored (biannual/annual) and regular reports are produced by the Ministry of Economy for circulation to the previously defined Industry Group, Donors/IFIs and stakeholders. The MoE will coordinate the process, which will involve two related but different monitoring aspects (see Chapter 5 for more details):

- Monitoring on the manufacturing action plan;

- Monitoring of the wider industrial policy, involving a wider set of institutions and their programmes.

The result will be biannual/annual monitoring reports to be disseminated to the various partners and stakeholders. They will also be available on the www.konkurentnost.mk portal.

Measure 6.5: ***Mid-term Assessment and Final Evaluation****.*
Rationale: to determine the progress and impact of the strategy and action plan, the MoE will commission and coordinate three independent evaluations (see also Chapter 5):

- End of 2020: to allow the first action plan to be assessed. This will allow progress to be assessed and enable the strategy and action plan to be recalibrated in the light of the progress being made, problems being identified and new funding regimes and policy initiatives that will arise from the new 7-year EU programming period;
- End of 2023: mid-term assessment of the next action plan;
- End of 2027: final evaluation of the strategy and its impact using the DAC-OECD evaluation criteria, namely: relevance, efficiency, effectiveness, coherence, impact and sustainability.

All the evaluation reports will be available on the www.konkurentnost.mk portal.

Measure 6.6: ***Coordination*** *of strategy and* ***applications for funding***
Rationale: there is a need for capacity building of MoE staff to enable better focus on policy, coordination and engagement at the international level (e.g. EU/EC/RCC/OECD, etc.), as well as the national level (PPD/inter-ministerial coordination/donor coordination/EUD, etc.). In addition, it is essential for the skills to be further development in relation to making application for funding to IFI/donor/EC since the state funds need to be supplemented with other funds.

5. Implementation and Coordination

The experience of implementing strategies and action plans in the Republic of Macedonia, as well as many other countries, demonstrates that having a good strategy and action plan is the starting point but it is not necessarily sufficient. The most critical issue is whether effective implementation is secured, which is not a given. Among other elements, effective implementation requires a clear roadmap (action plan), an adequate and consistent state budget, close engagement to mobilise donor/IFI funds, clear institutional responsibilities and sound capacities, effective coordination with other public bodies, regular public private dialogue, as well as effective monitoring, reporting and evaluation systems.

This chapter covers these important dimensions underpinning effective implementation of the strategy and action plan.

5.1 Industrial Policy / Strategy and Manufacturing Strategy / Action Plan

This strategy discussed industrial policy, industrial strategy, manufacturing strategy and the manufacturing action plan; these are all connected but different:

- Policy: refers to a set of guidelines which help people to take appropriate decisions or act in a specific situation, in this case in relation to industry generally and manufacturing specifically;
- Strategy: is a comprehensive plan of action formulated or designed to achieve a particular policy vision. It is an interpretative framework guiding realisation of the vision;
- Industrial strategy with a manufacturing focus: there are many different possible interventions in relation to industrial matters, covering issues as diverse as trade, tax, competitiveness, etc. The approach used in this industrial strategy is to focus on the manufacturing sector, since it is viewed as the engine of growth of the economy. The approach is not to “pick winners” but to focus policy measures on the issues that positively affect the productivity, innovation, human capital and sustainability of the manufacturing sector;
- Action Plan: is a way to ensure that the vision and strategic objectives contained in the strategy are made concrete. It describes the way human, financial and physical resources will be deployed in order to maximise the chance of achieving the vision. It consists of several changes to be brought about in the manufacturing sector.

5.2 Role of Ministry of Economy

The Ministry of Economy (MoE) has official responsibility for industrial policy, FDI, export, SMEs, trade, etc. As the key ministry in relation to industrial and manufacturing issue, it is responsible for creating and securing strategy approval, as well as coordinating its implementation (see below - inter-ministerial, donor and stakeholder coordination). It will also take the lead in mobilising state and non-state funds (donors and IFIs) in connection to the issues in this strategy, as well as its monitoring, reporting and evaluation (see below).

5.3 Role of Government/Ministries

The industrial / manufacturing strategy is broad in nature. The action plan (see Annex B) makes clear that numerous state bodies have responsibility for various measures identified within the strategy. Each of these other government institutions (Ministries, Agencies, Offices, Chambers, NGOs, etc.) are required to take ownership of the measures that they are responsible for, including mobilising the resources necessary for implementation of the specific areas that fall within their official remit. They also have responsibility for

implementing the measures within the action plan by the identified deadlines. Furthermore, they will need to provide monitoring information on the measures that they are respectively responsible for on a biannual basis. This information will be used for reporting and effective coordination of implementation.

5.4 Role of Stakeholders

The broad nature of the industrial / manufacturing inevitably means that it is not only government but also non-governmental organisations, national innovation systems, businesses, business associations, etc. that have part responsibility for effective implementation of the industrial / manufacturing strategy. They too have responsibility for implementing the measures within the action plan by the identified deadlines. They will provide monitoring information on the measures that they are respectively responsible for on a biannual basis to allow for reporting and coordination of implementation.

5.5 Inter-Ministerial Coordination

The strategy involves a variety of state institutions cooperating to implement the Action Plan set out in Annex B. The Ministry of Economy´s Department of Industrial Policy will oversee the overall process and coordinate the implementation of the strategy and associated action plans. Inter-ministerial coordination is even more important than usual given the centrality of the Economic Growth Plan´s measures for the effective implementation of this strategy. This coordination process will involve regular (biannual meetings) of the Sector Working Group for Competitiveness and Innovation, which will the strategy and action plan.

There members of the Sector Working Group for Competitiveness and Innovation include:

- Cabinet of Deputy Minister for Economic Affairs (Chair);
- Ministry of Economy (Deputy Chair);
- Ministry of Education and Science;
- Ministry of Finance;
- Ministry of Information Science and Administration;
- Secretariat of European Affairs;
- Directorate of Technological and Industrial Development Zones;
- Fund for Innovation and Technological Development;
- Agency for Entrepreneurial Development;
- Agency for Foreign Investments and Export Promotion (InvestMacedonia);
- State Statistical Office.

Others can be involved, including:

- Minister of Labour and Social Policy;
- Customs Administration;
- National Technology Transfer Office (to be established);
- Donors/IFIs, etc.

The Inter-ministerial coordination group will ensure the effective coordination of the strategy. Any delays, bottlenecks, and other implementation issues will be discussed and resolved through the biannual meetings.

5.6 Public Private Dialogue

It is not only government institutions and donors/IFIs that are actively implementing the strategy and action plan. In addition, numerous other NGOs and private sector bodies are

responsible for specific measures. Therefore, the MoE will also meet regularly (biannual) with the wider industry and manufacturing stakeholders, possibly through the newly established Platform for PPD, which is in the process of being supported with donor funding.

The most important stakeholders active in the thematic area include:
- Universities/Faculties/Think Tanks;
- Clusters/incubators/accelerators/business centres, etc;
- Chambers of Commerce;
- Business Associations;
- SMEs;
- Donor/IFI projects.

5.7 Funding

The Ministry of Economy (MoE) has overall responsibility for ensuring that there are sufficient funds to implement the measures in this strategy and action plan. This will come from five main sources:
- MoE state funding: the annual Competitiveness Programme will be restructured to reflect the emphasis of the strategy and action plan;
- Other state funding: there are various state bodies drawing national resources to implement various aspects of the strategy, the most important being line ministries as well as the Deputy Minister for Economy Affairs, which will coordinate EUR 30 million worth of funding per annum for the implementation of the Economic Growth Plan, part of which will be absorbed by the industrial / manufacturing sector;
- Donors/IFIs: there are significant resources available through the donor community, not least the European Union Delegation (EUD) as well as International Financial Institutions such as the World Bank and the European Bank of Reconstruction and Development (EBRD). The funds will be mobilised through the Donor Coordination mechanism discussed below;
- EU funds: in addition to the funds directly allocated by the EUD, there are significant resources which could potentially be absorbed by the manufacturing sector via initiatives such as EEN, COSME, HORIZON2020; EUREKA, FP9, ERASMUS, etc., as well as any new programmes that may arise in 2021. Part of the strategy addresses the need to support the national innovation system and manufacturing SMEs to access EU funds;
- Private sector: manufacturing SMEs are expected to commit time, staff and to “in-kind” resources for the grant-based measures. In other cases, they will be expected to co-finance to be eligible for the measures contained in this strategy and action plan.

5.8 Donor Coordination

Many of the measures contained in the strategy and action plan will be implemented with state funds. However, a significant portion of the measures contained in the approved action plan require donor/IFI support to supplement the national resources. In compliance with the principles of donor funding embodied in the Paris Accord and the Accra Agreement, the Ministry of Economy will convene donor/IFI meetings to ensure effective donor coordination and mobilisation of funds to implement the strategic priorities approved by the government and contained in the action plan.

The most important donors active in the thematic area include:
- European Delegation Office;
- Deutsche Gesellschaft für Internationale Zusammenarbeit;
- United States Agency for International Development
- United National Development Programme;

- Swiss Contact;
- European Bank of Reconstruction and Development;
- World Bank
- Others, as relevant.

5.9 Monitoring and Reporting

The strategy and action plan can only be implemented effectively is if they are regularly monitored (biannual/annual) and reports are produced by the Ministry of Economy for circulation to the previously defined Industry Group, Donors/IFIs and stakeholders. The MoE will coordinate the process, which will involve two related but different monitoring aspects:

- Monitoring on the manufacturing strategy and action plan (this document): is essential for tracking the implementation of proposed measures and achievement of annual targets. For the action plan to be monitored in a comprehensive manner it is necessary to agree with the implementing agencies collection of information and regular reporting on progress being made in implementing the activities and funds spent against the planned activities / funds. The MoE will collect and aggregate the individual reports and prepare a biannual/annual report with information on all the measures/activities;
- Monitoring of the wider industrial policy, involving a wider set of institutions and their programmes: the MoE will maintain a database of relevant information about manufacturing, SMEs, innovation, competitiveness and cluster development. The data will be collected from various institutions, including the State Statistical Office, National Bank, Central Registry, but also from the annual reports of the relevant institutions.

The result will be biannual/annual monitoring reports, which will be disseminated to the various partners and stakeholders. They will also be available on the www.konkurentnost.mk portal.

5.10 Evaluation

To determine the progress and impact of the strategy and action plan based on the monitoring reports and stakeholders' meetings, the MoE will perform regular annual self-evaluation of action plan implementation.

It will be also needed to commission and coordinate independent evaluations exercises every three years. The first one will be carried out at the end of 2020. This will allow progress to be assessed and enable the strategy and action plan to be recalibrated in the light of the progress being made, problems being identified and new funding regimes and policy initiatives that will arise from the new 7-year EU programming period.

Two further external evaluations will be commissioned at the end of 2023, allowing a revision of the next action plan, and in 2026/7, allowing the whole strategy to be evaluated and enabling it to be extended to the subsequent 7-years period.

These exercises will be used to evaluate the strategy and its measures based on the DAC-OECD evaluation criteria, namely: relevance, efficiency, effectiveness, coherence, impact and sustainability.

All the evaluation reports will be available on the www.konkurentnost.mk portal.

Annex A: Manufacturing Analysis

Table A1. Components of GDP by industrial sectors

In current prices (million denars)

Sector/Sub-sector	2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added	Gross output	Value added
B - Mining and quarrying	3138	1483	4138	1921	5683	3125	9739	3224	8117	3914	11288	6181	11976	6051	12116	6610	12672	6876	12788	6632	13336	7127
05. Mining of coal and lignite	58	8	59	5	89	18	489	82	490	42	485	104	444	127	232	106	174	65	171	60	247	138
06. Extraction of crude petroleum and natural gas	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
07. Mining of metal ores	1026	716	1997	1171	3486	2311	6989	2389	4834	2560	7538	4430	8147	4651	8606	4879	8892	5210	8761	4840	8854	5023
08. Other mining and quarrying	1896	708	1875	649	1892	694	2002	652	2474	1171	2719	1362	2903	1048	2683	1332	3215	1450	3376	1519	3499	1639
09. Mining support service activities	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C - Manufacturing	175933	29899	198398	34207	242874	38037	258531	40543	193999	36599	222755	43142	253299	52964	234315	47784	217910	49758	246860	57783	274217	65735
10. Manufacture of food products	19074	1127	20082	1333	21857	1940	26573	2221	25953	2456	30858	6323	34345	3430	33610	3881	35618	7170	35561	8241	37792	9158
11. Manufacture of beverages	7492	2328	8026	2464	8511	2531	9735	2063	10243	1754	10842	3820	11104	3632	11388	3724	11945	3205	11025	3477	12114	3590
12. Manufacture of tobacco products	9350	2330	5640	1580	7218	2064	9087	2541	9550	2211	9152	2323	9737	2132	8936	1891	8439	3441	8212	3279	7339	2134
13. Manufacture of textiles	3066	415	3183	508	3468	653	3645	819	3167	873	3170	470	2672	758	3204	892	3858	1132	4456	1508	5643	2045
14. Manufacture of wearing apparel	29056	6676	27712	6990	34940	7937	35694	8832	32191	8417	33483	7019	34502	8774	34947	8162	16693	8705	17828	9452	17081	9124
15. Manufacture of leather & related	4714	1035	7498	1439	7877	719	7502	370	5708	411	4107	802	3263	734	3112	1016	2433	1188	2555	1245	2421	1238
16. Manufacture of wood and products of wood and cork, except furniture; articles of straw & plaiting	1515	334	1886	620	2421	638	2583	720	2256	748	1672	444	1785	647	1756	577	2133	699	2098	683	2215	743
17. Manufacture of paper &paper products	1662	321	1879	424	2254	548	2417	598	2538	696	2759	716	2571	740	2429	714	2308	615	2424	750	2500	767
18. Printing and reproduction of recorded media	3718	959	4327	1108	4490	1094	5172	1704	4422	1315	4361	982	4660	1326	4457	1216	5204	1783	5629	1797	5674	1878

19. Manufacture of coke and refined petroleum products	22645	2121	29274	2165	28449	2242	37216	2344	21633	728	30692	499	29151	1083	11485	1049	69	12	55	37	55	22
20. Manufacture of chemicals and chemical products	1816	95	1861	206	2172	421	2306	500	2065	556	2238	613	1968	634	1845	646	1937	656	1991	633	2293	708
21. Manufacture of basic pharmaceutical products&preparations	4546	1119	4593	1822	5338	2504	5733	2404	5059	2707	5398	2482	6048	2835	6466	3047	5944	2468	6490	3355	6907	3795
22. Manufacture of rubber and plastic products	4367	876	4204	901	5033	1464	6591	1996	5918	1659	5062	1394	6564	1460	7069	1531	8010	1483	7922	1852	7981	1962
23. Manufacture of other non-metallic mineral products	8240	2614	9785	2791	11286	2854	11752	2357	11280	2339	10081	3951	12867	4934	11434	4131	10893	4063	10818	4149	11049	4264
24. Manufacture of basic metals	31572	3004	43931	4752	70298	4980	62121	5160	27342	3713	39083	4239	42771	4740	36806	3868	34429	4463	34388	3318	31261	4648
25. Fabricated metal products, except machinery & equipment	6610	1641	7657	1507	8919	1665	9008	2173	8614	2530	7367	2060	8134	2674	7981	2517	7478	2209	8228	2651	9468	2683
26. Manufacture of computer, electronic and optical products	2405	280	2069	312	2098	228	2826	307	848	110	979	349	904	312	728	125	1255	330	2077	542	2814	626
27. Manufacture of electrical equipment	3661	869	4024	1024	4519	995	5451	312	5337	708	5894	1013	9394	1552	8958	2039	9169	1397	9766	1572	11084	1855
28. Manufacture of machinery and equipment i.e.	896	211	1035	279	1790	435	1557	448	1342	444	9611	1012	24548	8073	31142	4440	40165	1693	58746	4376	76140	7233
29. Manufacture of motor vehicles, trailers and semi-trailers	4915	168	4897	404	4374	434	4608	484	3278	354	682	66	709	298	822	281	3077	638	9310	2223	14839	4245
30. Manufacture of other transport equipment	827	249	865	244	852	247	767	230	549	206	595	137	700	132	777	59	818	113	1070	280	1140	388
31. Manufacture of furniture	1774	428	1834	491	2509	616	2858	850	2612	1001	2673	1146	3041	1064	2863	946	3803	1314	4063	1355	4224	1586
32. Other manufacturing	851	308	896	375	1027	331	1265	450	818	257	955	622	720	395	904	431	1440	639	1402	683	1022	429
33. Repair and installation of machinery&equipment	1161	391	1240	468	1174	497	2064	660	1276	406	1041	660	1141	605	1196	601	792	342	746	325	1158	614
D - Electricity, gas, steam and air conditioning supply	31402	12386	34232	10369	34520	10366	39535	10220	36848	10875	46186	13532	31558	12442	33826	12357	35647	14303	35810	14262	38255	15853
35. Electricity, gas, steam and air conditioning supply	31402	12386	34232	10369	34520	10366	39535	10220	36848	10875	46186	13532	31558	12442	33826	12357	35647	14303	35810	14262	38255	15853

Total	617309	264847	682689	291105	775084	321378	873068	357150	803581	358369	845805	377201	900366	399376	889606	403684	930141	436706	982380	458128	1042294	488408
Taxes on products net	-	43600	-	43735	-	51511	-	57740	-	56253	-	60095	-	64811	-	63019	-	65185	-	69503	-	70546
GDP (market prices)	-	308447	-	334840	-	372889	-	414890	-	414622	-	437296	-	464186	-	466703	-	501891	-	527631	-	558954

: confidential data; - no occurrence; Source: State Statistical Office

Table A2. Share of industrial sub-sector in sector value added in %

Sector/sub-sector	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average
B - Mining and quarrying	**0,48**	**0,57**	**0,84**	**0,78**	**0,94**	**1,41**	**1,30**	**1,42**	**1,37**	**1,26**	**1,04**
05. Mining of coal and lignite	0,54	0,26	0,58	2,54	1,07	1,68	2,10	1,60	0,95	0,90	**1,22**
07. Mining of metal ores	48,3	61	73,95	74,10	65,4	71,67	76,86	73,81	75,77	72,98	**69,38**
08. Other mining and quarrying	47,7	33,8	22,21	20,22	29,9	22,04	17,32	20,15	21,09	22,90	**25,74**
C – Manufacturing	**9,69**	**10,2**	**10,2**	**9,77**	**8,83**	**9,87**	**11,41**	**10,24**	**9,91**	**10,95**	**10,11**
10. Manufacture of food products	3,77	3,9	5,10	5,48	6,71	14,66	6,48	8,12	14,41	14,26	**8,29**
11. Manufacture of beverages	7,79	7,2	6,65	5,09	4,79	8,85	6,86	7,79	6,44	6,02	**6,75**
12. Manufacture of tobacco products	7,79	4,62	5,43	6,27	6,04	5,38	4,03	3,96	6,92	5,67	**5,61**
13. Manufacture of textiles	1,39	1,49	1,72	2,02	2,39	1,09	1,43	1,87	2,28	2,61	**1,83**
14. Manufacture of wearing apparel	22,3	20,4	20,87	21,78	23,00	16,27	16,57	17,08	17,49	16,36	**19,22**
15. Manufacture of leather and related products	3,46	4,21	1,89	0,91	1,12	1,86	1,39	2,13	2,39	2,15	**2,15**
16. Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1,12	1,81	1,68	1,78	2,04	1,03	1,22	1,21	1,40	1,18	**1,45**
17. Manufacture of paper and paper products	1,07	1,24	1,44	1,47	1,90	1,66	1,40	1,49	1,24	1,30	**1,42**
18. Printing and reproduction of recorded media	3,21	3,24	2,88	4,20	3,59	2,28	2,50	2,54	3,58	3,11	**3,11**
19. Manufacture of coke and refined petroleum products	7,09	6,33	5,89	5,78	1,99	1,16	2,04	2,20	0,02	0,06	**3,26**
20. Manufacture of chemicals and chemical products	0,32	0,6	1,11	1,23	1,52	1,42	1,20	1,35	1,32	1,10	**1,12**
21. Manufacture of basic pharmaceutical products and pharmaceutical preparations	3,74	5,33	6,58	5,93	7,40	5,75	5,35	6,38	4,96	5,81	**5,72**
22. Manufacture of rubber and plastic products	2,93	2,63	3,85	4,92	4,53	3,23	2,76	3,20	2,98	3,21	**3,42**
23. Manufacture of other non-metallic mineral products	8,74	8,16	7,50	5,81	6,39	9,16	9,32	8,65	8,17	7,18	**7,91**
24. Manufacture of basic metals	10	13,9	13,09	12,73	10,15	9,83	8,95	8,09	8,97	5,74	**10,15**
25. Manufacture of fabricated metal products, except machinery and equipment	5,49	4,41	4,38	5,36	6,91	4,77	5,05	5,27	4,44	4,59	**5,07**
26. Manufacture of computer, electronic and optical products	0,94	0,91	0,60	0,76	0,30	0,81	0,59	0,26	0,66	0,94	**0,68**
27. Manufacture of electrical equipment	2,91	2,99	2,62	0,77	1,93	2,35	2,93	4,27	2,81	2,72	**2,63**
28. Manufacture of machinery and equipment i.e.	0,71	0,82	1,14	1,10	1,21	2,35	15,24	9,29	3,40	7,57	**4,28**

29. Manufacture of motor vehicles, trailers and semi-trailers	0,56	1,18	1,14	1,19	0,97	0,15	0,56	0,59	1,28	3,85	**1,15**
30. Manufacture of other transport equipment	0,83	0,71	0,65	0,57	0,56	0,32	0,25	0,12	0,23	0,48	**0,47**
31. Manufacture of furniture	1,43	1,44	1,62	2,10	2,74	2,66	2,01	1,98	2,64	2,34	**2,09**
32. Other manufacturing	1,03	1,1	0,87	1,11	0,70	1,44	0,75	0,90	1,28	1,18	**1,04**
33. Repair and installation of machinery and equipment	1,31	1,37	1,31	1,63	1,11	1,53	1,14	1,26	0,69	0,56	**1,19**
D - Electricity, gas, steam and air conditioning supply	**4,02**	**3,1**	**2,78**	**2,46**	**2,62**	**3,09**	**2,68**	**2,65**	**2,85**	**2,70**	**2,90**

Source: State Statistical Office

Table A3. Chain indices of industrial production (2006-2016)

Sector/Sub-sector	2006 ------- 2005	2007 ------- 2006	2008 ------- 2007	2009 ------- 2008	2010 ------- 2009	2011 `------- 2010 .	2012 ------- 2011	2013 ------- 2012	2014 ------- 2013	2015 ------- 2014	2016 ------- 2015	Average
Total	**105,9**	**103,9**	**105,1**	**91,3**	**95,2**	**106,93**	**97,25**	**103,21**	**104,79**	**104,92**	**103,38**	**101,99**
Mining and quarrying	**111,1**	**110**	**109,4**	**87,6**	**96,2**	**102,59**	**101,78**	**103,39**	**98,05**	**98,63**	**92,21**	**101,00**
Mining of coal and lignite	96,7	98,7	116,7	96,4	89	120,04	92,5	90,75	97,53	91,62	86,07	97,82
Mining of metal ores	118,4	168,9	124,8	95,3	93,3	92,01	114,85	106,24	94,32	98,93	92,19	109,02
Other mining and quarrying	123,2	91,8	89,3	67,6	113,3	101,25	89,73	119,61	108,38	104,92	98,07	100,65
Manufacturing	**106,4**	**105,5**	**105,9**	**89,6**	**92,5**	**109,61**	**97,76**	**102,83**	**109,02**	**105,96**	**105,32**	**102,76**
Manufacture of food products	102,2	105,9	107,6	97,7	102,8	105,26	115,55	98,58	102,53	110,36	97,53	104,18
Manufacture of beverages	100,3	113,1	109,9	99,7	90,8	86,05	109	107,42	90,84	113,01	100,33	101,86
Manufacture of tobacco products	102	99,2	101,9	96,8	119,6	120,96	85,12	108,96	105,6	77,51	102,56	101,84
Manufacture of textiles	97,1	88,6	102,5	66,9	115,4	95,07	93,99	179,83	106,49	114,83	111,47	106,56
Manufacture of wearing apparel	108,7	86	80	88,2	95,3	111,63	92,84	113,65	104,58	106,72	92,74	98,21
Manufacture of leather and related products	85,9	99,9	90,1	95,8	119,1	104,8	82,07	104,13	92,1	81,61	84,23	94,52
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	93,2	100,1	76,5	58,5	147,8	85,13	101,58	74,45	120,44	121,67	130,67	100,91
Manufacture of paper and paper products	102,6	102,6	103,8	118,1	87,9	84,4	162,04	83,11	109,6	112,75	98,79	105,97
Printing and reproduction of recorded media	146,4	87,2	157,3	126,8	65,8	87,23	131,15	90,69	98,58	94,31	96,86	107,48
Manufacture of coke and refined petroleum products	112,2	97,6	101,6	91,1	93,8	80,33	35,16	30,64	0,99	0	0	58,49
Manufacture of chemicals and chemical products	96,4	95,2	112,3	94,1	84,9	105,86	79,93	98,99	111,24	95,35	72,19	95,13
Manufacture of basic pharmaceutical products and pharmaceutical preparations	104,9	104,3	125,2	86,8	97,2	104,43	106,16	97,38	105,17	104,56	109,75	104,17
Manufacture of rubber and plastic products	80,9	102,2	125,9	98,3	88,8	108,41	119,21	110,46	120,12	95,65	118,22	106,20
Manufacture of other non-metallic mineral products	111,3	103,7	97	87,9	85,8	109,67	80,65	105,78	105,8	100,47	119,34	100,67
Manufacture of basic metals	117,8	132,2	94,7	57	131,8	115,26	88,87	89,49	101,39	106,3	88,88	102,15

Manufacture of fabricated metal products, except machinery and equipment	116,3	144,9	152	138,8	46,5	107,31	86,38	58,38	105,12	111,81	88,85	105,12
Manufacture of electrical equipment	120,5	81	127,8	75,2	56,8	132,98	75,81	110,1	130,11	93,99	113,23	101,59
Manufacture of machinery and equipment i.e.	89	161,9	110,7	77,1	116,2	204,52	115,37	125,01	122,8	121,3	122,02	124,17
Manufacture of motor vehicles, trailers and semi-trailers	69,6	73	92,7	61,9	163,7	94,92	61,03	47,3	1494,07	137,03	152,17	222,49
Manufacture of other transport equipment	106,8	133,4	81,6	53,6	144,5	179,57	119,04	103,22	116,25	89,09	98,69	111,43
Manufacture of furniture	76,7	109,3	266,5	71,6	80,5	115,93	100,55	121,15	99,01	112,9	96,4	113,69
Other manufacturing	62,4	62,2	60,6	100	187,1	93,5	89,25	91,44	128,81	99,07	97,93	97,48
Repair and installation of machinery and equipment	160,1	67,9	119,7	51,6	57,8	67,48	74,08	124,59	94	73,1	121,51	91,99
Electricity, gas, steam and air conditioning supply	**100,8**	**90,5**	**96,9**	**108,7**	**114,4**	**96,96**	**90,47**	**105,33**	**85,78**	**103,2**	**98,6**	**99,24**
Electricity, gas, steam and air conditioning supply	100,8	90,5	96,9	108,7	114,4	96,96	90,47	105,33	85,78	103,2	98,6	99,24

0 = value is less than 0,5 of the unit of measure being used
Source: State Statistical Office

Table A4. Indices of labour productivity 2010=100

Sector/Sub-sector	2011	2012	2013	2014	2015
Total	**106,9**	**104,0**	**107,3**	**112,5**	**118,0**
Mining and quarrying	**102,6**	**104,4**	**108,0**	**105,9**	**104,4**
Mining of coal and lignite	120,0	111,0	100,8	98,3	90,0
Mining of metal ores	92,0	105,7	112,3	105,9	104,8
Other mining and quarrying	101,2	90,9	108,7	117,8	123,6
Manufacturing	**109,6**	**107,2**	**110,2**	**120,1**	**127,3**
Manufacture of food products	105,3	121,6	119,9	122,9	135,7
Manufacture of beverages	86,1	93,8	100,8	91,5	103,4
Manufacture of tobacco products	121,0	103,0	112,2	118,5	91,8
Manufacture of textiles	95,1	89,4	160,7	171,1	196,5
Manufacture of wearing apparel	111,6	103,6	117,8	123,2	131,5
Manufacture of leather and related products	104,8	86,0	89,6	82,5	67,3
Manufacture of wood and of products of wood and cork, except furniture	85,1	86,5	64,4	77,5	94,3
Manufacture of paper and paper products	84,4	136,8	113,7	124,6	140,5
Printing and reproduction of recorded media	87,2	114,4	103,8	102,3	96,5
Manufacture of coke and refined petroleum products	80,3	28,2	8,7	0,1	0,0
Manufacture of chemicals and chemical products	105,9	84,6	83,8	93,2	88,8
Manufacture of basic pharmaceutical products & pharmaceutical preparations	104,4	110,9	108,0	113,5	118,7
Manufacture of rubber and plastic products	108,4	129,2	142,8	171,5	164,0
Manufacture of other non-metallic mineral products	109,7	88,4	93,6	99,0	99,4
Manufacture of basic metals	115,3	102,4	91,7	92,9	98,8
Manufacture of fabricated metal products, except machinery, equipment	107,3	92,7	54,1	56,9	63,6
Manufacture of electrical equipment	133,0	100,8	111,0	144,4	135,7
Manufacture of machinery and equipment i.e.	204,5	235,9	295,0	362,2	439,4
Manufacture of motor vehicles, trailers and semi-trailers	94,9	57,9	27,4	409,4	561,0
Manufacture of other transport equipment	179,6	213,8	220,6	256,5	228,5
Manufacture of furniture	115,9	116,6	141,2	139,8	157,9
Other manufacturing	93,5	83,5	76,3	98,3	97,4
Repair and installation of machinery and equipment	67,5	50,0	62,3	58,5	42,8
Electricity, gas, steam and air conditioning supply	**97,0**	**87,7**	**92,4**	**79,3**	**81,8**

Note: Base year for 2006-2009 is 2005; Source: State Statistical Office

Table A5. Export of goods (in mil EUR)

Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
TOTAL	**1.917,51**	**2.477,14**	**2.697,56**	**1.937,04**	**2.534,89**	**3.214,91**	**3.123,95**	**3.235,21**	**3.746,61**	**4.087,58**	**4.390,28**	**5.007,20**	**38,369.88**
Food and live animals	**153,06**	**182,12**	**210,15**	**202,49**	**248,81**	**267,42**	**264,45**	**275,16**	**293,54**	**306,19**	**315,17**	**306,72**	**3,025.28**
Live animals	0,06	0,26	2,46	4,42	3,07	3,04	2,91	1,76	1,92	2,16	0,78	2,26	**25.10**
Meat and meat preparations	15,53	17,85	22,45	25,99	27,87	31,45	30,38	28,25	27,13	23,03	22,98	22,00	**294.91**
Dairy products and eggs	4,83	4,58	6,57	4,60	6,01	7,83	8,80	7,18	9,17	12,75	10,10	14,48	**96.90**
Fish and fish preparations	6,18	6,10	7,63	6,87	6,97	7,25	5,99	4,23	3,91	1,53	0,91	2,30	**59.87**
Cereals and cereals preparations	16,26	22,01	28,22	30,66	36,28	43,25	45,81	50,71	55,43	63,26	66,50	72,34	**530.73**
Fruits and vegetables	87,39	104,36	112,81	101,59	137,35	141,09	136,88	145,97	158,53	164,75	171,99	150,40	**1,613.11**
Sugar, preparations and honey	4,53	6,22	6,90	7,04	8,17	8,67	8,60	8,92	8,75	8,64	8,52	8,59	**93.55**
Coffee tea, cocoa, manufacturers thereof	7,76	9,16	9,63	8,44	10,04	10,16	10,69	11,03	11,37	12,65	14,07	14,82	**129.82**
Feeding stuff animals	0,22	0,14	0,20	0,58	0,41	1,42	0,94	1,44	1,39	1,44	1,15	1,03	**10.36**
Miscellaneous food preparations	10,30	11,44	13,29	12,32	12,65	13,26	13,45	15,68	15,94	15,99	18,18	18,50	**171.00**
Beverages and tobacco	**153,99**	**152,70**	**148,80**	**141,34**	**153,47**	**169,73**	**185,40**	**203,37**	**167,97**	**144,87**	**177,61**	**197,81**	**1,997.06**
Beverages	64,13	75,03	65,01	62,14	59,99	58,49	70,87	66,03	58,46	48,31	59,01	58,65	**746.12**
Tobacco and tobacco manufactures	89,85	77,67	83,78	79,20	93,48	111,24	114,53	137,34	109,50	96,56	118,60	139,15	**1,250.90**
Crude materials, inedible, except fuels	**90,08**	**124,33**	**182,81**	**123,18**	**196,43**	**206,65**	**206,42**	**209,72**	**202,00**	**195,20**	**187,46**	**286,21**	**2,210.49**
Hides, skins and fur undressed	4,06	4,48	3,15	2,21	4,20	7,38	7,37	7,61	5,10	4,30	3,96	4,83	**58.65**
Oil seeds and oleaginous fruits	0,62	1,04	1,37	0,75	1,90	2,41	2,64	2,26	2,75	1,82	1,03	2,99	**21.58**
Crude rubber (including synthetic and reclaimed)	0,00	0,00	0,02	0,01	0,04	0,01	0,09	0,01	0,00	0,03	0,02	0,01	**0.24**
Cork and wood	3,78	5,55	4,02	2,98	2,34	2,45	2,89	1,82	2,05	2,12	2,07	2,34	**34.41**
Pulp and waste paper	0,34	0,55	0,45	0,38	0,69	2,76	2,57	2,88	3,05	3,27	4,46	4,81	**26.21**
Textile fibbers and their wastes	1,09	1,20	0,71	0,38	1,23	1,81	1,12	1,54	1,48	1,52	0,70	1,57	**14.35**
Crude fertilizers and crude minerals	13,61	13,51	15,97	20,38	27,24	26,05	20,20	22,33	26,06	23,43	23,96	43,53	**276.27**
Metalliferous ores and metal scrap	61,28	92,44	151,36	91,84	153,46	157,88	163,72	164,13	155,38	149,03	137,76	210,04	**1,688.32**
Crude animal and vegetable materials n.e.s	5,30	5,56	5,77	4,24	5,33	5,89	5,81	7,15	6,12	9,66	13,51	16,08	**90.42**
Mineral fuels, lubricants and related materials	**178,36**	**120,12**	**210,66**	**144,52**	**195,12**	**279,39**	**200,99**	**80,32**	**65,87**	**55,46**	**52,04**	**75,36**	**1,658.21**
Coal, coke and briquettes	2,02	2,12	0,68	0,82	1,41	0,73	1,21	0,20	0,02	0,57	0,16	0,16	**10.10**
Petroleum and petroleum products	161,45	114,93	204,81	136,35	164,89	238,96	160,47	71,48	55,36	42,37	41,36	48,35	**1,440.78**
Gas natural and manufactured	3,26	1,52	4,54	3,44	2,66	4,00	4,05	3,85	2,14	2,21	2,10	2,35	**36.12**
Electric energy	11,63	1,55	0,63	3,92	26,16	35,70	35,26	4,79	8,34	10,30	8,42	24,50	**171.20**
Animal and vegetable oils and fats	**1,72**	**1,75**	**8,45**	**5,93**	**8,45**	**12,82**	**12,11**	**7,29**	**9,40**	**18,34**	**18,37**	**6,08**	**110.71**
Chemicals	**79,94**	**96,85**	**123,43**	**122,91**	**288,20**	**537,65**	**528,94**	**630,41**	**795,92**	**922,99**	**1.036,79**	**1.200,93**	**6,364.96**
Organic chemicals	1,74	2,41	1,24	1,21	1,22	1,86	1,62	1,28	1,46	1,81	1,77	1,46	**19.08**

Inorganic chemicals	6,86	5,73	7,39	7,69	7,63	15,56	8,32	8,73	7,87	7,49	7,60	8,44	**99.31**
Dyeing tanning and colouring materials	12,51	13,97	15,37	13,31	11,20	11,77	10,95	10,48	10,39	10,78	10,82	11,85	**143.40**
Medical and pharmaceutical products	35,14	40,21	51,56	51,71	57,84	59,82	65,08	60,72	61,71	63,75	69,46	79,85	**696.85**
Essential oils and perfume materials, toilet prps	5,09	6,48	6,77	6,72	6,94	8,22	8,86	9,55	9,68	10,39	10,77	11,68	**101.15**
Fertilizers (other than crude)	0,01	0,01	0,06	0,03	0,04	0,46	0,63	0,31	0,07	0,10	0,24	0,57	**2.53**
Plastics in primary forms	2,95	5,00	7,33	6,23	8,08	12,31	12,88	12,74	11,19	12,00	11,90	13,47	**116.08**
Plastics in non-primary forms	11,90	18,21	28,42	27,11	22,69	29,48	32,54	42,63	38,13	37,48	40,79	42,01	**371.39**
Chemical materials and products, n.e.s.	3,74	4,84	5,30	8,88	172,55	398,17	388,06	483,97	655,42	779,17	883,43	1.031,58	**3,783.53**
Manufactured goods classified chiefly by material	**676,85**	**1.104,75**	**1.079,16**	**551,23**	**750,48**	**884,79**	**808,13**	**775,82**	**725,96**	**724,36**	**625,81**	**674,52**	**9,381.86**
Leather, leather manufactures, n.e.s. and dressed fur skin	0,78	0,63	0,93	1,02	1,22	1,78	1,33	1,45	1,12	1,12	1,17	2,54	**15.09**
Rubber manufactures, n.e.s.	0,31	0,44	0,52	0,65	0,49	0,45	0,46	2,54	3,71	6,22	7,38	9,21	**32.38**
Wood and cork manufactures(excluding furniture)	2,82	4,52	4,32	3,79	3,62	3,10	3,09	2,88	3,21	3,90	4,45	4,15	**43.85**
Paper, paperboard and articles of paper pulp	7,94	12,71	10,42	8,32	9,29	9,28	7,03	6,50	6,87	8,60	9,63	10,97	**107.56**
Textile yarn, fabrics, madeup articles & products	36,28	36,93	38,15	32,76	42,71	43,17	46,69	58,52	59,25	60,54	70,67	71,29	**596.96**
Non-metallic manufactures, n.e.s	55,70	70,56	78,43	65,15	54,80	49,20	42,99	37,54	37,19	43,34	40,98	52,86	**628.74**
Iron and steel	530,18	926,50	870,59	381,54	589,69	725,90	649,68	605,99	551,30	522,23	413,98	435,62	**7,203.20**
Non-ferrous metals, n.e.s	6,44	6,88	5,24	4,95	6,14	5,55	10,90	16,58	10,27	15,29	7,80	11,73	**107.77**
Manufactures of metals, n.e.s	36,40	45,57	70,56	53,05	42,52	46,37	45,97	43,82	53,04	63,12	69,77	76,15	**646.34**
Machinery and transport equipment	**94,38**	**109,94**	**126,68**	**109,98**	**150,28**	**254,10**	**310,44**	**429,41**	**789,44**	**1.008,58**	**1.234,60**	**1.476,10**	**6,093.93**
Power generating machinery and equipment	1,26	1,85	2,24	3,80	1,21	0,94	0,79	0,74	0,75	1,01	1,94	1,15	**17.68**
Machinery specialized for particular industries	4,05	7,77	10,33	9,02	8,12	11,84	11,78	10,69	11,93	12,94	17,30	10,91	**126.68**
Metal working machinery	1,00	1,22	1,18	0,53	1,57	0,84	1,70	1,01	1,18	0,92	2,07	1,54	**14.76**
General industrial machinery	8,99	12,03	11,43	15,01	33,58	88,13	147,20	214,31	335,00	446,57	517,97	553,62	**2,383.84**
Office machines & automatic processing machines	1,69	2,11	2,60	3,25	2,71	4,19	3,90	3,19	3,11	4,07	4,25	3,33	**38.40**
Telecommunication apparatus and equipment	0,91	1,93	5,61	3,05	3,73	4,41	3,78	4,76	7,07	13,95	27,00	27,68	**103.88**
Electrical machinery, apparatus and appliances	47,39	50,04	61,12	54,65	71,10	114,25	105,25	149,78	326,29	401,69	482,90	640,05	**2,504.51**
Road vehicles	21,33	24,35	23,87	16,30	22,41	22,83	28,62	35,30	90,14	109,51	163,80	226,31	**784.77**
Other transport equipment	7,75	8,65	8,31	4,38	5,85	6,69	7,42	9,63	13,97	17,91	17,38	11,50	**119.44**
Miscellaneous manufactured articles	**486,72**	**583,30**	**606,46**	**534,86**	**541,86**	**600,38**	**606,33**	**621,22**	**693,32**	**710,44**	**738,35**	**779,21**	**7,502.45**
Prefabricated buildings, sanitary plumb. heat, light fixtures and fittings	5,32	5,90	5,33	4,59	4,55	2,18	1,26	0,87	0,83	1,17	1,78	1,92	**35.70**

Furniture and parts thereof	10,50	17,16	23,78	22,95	25,76	30,02	42,58	49,22	76,32	123,66	157,78	196,06	**775.79**
Travel goods	0,40	0,33	0,23	0,17	0,18	0,67	1,24	1,74	1,49	1,49	1,22	1,43	**10.59**
Clothing	410,68	478,10	485,52	420,01	425,96	473,54	468,59	472,03	509,16	481,88	473,99	465,06	**5,564.52**
Footwear	45,19	62,31	62,00	58,61	57,09	59,34	53,78	58,93	63,54	57,93	54,10	57,27	**690.09**
Scientific and controlling instruments	0,94	1,37	8,65	9,70	8,99	11,07	10,67	8,91	10,69	12,80	12,35	14,16	**110.30**
Photo cameras, watch	0,33	0,54	0,49	0,32	0,35	0,44	0,55	1,01	1,31	1,39	1,56	1,87	**10.16**
Miscellaneous manufactured articles, n.e.s	13,35	17,58	20,46	18,51	18,98	23,11	27,64	28,50	29,99	30,12	35,56	41,46	**305.26**
Commodities & transactions not classified in SITC	**2,42**	**1,28**	**0,94**	**0,59**	**1,79**	**1,98**	**0,74**	**2,49**	**3,19**	**1,15**	**4,08**	**4,27**	**24.92**

Source: National Bank of the Republic of Macedonia

Table A6. FDI inflow in industrial sectors and sub-sectors (2009-2015) in million euro

Sector/sub-sector	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
MINING AND QUARRYING	**-5,77**	**42,09**	**43,55**	**-17,22**	**4,02**	**27,85**	**-103,65**
Extraction of crude petroleum, natural gas & mining support service activities	1,10	0,50	0,17	-0,10	-0,65	0,68	0,35
MANUFACTURING	**48,44**	**84,58**	**208,77**	**49,35**	**85,17**	**57,87**	**11,28**
Food products, beverages and tobacco products	**34,01**	**13,81**	**49,27**	**-17,43**	**-5,87**	**-2,11**	**34,42**
TOTAL textiles & wood activities	**4,15**	**7,88**	**28,69**	**23,45**	**17,10**	**8,01**	**-13,22**
Textiles and wearing apparel	4,71	6,22	26,22	23,60	17,18	8,32	-13,11
Wood, paper, printing and reproduction	-0,56	1,67	2,48	-0,15	-0,08	-0,30	-0,10
TOTAL petroleum, chemicals, pharmaceutical products, rubber & plastic	**4,53**	**-0,18**	**2,50**	**-10,79**	**-4,10**	**-3,90**	**3,06**
Coke and refined petroleum products	1,75	1,45	-0,91	-8,02	-1,99	-6,62	0,00
Chemicals and chemical products	2,15	1,09	3,78	-0,96	-1,52	-0,03	0,83
Basic pharmaceutical products and pharmaceutical preparations	0,00	-3,56	-1,61	-0,45	-1,25	-1,16	0,41
Rubber and plastic products	0,73	0,84	1,25	-1,37	0,66	3,90	1,83
TOTAL metal & machinery products	**-47,22**	**-12,41**	**39,69**	**11,68**	**-43,59**	**-12,99**	**9,25**
Basic metals and fabricated metal products	-48,74	-11,98	35,07	-2,99	-43,25	-13,38	5,46
Computer, electronic and optical products	0,00	0,01	4,07	14,65	-0,62	0,00	0,08
Computers and peripheral equipment	0,00	0,00	0,00	0,00	-0,04	-0,05	0,00
Communication equipment and consumer electronics	0,00	0,01	0,01	0,02	0,00	0,01	0,00
Instruments and appliances for measuring, testing and navigation; watches and clocks; irradiation, electromedical and electrotherapeutic equipment	0,00	0,00	0,00	0,00	0,00	0,23	0,00
Machinery and equipment i.e.	1,52	-0,44	0,55	0,02	0,27	0,40	3,71
TOTAL vehicles & other transport equipment	**54,67**	**69,03**	**88,34**	**24,04**	**99,44**	**90,10**	**-24,53**
Motor vehicles, trailers and semitrailers	52,77	65,51	87,42	23,17	96,81	88,27	-25,50
Other transport equipment	1,90	3,52	0,93	0,87	2,63	1,83	0,96
Air and spacecraft and related machinery	0,00	0,00	0,00	0,00	0,00	0,00	0,00
TOTAL of other manufacturing	**-1,95**	**6,46**	**0,27**	**18,40**	**22,18**	**-21,24**	**2,31**
ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY	**24,42**	**1,28**	**5,09**	**21,90**	**14,92**	**27,60**	**-6,63**
TOTAL	**144,97**	**160,47**	**344,41**	**111,22**	**252,20**	**205,14**	**130,48**

Source: National Bank of the Republic of Macedonia

Table A7. Competitive Industrial Performance Index of Macedonia (2005-2014)

Indicator	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
CIP rank	81	85	87	83	89	91	86	86	88	92
CIP value	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Per capita indicators										
Manufacturing Value Added per capita in USD	516.44	470.66	447.91	481.31	441.52	407.15	432.21	400.73	377.17	289.12
Manufactured Exports per capita in USD	2149.86	1828.13	1719.54	1922.89	1423.55	811.61	1468.71	1468.71	1023.68	867.39
World share indicators										
Impact of a country on World Manufacturing Value Added	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Impact of a country on World Manufactures Trade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of medium- and high-tech activities										
Medium- and High-tech Manufacturing Value Added share in total manufacturing value added	0.16	0.16	0.16	0.15	0.19	0.15	0.14	0.13	0.14	0.14
Medium- and High-tech manufactured Exports share in total manufactured exports	0.55	0.48	0.43	0.40	0.31	0.18	0.30	0.30	0.22	0.20
Share of national aggregates										
Manufacturing Value Added share in total GDP	0.11	0.10	0.10	0.11	0.10	0.09	0.10	0.10	0.10	0.08
Manufactured Exports share in total exports	0.92	0.90	0.90	0.90	0.89	0.63	0.92	0.92	0.89	0.89
Manufacturing export indexes										
Manufactured Exports per capita index	0.06	0.05	0.05	0.05	0.04	0.03	0.04	0.04	0.03	0.03
Share of manufactured exports in total exports index	0.94	0.91	0.92	0.93	0.91	0.65	0.94	0.94	0.91	0.91
Share of Medium and High-Tech Activities in Manufacturing Export Index	0.59	0.56	0.50	0.46	0.38	0.22	0.37	0.36	0.27	0.25
Industrial export quality index	0.77	0.74	0.71	0.69	0.65	0.43	0.66	0.65	0.59	0.58
MVA indexes										
MVA per capita index	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02
Share of MVA in GDP index	0.32	0.30	0.29	0.31	0.29	0.25	0.25	0.24	0.23	0.17
Share of Medium and High-Tech Activities in Total MVA Index	0.19	0.18	0.18	0.18	0.22	0.17	0.15	0.14	0.16	0.17
Industrialization intensity index	0.25	0.24	0.23	0.25	0.26	0.21	0.20	0.19	0.20	0.17

Source: UNIDO

Table A8. Competitive Industrial Performance Index between selected Middle group of countries (2014)

Indicator	Turkey	Russia	Romania	Belarus	Estonia	Bulgaria	Croatia	Ukraine	Serbia	Macedonia	BiH	Moldova
CIP rank	30	31	36	41	48	55	56	57	69	81	85	111
CIP value	0.13	0.13	0.11	0.08	0.07	0.06	0.05	0.05	0.04	0.03	0.02	0.01
Per capita indicators												
Manufacturing Value Added per capita	1799.26	1531.75	1796.62	1582.17	2622.46	1011.34	1611.23	384.24	636.50	516.44	505.66	228.55
Manufactured Exports per capita	1823.23	1577.41	2813.31	3298.95	11553.59	2956.96	2751.43	904.16	1321.17	2149.86	1241.85	271.61
World share indicators												
Impact of a country on World Manufacturing Value Added	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Impact of a country on World Manufactures Trade	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of medium- and high-tech activities												
Medium- and High-tech Manufacturing Value Added share in total manufacturing value added	0.30	0.26	0.38	0.36	0.29	0.32	0.32	0.41	0.22	0.16	0.15	0.10
Medium- and High-tech manufactured Exports share in total manufactured exports	0.41	0.22	0.56	0.35	0.50	0.39	0.42	0.40	0.47	0.55	0.24	0.27
Share of national aggregates												
Manufacturing Value Added share in total GDP	0.16	0.13	0.22	0.24	0.15	0.14	0.12	0.12	0.15	0.11	0.11	0.11
Manufactured Exports share in total exports	0.88	0.45	0.87	0.85	0.84	0.72	0.85	0.75	0.84	0.92	0.81	0.61
Manufacturing export indexes												
Manufactured Exports per capita index	0.05	0.04	0.08	0.09	0.31	0.08	0.07	0.02	0.04	0.06	0.03	0.01
Share of manufactured exports in total exports index	0.90	0.46	0.89	0.87	0.87	0.74	0.87	0.77	0.87	0.94	0.83	0.63
Share in world manufacturing exports index	0.06	0.10	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00
Share of Medium and High-Tech Activities in Manufacturing Export Index	0.43	0.23	0.60	0.37	0.53	0.42	0.45	0.42	0.50	0.59	0.26	0.29
Industrial export quality index	0.67	0.35	0.74	0.62	0.70	0.58	0.66	0.60	0.68	0.77	0.54	0.46
MVA indexes												
MVA per capita index	0.12	0.11	0.12	0.11	0.18	0.07	0.11	0.03	0.04	0.03	0.03	0.01
Share of world MVA index	0.05	0.08	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Share of MVA in GDP index	0.47	0.39	0.65	0.74	0.44	0.42	0.36	0.36	0.45	0.32	0.33	0.33
Share of Medium and High-Tech Activities in Total MVA Index	0.37	0.31	0.47	0.45	0.35	0.39	0.39	0.50	0.27	0.19	0.18	0.13
Industrialization intensity index	0.42	0.35	0.56	0.59	0.40	0.41	0.37	0.43	0.36	0.25	0.26	0.23

Source: UNIDO

Table A9. Basic structural business indicators by Activity in 2015

	2013			2014			2015		
	No. of enterprises	No. of employees	Turnover, in million denars	No. of enterprises	No. of employees	Turnover, in million denars	No. of enterprises	No. of employees	Turnover, in million denars
Manufacturing	7135	104104	229461	7085	108566	255533	7362	113264	281595

Source: State Statistical Office

Table A10. Basic structural business indicators by sub-sectors in 2015

	Number of enterprises	Number of employees	Turnover (in millions MKD)
C MANUFACTURING	7362	113264	281595
C10 Manufacture of food products	1529	16306	41139
C11 Manufacture of beverages	105	:	:
C12 Manufacture of tobacco products	15	1788	6008
C13 Manufacture of textiles	193	:	5875
C14 Manufacture of wearing apparel	894	33014	16280
C15 Manufacture of leather and related products	148	5116	2585
C16 Wood and of products of wood and cork, except furniture, straw and plaiting	397	1869	2136
C17 Manufacture of paper and paper products	214	1338	3473
C18 Printing and reproduction of recorded media	408	2506	4623
C19 Manufacture of coke and refined petroleum products	5	:	:
C20 Manufacture of chemicals and chemical products	95	:	2950
C21 Basic pharmaceutical products and pharmaceutical preparations	8	:	:
C22 Manufacture of rubber and plastic products	447	3444	9253
C23 Manufacture of other non-metallic mineral products	306	:	:
C24 Manufacture of basic metals	50	:	:
C25 Manufacture of fabricated metal products, except machinery and equipment	823	6427	11042
C26 Manufacture of computer, electronic and optical products	54	:	:
C27 Manufacture of electrical equipment	114	:	:
C28 Manufacture of machinery and equipment n.e.c.	148	1791	:
C29 Manufacture of motor vehicles, trailers and semi-trailers	36	:	:
C30 Manufacture of other transport equipment	5	:	:
C31 Manufacture of furniture	593	4206	4729
C32 Other manufacturing	498	1549	1271

: not available; Source: State Statistical Office

Table A11. External trade and number of enterprises by sectors of activity and by employment size class, 2014-2015

	Number of enterprises				Value in thousand EUR			
	2014		2015		2014		2015	
	export	import	export	import	export	import	export	import
C10 Manufacture of food products	159	253	152	253	**140547**	137521	**166346**	153521
C11 Manufacture of beverages	**56**	**47**	**51**	**52**	53503	41714	44776	52459
C12 Manufacture of tobacco products	**8**	**6**	**12**	**7**	66438	21916	62247	23280
C13 Manufacture of textiles	38	63	45	63	81861	79829	129585	105804
C14 Manufacture of wearing apparel	176	221	163	211	**353092**	250095	**347212**	244818
C15 Manufacture of leather and related products	44	49	41	46	41980	30825	41982	28020
'C16 Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials'	69	107	73	99	5287	7912	6022	8693
C17 Manufacture of paper and paper products	38	87	32	75	6499	22407	8004	23615
C18 Printing and reproduction of recorded media	48	99	44	94	8822	20371	8936	21655
C19 Manufacture of coke and refined petroleum products	..	5	..	5	..	..	168	1140
C20 Manufacture of chemicals and chemical products	28	40	25	45	11667	14538	14352	19948
C21 Basic pharmaceutical products and pharmaceutical preparations	4	5	..	6	..	..	..	..
C22 Manufacture of rubber and plastic products	113	163	118	160	65880	76663	64961	80457
C23 Manufacture of other non-metallic mineral products	70	118	67	119	47152	53354	50227	55539
C24 Manufacture of basic metals	18	25	21	22	**549473**	405650	**521081**	..
'C25 Fabricated metal products, except machinery and equipment'	131	230	150	227	46499	40091	58601	43813
'C26 Manufacture of computer, electronic and optical products'	15	43	16	40	..	27586	..	39998
C27 Manufacture of electrical equipment	33	68	41	60	57429	50476	151428	125781
C28 Manufacture of machinery and equipment n.e.c.	40	70	50	80	10127	13294	..	..
'C29 Manufacture of motor vehicles, trailers and semi-trailers'	14	22	17	22	**1308536**	1120909	**332836**	286910
C30 Manufacture of other transport equipment	..	4	..	5	..	..	..	..
C31 Manufacture of furniture	97	105	97	107	22502	16595	23442	17747
C32 Other manufacturing	19	39	15	46	4927	5320	3751	5074
C33 Repair and installation of machinery and equipment	10	61	16	67	160	3188	665	3163

.. not available / Source: State Statistical Office

Table A12. External trade of products by activity, cumulative data 2015-2017

	2015M12		2016M12		2017M08	
	export	import	export	import	export	import
	1000 EUR	1000 EUR	1000 EUR	1000 EUR	1000 EUR	1000 EUR
C Manufactured products	**3693412**	**5345612**	**3916217**	**5741227**	**2844536**	**4037489**
10 Food products	227583	513556	229130	518609	138010	361337
11 Beverages	48422	35342	59093	37604	39216	27760
12 Tobacco products	10218	17048	12079	18026	12287	19077
13 Textiles	76946	410923	81008	401421	54845	273248
14 Wearing apparel	**480456**	62695	**462987**	72860	**295628**	48421
15 Leather and related products	60427	63811	53541	77350	40766	60054
16 Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	5655	62966	7178	67662	4188	48207
17 Paper and paper products	11364	107142	12797	112028	9125	72695
18 Printing and recording services	25	526	21	669	9	337
19 Coke and refined petroleum products	43007	451357	40128	407031	32598	313519
20 Chemicals and chemical products	**820926**	472032	**925448**	488801	**694516**	343712
21 Basic pharmaceutical products and pharmaceutical preparations	63956	132170	69691	146930	48431	92038
22 Rubber and plastic products	64308	225877	70572	243891	48289	166776
23 Other non-metallic mineral products	46059	265656	42763	334395	34725	237266
24 Basic metals	**537831**	1056521	420092	1169149	309022	819549
25 Fabricated metal products, except machinery and equipment	45907	117951	49855	133859	31098	89947
26 Computer, electronic and optical products	29829	259122	27571	273135	17288	177193
27 Electrical equipment	204505	331885	189074	385621	183093	301973
28 Machinery and equipment n.e.c.	459671	333541	**536027**	353130	**368634**	234019
29 Motor vehicles, trailers and semi-trailers	316388	277781	456672	333024	355860	232475
30 Other transport equipment	19688	25795	19369	25494	8220	22376
31 Furniture	104721	37628	131484	48566	105975	37476
32 Other manufactured goods	15523	84285	19638	91973	12712	58033

Source: State Statistical Office

Annex B: Manufacturing Action Plan

Strategic Objective 1: Reinforce the Manufacturing Foundation

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
1.1	*Identify and target support to priority **manufacturing sub-sectors**, through smart specialisation*	Smart specialisation (SS) strategies will be developed at national and, if possible, regional level. As part of the process, the priority manufacturing sub-sectors, including possible service sectors such as ICT, will be identified using quantitative and qualitative methods. The priority manufacturing sub-sectors will be promoted systematically.	MoES MoE DPMEA	2018-2020 IPA /GRC (donors)	• National SS strategy • Priority manufacturing sub-sectors identified • Priority sub-sectors promoted at national & regional levels
1.2	*Maximise the capacity of the **Economic Growth Plan (EGP)** to be effective*	The EPG will invest EUR 150 million into the manufacturing sector until 2022. The 12 programmes will be targeted at the previously identified priority manufacturing sub-sectors (see 1.1 above). This measure involves three aspects: • The EPG will be monitored regularly; • The EPG will be evaluated regularly.	DPMEA All implementers e.g. FITR, DTIDZ, InvestMacedonia, etc.	2018-2020 EUR 50,000 for evaluations (donors/state)	• EUR 90 MM absorbed • # of manufacturers supported • % of funds for manufacturers • # new manufacturing jobs • % of manufacturing export • # of monitoring reports • # evaluations
1.3	*Focus **Foreign Direct Investment (FDI)** policy on the manufacturing sector (and streamline state aid)*	The key FDI players (Ministers without Portfolio, InvestMacedonia, Department of TIDZ, Embassies) will coordinate their activities with an explicit manufacturing sector and priority sub-sector (see 1.1– smart specialisation) focus, with an emphasis on value adding/R&D/green FDI. The FDI-related state aid system will be operated by one institution to increase transparency and efficiency.	FDI Ministers InvestMacedonia DTIDZ Embassies	2018-2020	• FDI as % of GDP • 40% manufacturing FDI • 25% of manufacturing FDI inflow green/R&D • Unitary FDI-related state aid system established
1.4	*Stimulate **investment** (EGP, Measures 1.4, 1.5 and 1.6).*	The new Economic Growth Plan will stimulate investment through 3 activities: • Support for Investment Projects of Significant Economic Interest: exemption from income tax on wages; income tax; received a 10% grant anda grant per employee; • Support to Increase Capital Investments and Incomes: 10% of investment in new machinery, equipment or premises / land); • Support for Acquisition of Companies facing Difficulties: rebate of 10% of the value of the investment in machinery and liabilities of the bankruptcy or liquidation.	Ministers without Portfolio InvestMacedonia Foreign investors Domestic investors	2018-2020 up to 61,500,000 MKD (1,000,000 EUR) per applicant (state) for all three activities	• FDI as % of GDP • % manufacturing FDI • # requestsfor 3 activities • % successful requestsfor 3 activities • # companies facing difficulties supported
1.5	*Develop the **Technological and Industrial Development Zones (TIDZs)** with a manufacturing focus*	8 TIDZs are active and a further 6 in the pipeline, not counting Skopje 3. This activity focuses on fully utilising Skopje 1 & 2, Stip, Tetovo, Prilep, Struga, Kicevo and	DTIDZ InvestMacedonia FDI Ministers	2018-2020	• Skopje 1 & 2 fully utilised • Stip and Tetovo fully utilised • # tenants in TIDZs

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		Strumica TIDZs, to prepare Skopje 3 and then to prioritise the implementation of the other TIDZs. To coordinate with the FDI approach (see 1.3 and 1.4), the focus will be on securing tenants in the identified manufacturing sub-sectors (see 1.1), including R&D, IT and capital-intensive investments.	Foreign MNCs		• Prilep, Struga, Kicevo and Strumica fully utilised • Skopje 3 ready for investors • % high tech firms • % R&D firms • % employees in high tech
1.6	*Further development of **industrialclusters** with a focus on innovation and competitiveness*	The MoE will establish an integrated programme for different types of clusters (immature, mature, clusters in transitions, etc.), to address their specific development needs. The donor funded "Pilot Integrated Cluster Programme for Immature Clusters" willsupportindustrial/manufacturing clusters to develop innovation clustering with a mixture of capacity building, awareness raising, consultancy and grant funding, designed to strengthen innovation and competitiveness. It will also support companies operating in sectors within the smart specialisation strategy to implement new business models to integrate SMEs in Global Value Chains.	MoE Cluster Managers SMEs	2019-2022 EUR 2MM (donor)	• 5 manuf. clusters supported • # innovating/collaborative activities performed • # signed agreements with R&D institutions • Increased turnover • Increased profitability • Increased export • Increased R&D • Increased employment
1.7	*Support the establishment of **value chains** with a manufacturing focus and link manufacturing firms to global value chains*	This activity will identify and support the strengthening of 5 manufacturing value chains with a close link with the existing TIDZs, since this offers the greatest opportunity to link domestic firms to national, regional (Western Balkans and EU) and wider global value chains. This will be achieved through a donor funded project to select the value chains, perform the VC analysis and technical assistance and finance for companies to implement the recommendations.	MoE DTIDZ SMEs	2019-2022 EUR 3 MM (donor)	• 5 value chains supported • # TIDZ firms involved • 5 value chain analyses with recommendations • # of VC projects supported to fill the gaps in the VC • # SMEs supported
1.8	*Creating Conditions and Preparation of **Legal Bases for Development of Venture Capital** for manufacturing firms (EGP, Pillar 3, Measure 3.5)*	This activity concerns the development of the legal and financial basis for establishing a Fund of Equity and Mezzanine finance to support activities relating to the preparation and realization of projects for technological development. It will involve three main tasks: • Creation of bye laws to establish the fund; • Support for technological development projects.	MoF FITR Firms	2018-2020 50.000.000 MKD (up to MKD 30 MM / EUR 487,800 per applicant (state)	• Bye laws adopted • Volume of Fund • Volume of equity • Volume of mezzanine funding • # firms supported • Increase in employment, turnover, export, profit

Strategic Objective 2: Raise Productivity, Innovation and Technology Transfer

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
2.1	Strengthen the institutional base for **Technology Transfer / Extension / Absorption** in support of the manufacturing sector (various EGP Measures)	The rate of technology acquisition, adaptation, dissemination and absorption needs to be increased in relation to SMEs. Four main initiatives will be implemented to assist with TT/TE/TA: • FITR will support technology extension and absorption through instrument for support of technology extension; • NTTO will be created and deliver technology transfer; • Science and Technology Park will be established for TTconnecting Faculties in Skopje; • IPA application will be considered to help Technical Facultiestofacilitatefirm collaboration in respect to digitisation of industrial processes through TT Centres.	FITR MoES/NTTO/FITR MoES/NTTO/FITR Faculties/MoE	2018-2020 EUR 1.5 MM (state) EUR 500,000 (state) EUR 180,000 (feasibility, state) EUR 20,000 (state) and 2 MM (donor)	• Volume of funding for TT/E/A • # SME supported with TT/E/A • NTTO established & operational • STP feasibility study • STP operational • Increase in level of technology absorption rank (105th in 2016)
2.2	**Raise innovation levels** among manufacturing SMEs (EGP Measure 3.3).	Certain production / manufacturing sub-sectors offer technological and innovation potential, but support is needed in terms of the process of commercialisation of research and access to laboratories and research equipment. Assistance will be providedto SMEs for the development and application of innovative solutions such as: development and introducing new products or services, improvement of the existing products or services, new fashion collections, industrial design or redesigning the products, new packages and marketing plans (market analysis, competitors' analysis, product research, sales, etc.), improvement of the existing or introducing new manufacturing processes.	FITR Enterprises	2019-2020 Up to 20 MM MKD (325,200 EUR) per applicant (state)	• # applications for funding • # successful applications • Volume of investment • Volume of state funding • # of innovations • # patents
2.3	Support **Fast Growing SMEs ("Gazelles")** with technological development (EGP Measure 3.1).	Financial support will be awarded competitively (calls for proposals) to "Gazelles" for technological development of the companies, covering 30% of the investments in, for example: European product safety; quality certificates; industrial and intellectual ownership rights; information systems; energy efficiency; environmental protection consulting and waste management systems.	FITR SMEs	2018-2020 Up 10 MM MKD (162,000 EUR) per applicant (state)	• # applications for funding • # successful applications • Volume of tech investment • Volume of state funding • # growing more than 20% per year

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
2.4	Strengthen **linkages between foreign investors and domestic manufacturers** *(party EGP, Pillar 1, Measure 1.2)*	The weak linkage between MNCs and domestic SMEs remains weak and underdeveloped. This activity involves two tasks: • To build on the piloted WB automotive initiative and mainstream it to strengthen the linkages between manufacturing FDI in the TIDZs and domestic SMEs; • To implement EGP measure to allow tenants of TIDZs and others to receive financial support for business linkage with domestic suppliers (up to 1% of total procurements if they procure 15% of production inputs from domestic firms).	DTIDZ MNCs SMEs DTIDZ MNCs SMEs	2018-2020 EUR 2 MM (state) EUR 2 MM (donor Up to 18,5 MM MKD EUR 300,000 per firm (state)	• #local manuf. firms linked • Volume of contracts with domestic suppliers • Volume of co-financing • # requests for funding • # successful requests • Volume of procurement • Volume of state funding
2.5	Identify and support manufacturing **Key Emerging Technologies** (KETs) and **Smart Factories** (Industry / Factory 4.0)	KETs and smart factories underpin the future manufacturing capabilities in a broad range of industries, catalysing the next wave of high value products and production technologies, including the development of new industries and business models. This activity involves the: Establishment of a technical Working Group to make recommendations for targeted instruments of state support and maximising access to EU funds; A donor funded project will be developed and implemented based on recommendations of the technical Working Group.	MoE MoES Universities Private Sector	2019-2020 EUR 500,000 (donor)	• Technical WG established • WGKET &Smart factory recommendations • 2 EU applications for funding • 10KET / Smart Factory projects submitted for EU funding • 5 successful KET / Smart Factory projects implemented

Strategic Objective 3: Catalyse Green Industry and Green Manufacturing

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
3.1	*Undertake **Green Regulatory Reform***	This activity will involve green regulatory reformwith a focus on the manufacturing sector including: new laws and regulations, partly connected with EU directives (e.g. WEEE, RoHS,REACH, etc.)to promote green manufacturing: • Awareness raising programme for business associations and SMEs: • New Energy Law; • New Energy Efficiency Law; • Legal basis for Energy Efficiency Fund • Industrial Rulebook (Energy Audit/ISO 50001); • Preparation Long Term Strategyon Climate Action; • Preparation of Law on Climate Action; • NewControl of Industrial Emissions Law.	MoE/MoEPP/Agency, Biz Associations MoE MoE To be determined Energy Agency MoEPP MoEPP MoEPP	2019-2020 EUR 50,000 (donor) 2018 2018-19 2019-20 2018-19 2018-20 2018-20 2019-20 2019-20	• # events for SMEs • # SMEs participating • Law adopted • Law adopted • Escrow basis created • Rulebook adopted • Draft created • Draft created • Law adopted
3.2	***Green Public Procurement (GPP)****in industry*	GPP can boost demand for resource efficient, durable, recyclable, repairable products, and promote new business models by enabling local, regional and national authorities to set examples to follow for businesses, industries, etc. • The new Public Procurement Law will be revised to allow sustainable / environmental / green development considerations, including the necessary manuals and capacity building for contracting authorities. • The new Law on Energy Efficiency will be revised to introduce procurement requirements in relation to energy efficiency for public sector institutions.	MoF/PP Bureau MoE	2019-2020 EUR 30,000 (donor) 2018	• GPP in new PP law • % of GPP in total PP • Law approved
3.3	*Embed **sustainability as a core business strategy** in manufacturers*	Green manufacturing can lower raw material costs, environmental and occupational safety expenses, waste or pollution, gaining production efficiency and improving corporate image. Businesses will be assisted develop these competitive advantages by integrating environmental considerations into their business models/operations leading	MoE SMEs	2019-2020 EUR 10,000 (state)	• # SMEs co-funded • # green business plans

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		to improved business performance, spurring innovation and improvingfinancial results through grants/co-funding.			
3.4	*Support industry-led **green manufacturing initiatives** (greening value chains)*	Industry-led initiatives supported by government through grants/co-funding can help green value chains by supporting various forms of certification such as ISO 14001 (environment), ISO 9001 (quality), ISO 18001 (health and safety), ISO 50001 (energy management), EcoLabel, Eco-Management and Audit Scheme (EMAS), Product Environmental Footprint (PEF), Organisation Environmental Footprint (OEF), etc. for manufacturers, especially export-oriented firms.	MoE SMEs	2019-2020 EUR 100,000 (state)	• # SMEs co-funded • # green standards implemented
3.5	Develop the **Industrial and Green Zones (IGZs)** with a manufacturing focus	The Green Zones part of the Industrial and Green Zones (IGZs) are designed to stimulate the development of green industry and manufacturing, however, none exist at present. This activity involves the following tasks: • Reform the Law on Industrial and Green Zones; • Finalise the feasibility work for the first Green Zone; • Obtain state funding for the first Green Zone.	MoE Municipalities Investors	2018-2020 EUR 11 MM (state)	• Law revised and approved • Feasibility study completed1st Green Zone operational • 10 green enterprises attracted
3.6	*Stimulate **resource / energy efficiency and low carbon / resource efficiency best available techniques** in the manufacturing sector*	There is scope to leapfrog inefficient technologies by adopting cleaner production programmes.Manufacturinginstallations will be assisted to enhance resource efficiency and low carbon / cleaner production via technical assistance, finance and capacity building, including: • Training of IPPCpermit writers to audit Energy Efficiency Plans, starting with the manufacturing sector; • Training and qualifying consultants and industryon energy management systems to comply with ISO 50001 • Implementing manufacturing energy efficiency projects; • Establishing the Fund for Energy Efficiency.	MoEPP UNIDO/universities UNIDO/REC/MBDP To be determined	2019-2020 2018-2020 2018-2020 EUR 4 ML (donor) 2020	• # EEPs audited • 40 certified consultants • # applicants • 30-50 projects funded • Fund established
3.7	*Supporting SMEs with **Remanufacturing***	Remanufacturing is increasingly significant in motor vehicle components, compressors, communications equipment, office furniture, vending machines, photocopiers / toner cartridges, agricultural equipment, etc. It can work synergistically with clusters, TIDZs, etc. A study will be performed on the TIDZs and their potential for	MoE DTIDZ MNCs SMEs	2020 onwards EUR 2 MM (donor)	• Report with recommendations • Project concept • Funding obtained • Project tendered in 2021 • Implementation from 2021 • Volume of reused products

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		remanufacturing leading to policy recommendations to support start-ups, grant/co-funding of equipment, etc. In the second phase, a project will be implemented to support it.			and components in manufacturing
3.8	*Support SMEs with* ***Additive Manufacturing / 3D Printing***	Additive manufacturing can potentially reduce or eliminate assembly lines and supply chains as 'final' products are produced in a singular process, while moving the production process closer to the customer, etc. This measure will support SMEs with 3D Printing/Manufacturing, especially start-ups, through grants and co-financing.	MoE SMEs	2020 onwards EUR 2 MM (donor)	• Project concept • Funding obtained • Project tendered in 2021 • Implementation from 2021 • # 3D printers • # turnover and employment

Strategic Objective 4: Stimulate Manufacturing Export

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
4.1	*Institutional Strengthening of **Export Policy** with a focus on manufacturing*	To broaden and deepen exports, including in the manufacturing sector, MoE will prepare an export strategy in close cooperation with InvestMacedonia (promotion) and the Ministry of Foreign Affairs (commercial diplomacy) specifying the sub-sectors, products and countries to target, as well ascreate an Export Unit to coordinate export activities with Invest Macedonia and with Economic Diplomacy. InvestMacedonia will review and reform the Export Promotion department to generate more resources and capacities to support export promotion activities.	MoE InvestMacedonia MoFA	2019-2020 EUR 100,000 (state)	• Export strategy approved • Export Promotion Unit strengthened • Quarterly meetings MoE, InvestMacedonia and MFA • Increase manufacturing export as % of GDP
4.2	*Strengthen FDI and export through **economic diplomacy***	There is a need to increase the capacity of the economic promoters /economic diplomacy staff to assist manufacturing SMEs to penetrate foreign markets based on targeted sub-sectors, countries and products (see export strategy above) based on the following export/FDI focused activities: • Recruit 20 Economic Promoters; • Train Economic Promoters; • Train Economic Diplomacy Unit; • Train the economic diplomacy staff. This will lead to a coordinated approach to export jointly with MoE and InvestMacedonia.	MoFA InvestMacedonia MoE	2019-2020 EUR 100,000 for capacity building (state)	• 20 Economic Promoters recruited • Training for Economic Promoters • Training for Economic Diplomacy staff • # export B2B meetings • # FDI meetings • Increase manufacturing export as % of GDP
4.3	*Support for **Winning New Markets and Increase in Sales** (EGP Measure 2.2)*	Thiswillassist companies win new markets and/or increase sales in new markets with financial support up to 20% of the costs incurred. The activities to be supported include: participation in fairs abroad; business missions; B2B in foreign markets; costs used for certifying the products according to the requests on the foreign markets; and costs for building capacities for marketing approach on foreign markets (preparation of promotional material, catalogues, brochures, website design).	InvestMacedonia FITR Enterprises	2018-2020 Up to 1,8 MM MKD (30,000 EUR) per firm (state)	• # requestsfor funding • # successful requests • Increase exports in new markets • Volume of state funding
4.4	*Support to **Increase***	This will assist firms to increase competitiveness in new	InvestMacedonia	2018-2020	• # requestsfor funding

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
	Competitiveness in New Markets *(EGP Measure 2.1).*	markets in general (10% support).	FITR Enterprises	10% investment costs Up to 61,5 MM MKD (1 MM EUR) per firm (state)	• # successful requests • Volume of exports • Volume of state funding
4.5	***ManufacturingExport Readiness*** *Support Programme*	This measure will involve selecting 300 especially selected manufacturing SMEs with export potential. Support will be provided in terms of "Investment readiness" (including web tools), technical assistance and capacity building; and financing for export readiness (e.g. standards, health & safety, marketing, business planning, technology, branding, labelling, packaging, product testing, certification, contracting, customs, logistics, marketing, information and analysis, etc.).	MoE SMEs	2020 onwards EUR 5 MM (donor)	• Project concept • Funding obtained • Project tendered in 2021 • Implementation from 2021 • # firms supported • Increase manufacturing export as % of GDP
4.6	*Leverage manufacturing export through* ***international standards***	There is a need to raise awareness of the critical importance of creating "high quality, high standard products" consistent with international standards that are recognisable, trusted and valued on both the domestic and international markets. This activity will include financial and technical assistance support for targeted manufacturing SMEs, in relation to ISO, HACCP, HALAL, Good Manufacturing Practice (GMP), etc.	MoE SMEs	2019-2020 EUR 50,000 (state)	• # ISO standards supported • # HACCP standards supported • # HALAL standards supported • # GMP standards supported • Increase manufacturing export as % of GDP
4.7	*Establish an* ***Export Point of Contact***	There is also a need to establish a single point of contact about export, to provide general information, export data and analysis (e.g. Euromonitor), as well as signposting and support to SMEs to access international markets, including collaborating with the Enterprise Europe Network (EEN), the regions (e.g. Regional Development Centres), Chamber of Commerceand economic diplomacy points of contact.	InvestMacedonia	2019-2020	• Export Point of Contact • Access to EuroMonitor • # Coordination events with EEN, MoFA, RDCs, etc • # SMEs advised/supported • # export reports/analyses for export firms
4.8	*Integrate****Export Promotion Information***	The SME portal(www.konkurentnost.mk) will be upgraded to support the SME sector with relevant information. The portal will provide statistics /analysis on import and export. It will also integrate with the key sources of export information, including Customs Administration (www.customs.gov.mk), InvestMacedonia (www.investinmacedonia.com), Macedonian Bank for Development Promotion (www.mbdp.com.mk), European Trade Desk (www.trade.ec.europa.eu), Enterprise Europe Network	MoE / InvestMacedonia	2018-2020	• Portal upgraded • Export signposting added • Export statistics added • # hits per month • # updates per month

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		(www.een.mk / www.een.ec.europa.eu), CEFTA (www.cefta.int) and other relevant sources such as the chambers, business associations, regional export network.			
4.9	*Support to the **Export Accelerator** for SMEs*	The export accelerator will support SMEs to stimulate export in the food processing industry in relation to export procedures, documentation and other related export activities (analyses, new markets, contacts with distribution networks, etc.). After the 24 months of implementation, the impact will be reviewed to assess the scope continuing the food processing focus and/or possibly extending the support to other priority manufacturing sub-sectors (see 1.1 above).	Organisation of Employers (ORM) Institute for dynamic development SFERA-NOVA SMEs	2018-2020 EUR 143,000 (donor 122,000 and 21,000 contribution)	• Export accelerator established • # food processing SMEs • # support measures • Increase in food export

Strategic Objective 5: Build a Learning Manufacturing Sector

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
5.1	*Increase manufacturing access to* ***EU competitiveness and innovation funds***	This activity focuses on improving access to underutilised EU funding streams (IPA II, Eureka, Eurostars, COSME, HORIZON2020, ERASMUS for young entrepreneurs, EEN, FP9) etc.) by manufacturing SMEs, universities, civil society etc. through training for consultants and provision of information, guidance, support to firmsto make EU applications, preparation of good practice examples, contracting, monitoring, evaluation and reporting.	MoE MoES EEN SMEs	2020 onwards EUR 1.5 MM (donor)	• Project concept • Funding obtained • Project tendered in 2021 • Implementation from 2021 • 300 SME applications • 50 successful applications • Utilisation of EU funds by manufacturing firms
5.2	*Establish and strengthen* ***technological and research departments*** *(EGP Measure 1.3)*	Investorswill receivefinancial support to establish technological/research departments. The assistance will cover applied industrial research to gain new knowledge and skills for development of new products, production processes or services or to significantly improve the existing products, production processes and services in manufacturing activities for new equipment, instruments and equipment, buildings and land, research, patents and consulting services, industrial projects and operational costs (e.g. materials).	FITR InvestMacedonia Universities Chambers SMEs	2019-2020 61,5 MM MKD (1,000,000 EUR) per beneficiary /(state)	• # requestsfor funding • # successful requests • Volume of private/state R&D funding invested • # operational technological and research departments
5.3	*Support to SMEs for* ***Professional Upgrade and Practice for Newly-Employed Young People*** *(EGP Measure 3.4)*	This EGP measure will offer financial support for the technological development of companies by covering up to 30% of the costs for training and professional upgrade of newly-employed young people. Under its terms, it will support enterprises with up to 30% of the direct costs up to 1,000,000 MKD (16,260 EUR) per applicant.	FITR SMEs	2018-20 Up to 1 MM MKD (16,260 EUR) per applicant (state)	• # applications • # supported technological development projects • # young employees trained • # participants in the programme • # of new or improved products, services and/or working processes
5.4	*Strengthen* ***cooperation between Universities and manufacturing SMEs***	Manufacturing SMEs must connect with the latest technological and engineering developments.Graduates have the latest academic knowledge and theory often lack understanding of the requirements of industry. Various activities will improve the current situation:			

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		• R&D leave of absence to work in firms with right to return to engineering faculties; • Industrial PhDs sponsored by the private sector: this possible • Research assistants to work in company and in faculties (use labs for R&D, etc.); • Company managers to work (1-3 months) in similar companies in other countries to learn about technologies, business/organisational models, etc.	MoES Universities NTTO SMEs	2019 2019-2020 EUR 100,000 (donor)	• Reform of HELaw • # Industrial PhDs • # Doctoral R&D leave • # Research Assistants • # Company Managers • # SMEs involved • Improved Competiveness Index of manufacturing firms • # cooperation between manufacturers & universities
5.5	***Information, Awareness Raising and Training*** *on Circular Economy, Green Industry / Manufacturing and Closed-cycle Manufacturing, Energy Efficiency, clean production, etc.*	Assist manufacturing SMEs to understand the potential benefits and threats of Green Industry / Manufacturing through information, awareness raising, education, training and capacity building in relation to particular types of green processes, methods and technologies.	UNIDO/REC MoE/ Energy Agency MOEEP FITR/NTTO Chambers SMEs	2018-2020 EUR 50,000 (donor)	• Training programme set • # awareness raising events • # manufacturerstrained • # policy initiatives stimulated • Perception of firms changed
5.6	*Establish a* ***MakerSpace*** *to encourage a maker mindset*	Create a MakerSpace with equipment such as 3D printers, laser cutters, CNC machines, soldering irons, etc. to stimulate a maker mindset with an emphasis on science, technology, engineering and mathematics (STEM). It will provide hands-on learning, help with critical thinking, as well as skills including electronics, 3D printing, 3D modelling, woodwork, coding, robotics, etc.	FITR	2020 onwards EUR 300,000 (donor)	• Application for funding • MakerSpace established • # participants/visitors
5.7	***Financial support for micro firms*** *(technical expertise for firm(EGP Measure 3.2)*	This activitysupports financial and technological development for a range of investment activities: consulting/training for business planning; business cooperation with foreign investors; enhancing organisational structures; specialized management trainings (future leaders); planning and costs control; procurement; software for productivity and/or planning processes. In addition the following will also be supported: European technical regulations regarding product safety; preparations for quality certificates; analysis, preparation, acquiring and protecting of industrial and intellectual ownership rights and implementing information systems. In addition, this measure will also support various	FITR Micro firms	2019-2020 up to 5 MM MKD (81,300 EUR) per applicant (state)	• # applications for funding • # successful applications • Volume of tech investment by micro firms • Volume of state funding

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
		green initiatives including: improvement of the energy efficiency; consulting of protection of the environment and preparation and establishing waste management systems.			
5.8	***International expertise for Domestic SMEs*** *with a focus on manufacturing*	Senior experts from EU countries will be invited to support manufacturing firms with customised solutions to problems which cannot be solved by the domestic Business Development Services providers. 300 manufacturing SMEs will be supported, following open calls, to improve the quality of their products, increase the efficiency of their processes, create and maintain jobs, increase the turnover and profits etc. Domestic manufacturing SMEs will co-finance the mission costs.	DMPEA Office of Prime Minister SMEs Consultants	2019-2020 EUR 50,000 (state) EUR 950,000 (donor)	• 300 SMEs supported • # days worked by international experts • Increased turnover • Increased profitability • Increased employment

Cross-Cutting Objective 6: Implementation and Coordination

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
6.1	***Inter-ministerial Coordination***	The MoE´s Department of Industrial Policy will oversee the overall process and coordinate the implementation of the strategy and action plan. The coordination will involve regular (biannual) meetings of the Sector Working Group for Competitiveness and Innovation.Delays, bottlenecks and implementation issues will be discussed and resolved through the coordination meetings.	MoE DMPEA Relevant ministries Relevant state bodies	2018-20 EUR 0	• Min. 4 meetings per annum • Biannual progress reports • Biannual minutes with conclusions & recommendations • Annual progress report
6.2	***Donor/IFI Coordination***	According to the principles of donor funding (Paris Accord and the Accra Agreement), the MoE will convene regular donor/IFI meetings to ensure effective donor coordination and mobilisation of funds to implement the approved priorities defined in the action plan through the Sector Working Group for Competitiveness and Innovation.	DPMEA Sector WG on Competitiveness and Innovation MoE Donors IFIs	2018-20 EUR 0	• Min. 2 meetings per annum • Biannual progress reports • Biannual minutes • # donor project applications • # donor projects funded • Volume of donor funds
6.3	***Public Private Dialogue*** *with stakeholders*	Numerous other NGOs and private sector bodies are responsible for measures in the action plan so, the MoE will also convene biannual meetings with the wider industry and manufacturing stakeholders. If appropriate, the PPD could be implemented through the newly created Platform for PPD.	MoE Associations Chambers Academia NGOs/think tanks	2018-20 EUR 0	• Min. 2 meetings per annum • Biannual progress reports • Biannual minutes
6.4	***Monitoring and Reporting***	The strategy and action plan can only be implemented effectively is they are regularly monitored (quarterly/biannual/annual) and reports are produced for circulation. The MoE will coordinate two different monitoring procedures: • Monitoring on the manufacturing action plan; • Monitoring of the wider industrial policy, involving a wider set of institutions and their programmes. These will result in monitoring reports that will be disseminated to state bodies and stakeholders (also konkurentnost.mk portal).	MoE DMPEA Relevant ministries Relevant state bodies Associations Chambers Academia	2018-20 EUR 0	• Biannual progress reports • Annual progress report
6.5	***Mid-term Assessment and Final***	To determine the impact of the strategy and action plan, the	MoE	2020/1	• Evaluation report (2021)

#	Activity	Rationale/Focus	Responsibilities	Deadline/Budget	KPIs
	Evaluation	MoE will commission three independent evaluations: • End of 2020: to allow progress to be assessed and enable the strategy and action plan to be recalibrated,taking into consideration the 7-year EU programming period and new policy priorities and funding regimes; • End of 2023: mid-term assessment of action plan; • End of 2027: final overall evaluation of the impact of the strategy(DAC-OECD criteria): relevance, efficiency, effectiveness, coherence, impact and sustainability. All evaluation reports to be posted on konkurentnost.mk.	All implementers	2023/4 2027/8 EUR 75,000 (donors)	• Revised strategy /action plan • Evaluation report (2024) • Revised strategy /action plan • Evaluation report (2028)
6.6	***Coordination*** *of strategy and capacity building on* ***applications for funding***	Capacity building for MoE staff to enable policy, coordination and engagement at the international level (e.g. EU/EC/RCC/OECD, etc.), national level (PPD/inter-ministerial coordination/donor coordination/EUD, etc.) and skills for making application for funding to IFI/donor/EC to supplement state funds.	MoE	2018-20 EUR 20,000 (donors)	• Funding for capacity building • # of capacity building sessions