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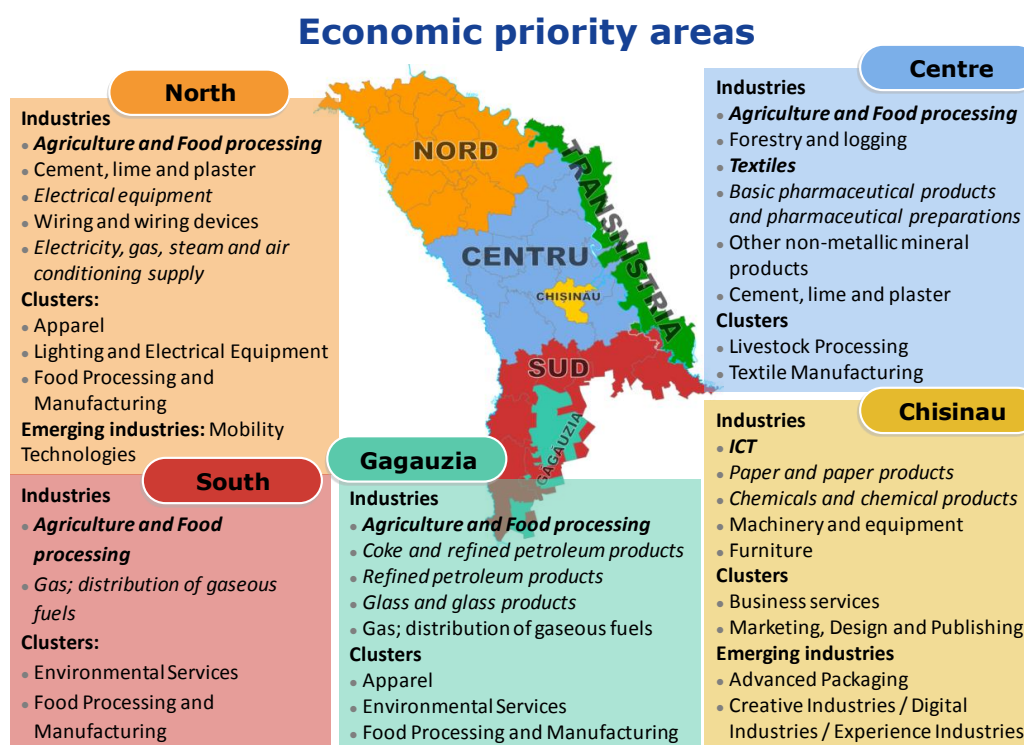
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## Executive summary

The analysis of economic potential, using data on employment, turnover and wages, has identified economic priority areas at the sub-national or regional level in the Republic of Moldova (as shown in the Figure below). For Chisinau ICT is the most important economic area; other areas of importance include Manufacture of paper and paper products, Manufacture of chemicals and chemical products, Manufacture of glass and glass products, Manufacture of machinery and equipment (not elsewhere classified), and Manufacture of furniture. The cluster analysis, using more detailed employment data and definitions from the European Cluster Observatory, confirmed the importance of ICT. For North, Centre, South and Gagauzia comparable priority areas for smart specialization have been identified. For all four regions Agriculture and Food processing is very important. Textiles, Apparel, Footwear and Leather (TAFL) and Renewable energy are also priority areas for smart specialization in several of these four regions. The cluster analysis has confirmed several of these areas, e.g. Apparel and Food processing for North, Livestock processing and Textile manufacturing for Centre, Environmental services and Food processing for South, and Environmental services and Food processing for Gagauzia.

An analysis of the innovation potential using data from the Moldovan innovation survey confirms several of these economic priority areas. These areas have been highlighted in italics in the Figure below and can be considered as the key economic priority areas, including Agriculture and Food processing in North, Centre, South and Gagauzia, ICT, Paper and paper products, and Chemicals and chemical products in Chisinau, Electrical equipment and Electricity, gas, steam and air conditioning supply in North, Textiles and Basic pharmaceutical products and pharmaceutical preparations in Centre, Gas, distribution of gaseous fuels in South, and Coke and refined petroleum products, Refined petroleum products, and Glass and glass products in Gagauzia.

There have been insufficient data to provide a detailed analysis of the scientific potential at the regional level.



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## Introduction

The objective of the final report is to provide a mapping of the economic, scientific and innovation potential in the Republic of Moldova at sub-national or regional level which would allow identifying smart specialisation domains at national level. The mapping is a statistical exercise using the indicators described in Section 1.

The mapping exercise focuses on five regions in the Republic of Moldova (cf. the map on the right):

- Municipality Chisinau or Chisinau
- Nord or North
- Centru or Centre
- Sud or South
- T.A.U. Gagauzia or Gagauzia

The Pridnestrovian Moldavian Republic (PMR) or Transnistria is not included in the mapping exercise.



Table 1 summarises some key socio-economic differences between the regions in Moldova. Centre has the largest population, Gagauzia the smallest. Chisinau, the capital region, is highly urbanised (91%) compared to the other regions. Centre, surrounding Chisinau, is the least urbanised. Unemployment is lowest in Chisinau and highest in North. Employees in Chisinau earn more than employees in other regions; compared to South and Gagauzia even at least 50% more. North has an above average share of elderly people and faces above average unemployment.

**Table 1 Socio-economic differences between the regions of the Republic of Moldova**

	Population	Below working age	Working age	Above working age	Urban	Rural	Registered unemployment	Average nominal monthly earning (Lei)
Chisinau	814147	14.2%	69.3%	16.6%	90.9%	9.1%	0.34%	5375.3
North	987475	16.7%	62.3%	21.0%	36.1%	63.9%	1.88%	3871.0
Centre	1057096	18.9%	64.7%	16.4%	19.6%	80.4%	1.21%	3719.5
South	532462	18.0%	65.0%	17.0%	26.5%	73.5%	1.15%	3527.3
Gagauzia	161876	18.7%	64.1%	17.2%	40.6%	59.4%	1.09%	3553.2
<b>Moldova</b>	<b>3553056</b>	<b>17.0%</b>	<b>65.1%</b>	<b>17.8%</b>	<b>42.5%</b>	<b>57.5%</b>	<b>1.16%</b>	<b>4538.4</b>

Data source: Statistical Yearbook of the Republic of Moldova 2016.

In economic terms, differences are even more pronounced. Although the share of population in Chisinau is about 23% of that of Moldova, Chisinau accounts for more than half of the registered economic activities in Moldova. The share of employment (including employed persons but excluding self-employed and informal employment) in Chisinau is 60%, in the number of firms 65%, in turnover almost 73%, and in wages 68% (Table 2).

**Table 2 Economic differences between the regions of Moldova**

	Population	Employment	Firms	Turnover	Wages
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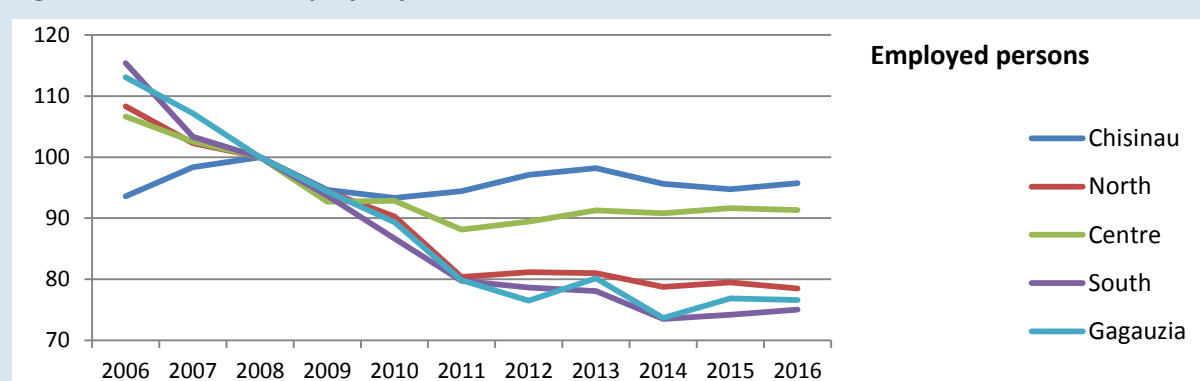
<b>Chisinau</b>	22.9%	60.2%	65.0%	72.9%	68.2%
<b>North</b>	27.8%	17.0%	12.2%	11.8%	14.9%
<b>Centre</b>	29.8%	13.5%	14.9%	10.2%	10.2%
<b>South</b>	15.0%	6.4%	5.2%	3.0%	4.6%
<b>Gagauzia</b>	4.6%	3.0%	2.6%	2.1%	2.1%

Data: National Bureau of Statistics (NBS). Data for are averages for 2014-2016.

There are also differences in dynamic performance over time. Employment, measured by employed persons, has been declining since 2008, in particular in North, South and Gagauzia (Figure 1). In Chisinau the decline in employment was for two years only, with employment increasing again between 2010 and 2013. The decline in Centre came to a halt in 2011 after which it increased slightly. For all regions the level of employed persons is still (well) below that in 2008.

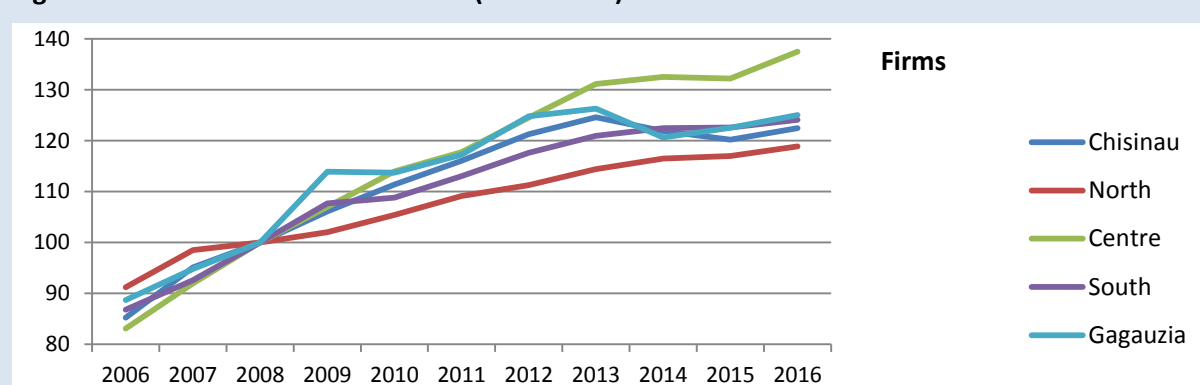
For all regions the number of firms has been increasing over time until 2013, even during the 2008-2013 crisis years (Figure 2). The rate of increase slowed down after 2013, in Gagauzia the number of firms even decreased. Although detailed data are not available, in combination with decreasing employment, this suggests that many of these new firms are only very small.

**Figure 1 Evolution of employed persons (2008 = 100)**



Data: National Bureau of Statistics (NBS).

**Figure 2 Evolution of number of firms (2008 = 100)**

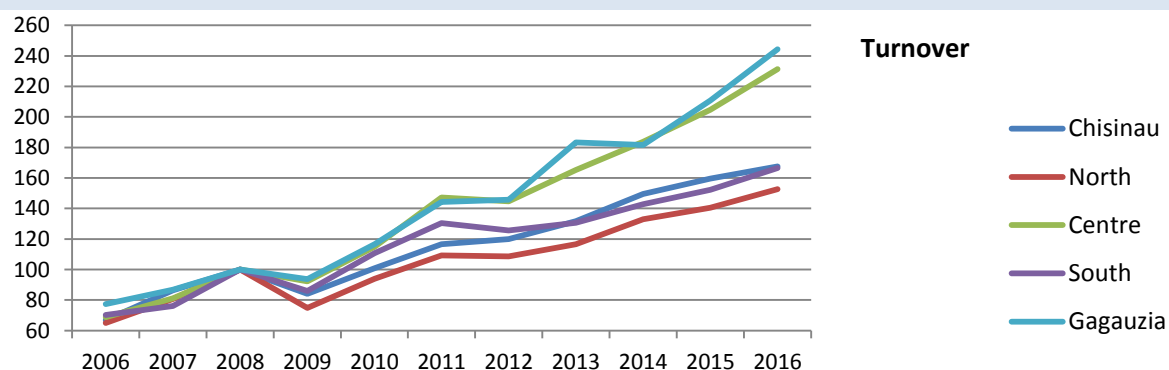


Data: National Bureau of Statistics (NBS).

Turnover has been increasing rapidly over time after an initial decline in 2009, in particular in Gagauzia and Centre (Figure 3). This rapid increase is however partly the result of inflation. Figure 4 shows the evolution with turnover expressed in real prices. The rate of increase is much lower, e.g.

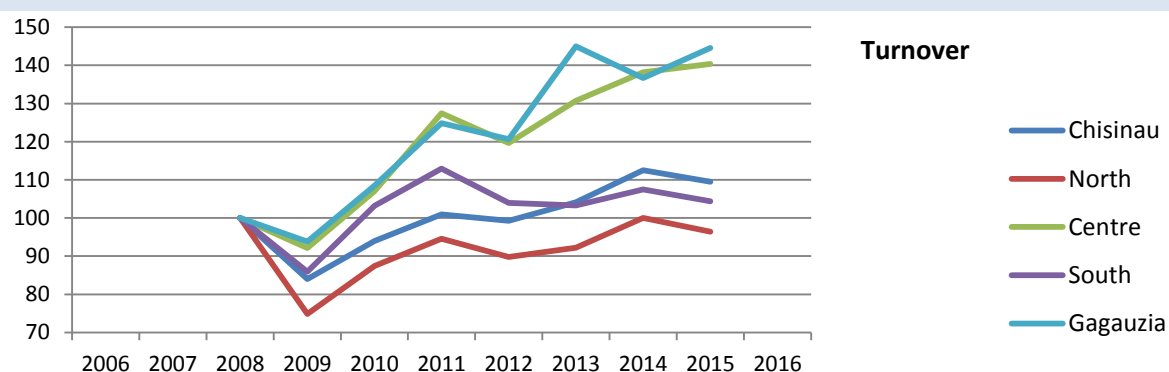
for Centre in 2015 turnover in nominal prices was more than twice as high as in 2008, but in real prices the increase between 2008 and 2015 is 'only' 40 percent. Adjustments have been made using the Consumer Price Index (CPI) for Moldova for all five regions, but the CPI will have evolved differently over time in each of the regions. The results in Figure 4 should thus be interpreted with care as they do not necessarily show the real evolutions in regional turnover data in real prices.

**Figure 3 Evolution of turnover, nominal prices (2008 = 100)**



Data: National Bureau of Statistics (NBS).

**Figure 4 Evolution of turnover, real prices (2008 = 100)**



Data: National Bureau of Statistics (NBS).

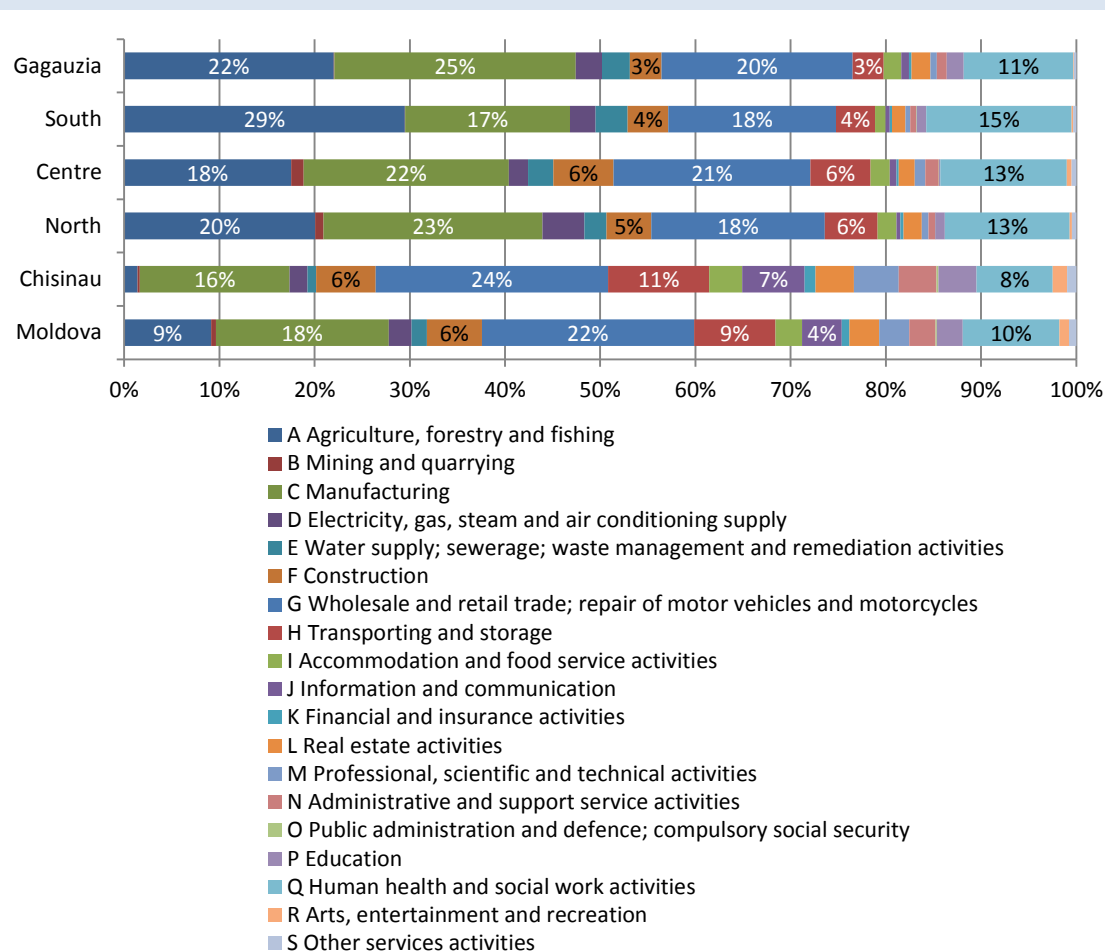
## 1. Methodology

### 1.1 Classification of regions

As stated in the Introduction, the objective of the final report is to provide a mapping of the economic, scientific and innovation potential in the Republic of Moldova at sub national level. The mapping will be done for five regions: Chisinau, North, Centre, South, and Gagauzia. However, for deriving conclusions and recommendations, a distinction can be made between Chisinau, which is the capital region characterized by a high degree of urbanisation and above average shares of activities in services, and the four more 'Rural regions' North, Centre, South, and Gagauzia, all of which are characterized by a low degree of urbanisation, above average shares in agriculture, and which have more similar economic structures.

Differences in economic structures, using the average 2014-2015 employment shares of NACE one-digit industries in the regional economies, are shown in Figure 5.<sup>1</sup> Employment shares in Agriculture, forestry and fishing in the *Rural regions* are much higher than average, whereas in Chisinau this share is far below average. Employment shares in Manufacturing in the *Rural regions* are close to or above average, whereas in Chisinau this share is below average.

**Figure 5 Economic structure of the regions in the Republic of Moldova**

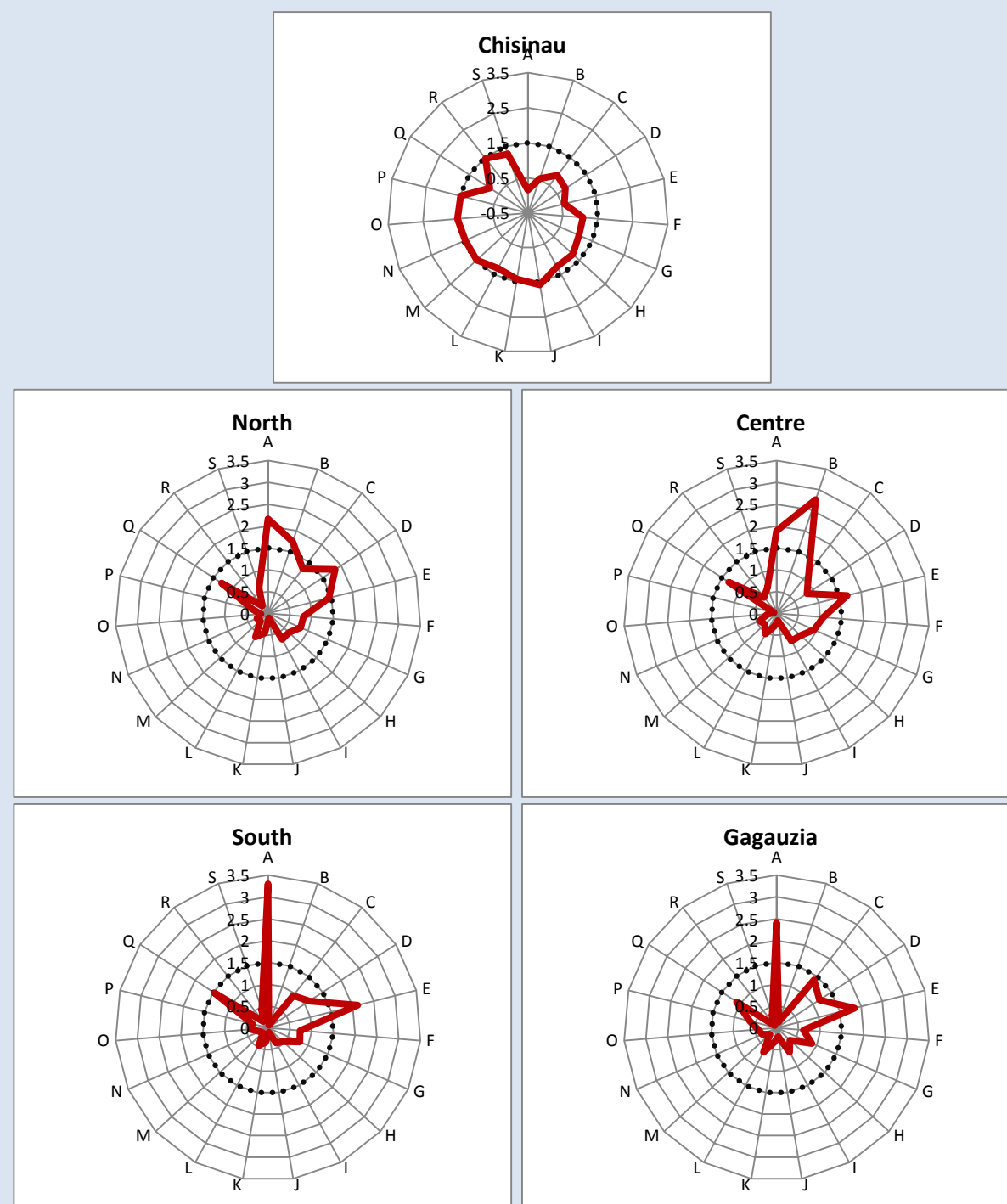


Note: the letter before the industry name shows the corresponding NACE one-digit code.

<sup>1</sup> A comparable graph using 2013-2014 data on value added is shown in Annex 3.



Figure 6 Specialisation patterns of the regions in the Republic of Moldova



Specialisation is calculated using Location Quotients (cf. section 1.2.1.1).

Letters show NACE one-digit codes: **A**: Agriculture, forestry and fishing; **B**: Mining and quarrying; **C**: Manufacturing; **D**: Electricity, gas, steam and air conditioning supply; **E**: Water supply; sewerage; waste management and remediation activities; **F**: Construction; **G**: Wholesale and retail trade; repair of motor vehicles and motorcycles; **H**: Transporting and storage; **I**: Accommodation and food service activities; **J**: Information and communication; **K**: Financial and insurance activities; **L**: Real estate activities; **M**: Professional, scientific and technical activities; **N**: Administrative and support service activities; **O**: Public administration and defence; compulsory social security; **P**: Education; **Q**: Human health and social work activities; **R**: Arts, entertainment and recreation; **S**: Other services activities.

Differences in economic structures are also evident from a comparison of specialisation patterns using 2014-2015 employment shares of NACE one-digit industries, as shown in Figure 6. A comparison of the radar graphs shows that the specialisation pattern of Chisinau is significantly different from those of the *Rural regions*. Comparing the *Rural regions*, North and Centre are slightly different from South and Gagauzia, with a specialization in Mining and quarrying.

## 1.2 Mapping of economic potential

### 1.2.1 Description of analytical approach

#### 1.2.1.1 Economic mapping based on critical mass and specialisation

The objective of the mapping is to identify industries with both proven strengths and a potential to drive economic transformation. For the economic mapping data have been made available on the number of employed persons, the number of firms, total turnover and total wages (cf. section 1.2.2). The mapping will not use the data on the number of firms as these as such do not measure economic outcomes. The economic mapping will identify industries where regions have a critical mass of activities and specialisation:

- **Specialisation:** measures if in relative terms, an industry is more important for the regional economy than is standard for the national economy. Specialisation is measured using Location Quotients (LQs), which are defined as:

$$LQ_i = (e_i/e) / (E_i/E)$$

where,

$LQ_i$  = location quotient for sector i in the regional economy

$e_i$  = size of activity in sector i in the regional economy

$e$  = total size of activity in the local region

$E_i$  = size of activity in industry i in the national economy

$E$  = total size of activity in the national economy

Here 'activity' can be replaced by 'employed persons' or 'employment'<sup>2</sup>, or 'turnover'.

An LQ above 1 shows an above average concentration in a particular activity, e.g. the share of employment of that industry in the regional economy is higher than the share of employment of that industry in the national economy. An LQ below 1 shows a below average concentration in a particular activity, e.g. the share of employment of that industry in the regional economy is lower than the share of employment of that industry in the national economy.

- **Critical mass:** specialisation as such is not sufficient to identify industries as too small industries are less relevant for regional economic policies. Absolute size of industries matters, and industries size or 'critical mass' is measured by the share of an industry in an activity compared to the total of that activity in the region: **CM<sub>i</sub> = e<sub>i</sub>/e**

Here 'activity' can be replaced by 'employed persons' or 'employment', or 'turnover'.

<sup>2</sup> Strictly speaking the term 'employment' is not correct, as employment also includes self-employed people, whereas the data available for the mapping only include employed people. But for ease of reference both terms will be used.

- **Wages:** average wages per employed person will be used as an additional criterion. The assumption is that in particular those industries with above average wages will contribute more to the economic development of a region. Wages should be both above a certain threshold compared to the average wages in the region and above a certain threshold compared to the average wages of that industry in the Republic of Moldova.

Ideally, a fourth criterion should be used, measuring the dynamics of each industry, if the size of the industry is increasing or decreasing. As will be discussed in section 1.2.2, for the economic mapping consistent data are only available for three years: 2014, 2015 and 2016. Calculating growth rates over a three-year period will, however, not provide sufficiently robust findings on the development of industries over time. Growth rates will thus not be used for selecting industries. Section 1.2.3 will discuss how the mapping methodology needs to be adjusted when, in the near future, sufficiently longer time-series are available to calculate robust growth rates.

The mapping exercise will identify those industries with a critical mass of activities and specialisation for employment and turnover, for which size and LQs are above pre-defined threshold values, and where wages are sufficiently high. The threshold values are shown in Table 3. Usually identical threshold values should be used for all regions. However, as shown above, Chisinau is different from the other four regions. Chisinau, among others, is much larger than the other four regions and accounts for more than half of the size of the Moldovan economy. Mathematically it is more difficult for an industry to have a regional share higher than the national share of that industry if the industry for that region accounts for a very large share of the country. Lower threshold values are therefore used for Chisinau to determine critical mass and specialisation. For Chisinau an industry is considered to have critical mass if its share in regional employment is above 1.5%, for the four *Rural regions* the threshold is 2.0%. For Chisinau an industry is considered to be specialised if its LQ is above 1.25, for the four *Rural regions* the threshold is 1.5.

**Table 3 Threshold values used for the economic mapping**

	Employment & Turnover				Wages	
	All industries		Manufacturing		Relative to average wages in each industry in the Republic of Moldova	Relative to average wages in all industries in each region
	Size	LQ	Size	LQ		
<b>Chisinau</b>	1.5 %	1.25	2.0 %	1.50	At least as high as average wages in Moldova	At least 10% higher than average wages in region
<b>North</b>	2.0 %	1.50	2.0 %	1.50	At least as high as 90% of average wages in Moldova	At least 10% higher than average wages in region
<b>Centre</b>						
<b>South</b>						
<b>Gagauzia</b>						

The selection of industries will be done in two steps:

1. In the **first step, all industries** will be included using the thresholds in Table 3. An industry will be selected, either at the NACE two-digit or three-digit level, if at least two of the three activities pass their thresholds. For employment and turnover this implies passing both the Size and LQ thresholds, for wages this implies passing both thresholds for relative wages.

Given the importance of the Manufacturing sector for the economy<sup>3</sup>, but its relatively small share in the economy<sup>4</sup>, the thresholds used in Step 1 are biased against selecting industries in Manufacturing. A second step is therefore introduced, which allows the selection of relevant manufacturing industries:

2. In the **second step**, the selection process explained above will be repeated for **Manufacturing only**, using the same thresholds for all regions, i.e. 2% for size and 1.5 for LQs. An industry will be selected, either at the NACE two-digit or three-digit level, if at least two of the three activities pass their thresholds. For employment and turnover this implies passing both the Size and LQ thresholds, for wages this implies passing both thresholds for relative wages.

The results of both steps will then be combined in a final list of industries for each region.

### *1.2.1.2 Mapping of clusters and emerging industries*

The mapping as explained in section 1.2.1.1 uses data based on current industrial classifications. However, there are several limitations to using these classifications:

- Current classifications are built upon the observation of economic activities that exist at the time;
- Current classifications are built upon categories of activities that are meant to be homogeneous and mutually exclusive, and therefore cannot constitute appropriate tools to identify and classify new activities that emerge from the combination and cross-fertilization of different types of activities and sectors.

It seems unlikely that mapping exercises based on current industrial classifications can reveal cross-sector spillovers between related but distinct sectors that transform, evolve and combine or sometimes even merge into new industries. In other words, mapping exercises based on current industrial classifications cannot reveal emerging industries with the latter defined as “the establishment of an entirely new industrial value chain, or the reconfiguration of an existing one, driven by a disruptive idea (or convergence of ideas), leading to turning these ideas/opportunities into new products/services with higher added value”<sup>5</sup>.

The European Cluster Observatory<sup>6</sup> has defined 51 cluster categories using combinations of NACE 4-digit industries. These clusters were originally defined for the United States using data at the 6-digit industry level (NAICS). The European Cluster Observatory has transferred the US definitions using a concordance table between NAICS and NACE with the restriction that data for EU Member States is

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<sup>3</sup> The Manufacturing sector produces tangible products which can be sold to foreign countries ('exports'). The production process of these tangible products relies on both physical capital and labor. Output per unit of labor ('labor productivity') can be increased by replacing labor by capital ('capital deepening'), creating the possibility for higher wages. Manufacturing, by producing tangible products, will also benefit more from new employment resulting from product innovations.

<sup>4</sup> For the Republic of Moldova, Manufacturing accounts for about 18% of total employment, 15% of total turnover, 19% of total wages and 9% of all firms.

<sup>5</sup> Definition from European Cluster Observatory.

<sup>6</sup> [http://ec.europa.eu/growth/smes/cluster/observatory\\_en](http://ec.europa.eu/growth/smes/cluster/observatory_en)

available for NACE 4-digit industries only. The European Cluster Observatory has identified 10 (cross-sectoral) emerging industries using a combination of methods as explained in Ketels et al. (2014)<sup>7</sup>.

The European Cluster Observatory has defined the following **51 cluster categories** with most combining at least two NACE 4-digit industries (cf. Annex 1 for full definitions):

Aerospace Vehicles and Defense; Agricultural Inputs and Services; Apparel; Appliances; Automotive; Biopharmaceuticals; Business Services; Coal Mining; Communications Equipment and Services; Construction Products and Services; Distribution and Electronic Commerce; Downstream Chemical Products; Downstream Metal Products; Education and Knowledge Creation; Electric Power Generation and Transmission; Environmental Services; Financial Services; Fishing and Fishing Products; Food Processing and Manufacturing; Footwear; Forestry; Furniture; Hospitality and Tourism; Information Technology and Analytical Instruments; Insurance Services; Jewellery and Precious Metals; Leather and Related Products; Lighting and Electrical Equipment; Livestock Processing; Marketing, Design, and Publishing; Medical Devices; Metal Mining; Metalworking Technology; Music and Sound Recording; Non-metal Mining; Oil and Gas Production and Transportation; Paper and Packaging; Performing Arts; Plastics; Printing Services; Production Technology and Heavy Machinery; Recreational and Small Electric Goods; Textile Manufacturing; Tobacco; Transportation and Logistics; Upstream Chemical Products; Upstream Metal Manufacturing; Video Production and Distribution; Vulcanized and Fired Materials; Water Transportation; Wood Products.

The European Cluster Observatory has defined the following **ten emerging industries** combining at least two NACE 4-digit industries (cf. Annex 2 for full definitions):

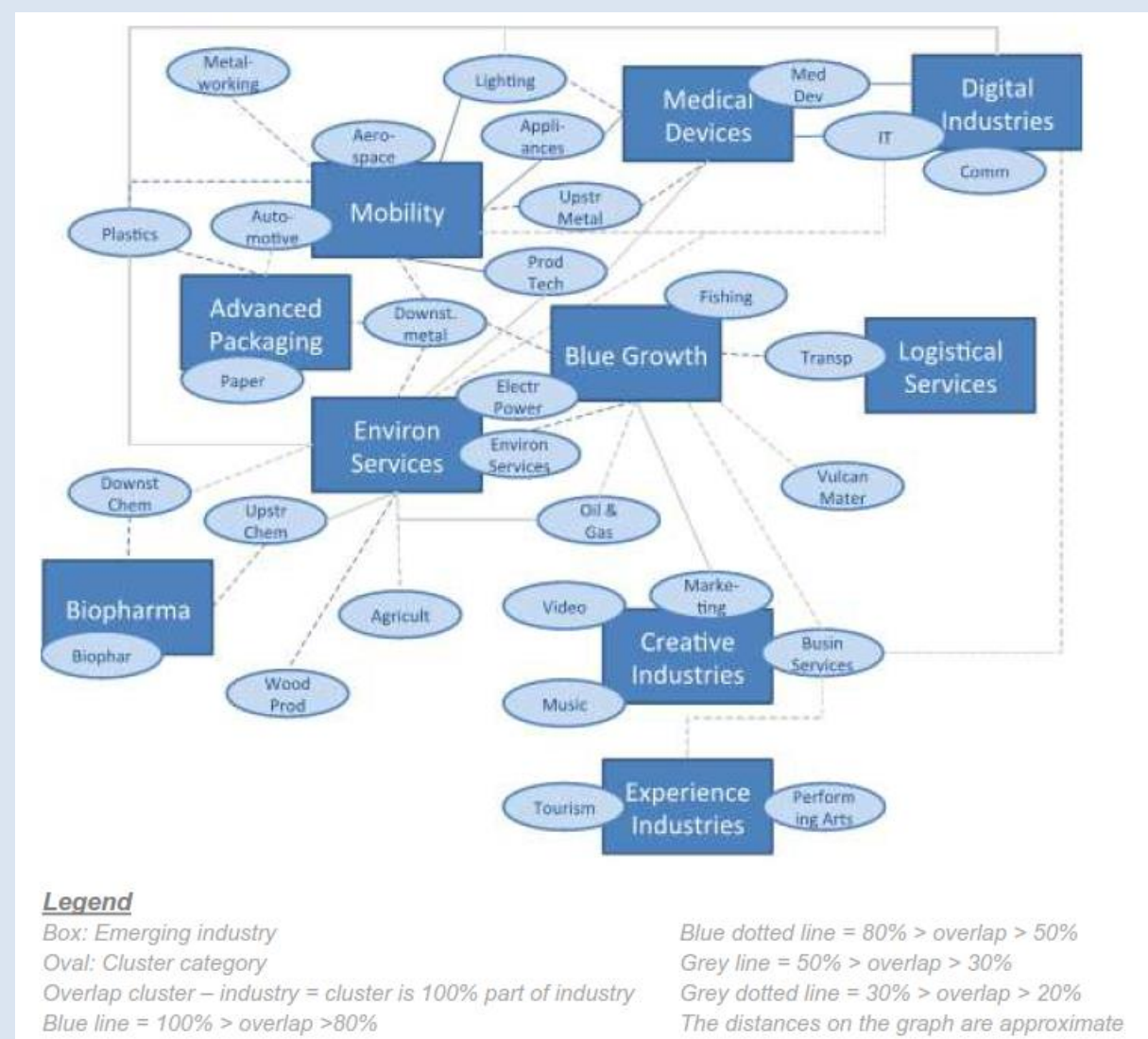
Advanced Packaging; Biopharmaceuticals; Blue Growth Industries; Creative Industries; Digital Industries; Environmental Industries; Experience Industries; Logistical Services; Medical Devices; Mobility Technologies.

Figure 6 provides a detailed map of the overlap between emerging industries and cluster categories. Detailed NACE Revision 2 4-digit data are available for 2015 and these data will be used to identify if and in which of these traded clusters and emerging industries each of the five regions has specialized.

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<sup>7</sup> Ketels, C. and S. Protsiv, "Methodology and Findings Report for a Cluster Mapping of Related Sectors", European Cluster Observatory report, October 2014.

Figure 7 Linkages between Clusters and Emerging Industries



Source: Figure 3 in: Ketels, C. and S. Protsiv, "Methodology and Findings Report for a Cluster Mapping of Related Sectors", European Cluster Observatory report, October 2014.

### 1.2.2 Data availability

For the economic mapping, the following data for employed persons, turnover, wages, and number of firms, have been available by the Ministry of Economy of the Republic of Moldova<sup>8</sup>:

- 2006-2013: NACE Revision 1.1, level 3
- 2014-2016: NACE Revision 2, level 3
- 2015: NACE Revision 2, level 4 (no data for number of firms)

Data for 2006-2013 are based on NACE Revision 1.1, data for 2014-2016 are based on NACE Revision 2<sup>9</sup>. Concordance tables between these two NACE classifications are available at the 4-digit level only; trying to link these time series at the 3-digit level would introduce an unacceptable noise in the results. As both time series cannot be matched, the mapping in the final report is done using the 2014-2016 data at NACE Revision 2, 3-digit level<sup>10</sup>.

### 1.2.3 Future needs for data collection

For an update of the economic mapping the most recent and detailed data would be required. Ideally data should be available:

- At the 4-digit level, which will allow both a more detailed economic mapping and an update of the mapping of clusters and emerging industries;
- As recent as possible, i.e. 2017 data for an update in 2018, 2018 data for an update in 2019, etc.
- For sufficiently long time series of at least five years to calculate robust growth rates. An additional selection criterion can then be introduced to only select industries which have grown above a certain absolute growth rate or a certain relative growth rate. E.g., a relative growth rate can be used for Manufacturing, where employment has been declining over time. One could then also select Manufacturing industries with declining employment, but where the rate of decline is smaller than for total Manufacturing.

For this report the most recent data are from 2016 and the second criterion is thus fulfilled. NACE 4-digit data however, are only available for 2015, and more detailed data should be made available for 2014, 2016, 2017, etc.

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<sup>8</sup> The data originate from the National Bureau of Statistics of the Republic of Moldova.

<sup>9</sup> The Statistical classification of economic activities in the European Community, abbreviated as NACE, is the classification of economic activities in the European Union (EU). Various NACE versions have been developed since 1970. NACE is a four-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics (e.g. production, employment and national accounts) and in other statistical domains developed within the European statistical system (ESS). NACE Rev. 2, a revised classification, was adopted at the end of 2006 and, in 2007, its implementation began. Previous versions of NACE have been: NACE (1970); NACE Rev. 1, the first revision of the original NACE (1970); NACE Rev. 1.1, a minor revision of NACE Rev. 1; and, the current, NACE Rev. 2.

<sup>10</sup> For the mapping over time 2009-2013 data have been used for the meeting in Belgrade July 3-5. Results are included in the note prepared for the July Belgrade meeting and the Interim report. As there is an apparent break in series in 2009 resulting from the crisis that started in 2008, 2006-2008 data were not used.

## 1.3 Mapping of innovative potential

### 1.3.1 Description of analytical approach

For the mapping of the innovation potential, data have been used from statistical survey on the innovation activity of enterprises in the Republic of Moldova in the years 2015-2016. This survey was conducted for the first time by the National Bureau of Statistics in 2017<sup>11</sup>. These data were not available for the final report of October 2017, but regional data at NACE 3-digit level have been available by the National Bureau of Statistics of the Republic of Moldova June 2018 for an update of the mapping of the innovation potential.

The following data are available at NACE 3-digit level for each of the five Moldovan regions:

- Total number of firms;
- Number of firms which introduced at least one innovation (product or process or organisational or marketing);
- Number of firms which introduced at least one product innovation (question 2.1 in the innovation survey, at least said yes to one of the two options);
- Number of firms which introduced at least one process innovation (question 3.1 in the innovation survey, at least said yes to one of the three options);
- Number of firms which introduced at least one marketing innovation (question 7.1 in the innovation survey, at least said yes to one of the three options);
- Number of firms which introduced at least one organisational innovation (question 8.1 in the innovation survey, at least said yes to one of the four options);
- Number of firms that introduced a product innovation new to the firm's market (question 2.3.1 in the innovation survey, share of all firms that replied yes);
- Number of firms that introduced a product innovation new to the firm (question 2.3.2 in the innovation survey, share of all firms that replied yes);
- Number of firms with own R&D activities (question 5.1.1 in the innovation survey, share of all firms that replied yes);
- Number of firms with external R&D activities (question 5.1.4 in the innovation survey, share of all firms that replied yes).

Given the small number of firms with product, process, organisational or marketing innovations, with new-to-market and new-to-firm innovations, and with internal and external R&D activities, these data are not used for identifying the innovation potential of industries.

For each region an industry is considered to have the potential to innovate if it has a critical mass of activities and specialisation:

- **Specialisation:** measures if in relative terms, an industry has more innovative firms than the national economy. Specialisation is measured using Location Quotients (LQs), which are defined as:

$$LQ_i = (\text{inn}_i / \text{inn}) / (\text{INN}_i / \text{INN})$$

where,

$LQ_i$  = location quotient for sector i in the regional economy

<sup>11</sup> Cf. <http://www.statistica.md/newsview.php?l=en&idc=168&id=5882>



- $inn_i$  = number of innovating firms in industry  $i$  in the regional economy  
 $inn$  = total number of innovating firms in the region  
 $INN_i$  = number of innovating firms in industry  $i$  in the national economy  
 $INN$  = total number of innovating firms in the national economy

An LQ above 1 shows an above average specialisation, an LQ below 1 shows a below average concentration.

- **Critical mass:** specialisation as such is not sufficient to identify industries as too small industries are less relevant for regional economic policies. Absolute size of industries matters, and 'critical mass' is measured by the number of innovating firms in the region:  $inn_i$ .

The methodology identifies industries with a critical mass of innovation activities and specialisation, for which size and LQs are above pre-defined threshold values. The threshold values are shown in Table 4. Usually identical threshold values should be used for all regions. However, Chisinau is much larger than the other four regions and accounts for more than half of the Moldovan economy. Mathematically it is more difficult for an industry to have a regional share higher than the national share of that industry if the industry for that region accounts for a very large share of the country. Lower threshold values are therefore used for Chisinau to determine critical mass and specialisation. For Chisinau an industry is defined as being specialised if its LQ is above 1.25, for the other four regions the threshold is 1.5<sup>12</sup>. For Chisinau an industry is considered to have critical mass if it has at least 4 innovative firms, for North and Center this should be at least 2 innovative firms, and for Gagauzia and South at least 1 innovative firm.

**Table 4 Threshold values used for the mapping of innovative potential**

	Size (number of innovative firms)	Specialisation (LQ)
Chisinau	4	1.25
North	2	1.5
Center	2	1.5
South	1	1.5
Gagauzia	1	1.5

In addition, the results of the analysis of the patent data used in the 2017 final report are also included in this report. The following indicators are available:

- Geographical distribution of national inventors
- Geographical distribution of applicants
- Patent applications for 35 technology fields

Results using data from the Enterprise Survey of the World Bank are no longer used<sup>13</sup>.

<sup>12</sup> The critical values for LQ are the same as those used in the economic mapping.

<sup>13</sup> Results using data from the 2013 World Bank's Enterprise Survey, showed that almost 28% of the surveyed firms introduced a new product or new service. If firms introduced a new product or new service, it is also more likely that this new product or new service is not only new to the firm itself but also to the firm's main markets. About 27% of firms introduced a process innovation and almost 10% of firms performed R&D. Almost 20% of manufacturing firms used technologies licensed from foreign firms.

### 1.3.2 Data availability

Data availability and data sources for the indicators mentioned in the previous section are shown in Table 5. For data from international sources only country level data are available. Regional data on patent applications are available from the website of the State Agency on Intellectual Property (AGEPI) but for an unspecified time period.

**Table 5 Data availability innovation potential**

Indicator	Source	Level of analysis	Years covered
Innovating firms	Moldovan innovation survey	Regional (5 regions)	2016
Patent applications: Geographical distribution of national inventors	AGEPI: State Agency on Intellectual Property	Regional (5 regions), no breakdown into separate IPC classes	Aggregate for a multi-year period (exact years not defined by AGEPI)
Patent applications: Geographical distribution of national applicants	AGEPI: State Agency on Intellectual Property	Regional (5 regions), no breakdown into separate IPC classes	Aggregate for a multi-year period (exact years not defined by AGEPI)
Patent applications by technology	WIPO: World Intellectual Property Office <sup>14</sup>	Country level, data for 35 technology fields	2000 - 2015

## 1.4 Mapping of scientific potential

### 1.4.1 Description of analytical approach

The mapping of the scientific potential will use a descriptive analysis of the below mentioned indicators linking these to the results of the economic mapping. The following indicators are available:

- Distribution of scientific publications by domain
- Researchers by R&D activity
- Share of PhD holders by R&D activity
- Admissions, students, and graduates – secondary vocational education
- Admissions, students, and graduates – post-secondary vocational education
- Admissions, students, and graduates – tertiary education
- Graduates tertiary education, by cycle and fields of study
- Number of education institutions
- Specialisation of post-secondary vocational education institutions
- Specialisation of tertiary education institutions

### 1.4.2 Data availability

Data availability and data sources for the indicators mentioned in the previous section are shown in Table 6. Most data have been received from the National Bureau of Statistics (NBS). Different data on publications data are available from National Bibliometric Instrument and Scimago.

<sup>14</sup> <https://www3.wipo.int/ipstats/index.htm>

**Table 6 Data availability scientific potential**

Indicator	Source	Level of analysis	Years covered
Scientific publications	Instrumentul Bibliometric Național (IBN) (National Bibliometric Instrument) <sup>15</sup>	Country level, data for 24 science fields	1994 - 2017
Scientific publications	Scimago Journal & Country Rank (SJR) <sup>16</sup>	Country level, data for 27 science fields	1996 - 2016
Researchers	National Bureau of Statistics (NBS)	Country level, data for 6 R&D activities	2011 - 2016
PhD holders	National Bureau of Statistics (NBS)	Country level, data for 6 R&D activities	2011 - 2016
Admissions, students, and graduates – secondary vocational education	National Bureau of Statistics (NBS)	Country level, regional (5 regions)	2010/2011 – 2015/2016
Admissions, students, and graduates – post-secondary vocational education	National Bureau of Statistics (NBS)	Country level, regional (5 regions)	2010/2011 – 2015/2016
Admissions, students, and graduates – tertiary education	National Bureau of Statistics (NBS)	Country level, regional (5 regions)	2010/2011 – 2015/2016
Graduates tertiary education, by cycle and fields of study	National Bureau of Statistics (NBS)	Country level, 23 fields of study	2010 - 2015
Number of education institutions	National Bureau of Statistics (NBS)	Country level, regional (5 regions)	2010/2011 – 2015/2016
Specialisation of post-secondary vocational education institutions	National Bureau of Statistics (NBS)	Regional (5 regions)	Current
Specialisation of tertiary education institutions	National Bureau of Statistics (NBS)	Regional (5 regions)	Current

### 1.4.3 Future needs for data collection

There is no real need for a breakdown of scientific publications into the five regions, as knowledge has a public nature and can be more easily accessed across regional borders. Education institutions, in particular in tertiary education, also serve the whole country, not just the region in which they are located. Currently there is no need for additional data.

<sup>15</sup> [https://ibn.idsi.md/en/Graph\\_Stacked?type=nrArticoleDomenii](https://ibn.idsi.md/en/Graph_Stacked?type=nrArticoleDomenii)

<sup>16</sup> <http://www.scimagojr.com/countrysearch.php?country=md>

## 2. Economic potential

### 2.1 Main economic sectors identified by Moldovan Investment and Export Promotion Organization (MIEPO)

The Moldovan Investment and Export Promotion Organization (MIEPO) has identified six main economic sectors contributing to the economic development of the Republic of Moldova<sup>17</sup>: Agriculture, Automotive, ICT, Medicine, Renewable energy, and Textile. These results will be included in the interpretation of the economic mapping in the following sections. MIEPO provides the following information in more detailed sector reports which are available at MIEPO's website.

**Agriculture** is "one of the leading sectors in the Moldovan economy, largely for natural reasons: the rich soil resources, biological diversity, good climate, and geographical conditions". The Agriculture and Food processing industry together account for approximately 16% of GDP, 45% of exports, and 27% of the labor force. The greatest potential for growth would be in the production of organic food<sup>18</sup>, as well as in conventional crops. Increasing exports can help to achieve growth, but there is a need to diversify and increase access to high value markets. The agricultural sector includes two major sub-sectors. The corporate sector includes large companies producing at large-scale employing relatively small numbers of people and specializing in low value-added crops. The individual sector includes peasant farms and household land in private property. These small farms produce high value-added crops sold locally.

The **Automotive** industry is a growing sector in the Moldovan economy, which would be "due to an increased focus on the unused industrial potential of Moldova and the maintained industrial orientation in the education system (Technical University, technical colleges and vocational schools)". "Production concentrates on cables, wiring harnesses for cars, car seat covers, plastic molding injection, metal processing, electronics and electronic components, and assembling".

The **ICT** sector is "primarily in a build out phase, with major investments focused on basic hardware infrastructure, such as server, storage, infrastructure software, and network equipment implementations". ICT "is expected to be driven primarily by large government projects, such as new e-government initiatives and technology investments in highly competitive sectors (banking and telecommunications, e.g.) and initiatives that support the alignment of IT with business goals." To support the strong growth of the ICT sector, the government has developed the Digital Moldova 2020 Strategy, "a policy document that creates the necessary preconditions defining the direction for the future stable development of" ICT.

The **Textiles** sector (or the Manufacturing textiles, apparel, leather, leather articles, and footwear (TAFL)) is an important branch of the Moldovan economy. More than 600 companies employ more than 26,000 people, and "most of these jobs are rural-based and occupied by women". About 60 percent of companies are located in Chisinau and Centre, about 20 per cent in North, and about 20 percent in South and Gagauzia. The sector is export-driven with 80% of produced goods being sold to foreign markets.

<sup>17</sup> <http://miepo.md/sectors>

<sup>18</sup> "Currently, sales of organic processed foods are growing in Western Europe, amounting to 37 billion EUR. Turning production over to organic products might revitalize the Moldovan food processing sector. Organic agriculture demands considerable manual work and non-use of chemicals... The organic sector does not have a long history, but combined efforts by NGOs, private investors, and the Government has led Moldova exporting to the European Union around 81 thousand tons of organic products at a value of 403 million USD in 2014" (MIEPO, [miepo.md/sites/default/files/reports/Agrifood%20sector%20overview.pdf](http://miepo.md/sites/default/files/reports/Agrifood%20sector%20overview.pdf)).

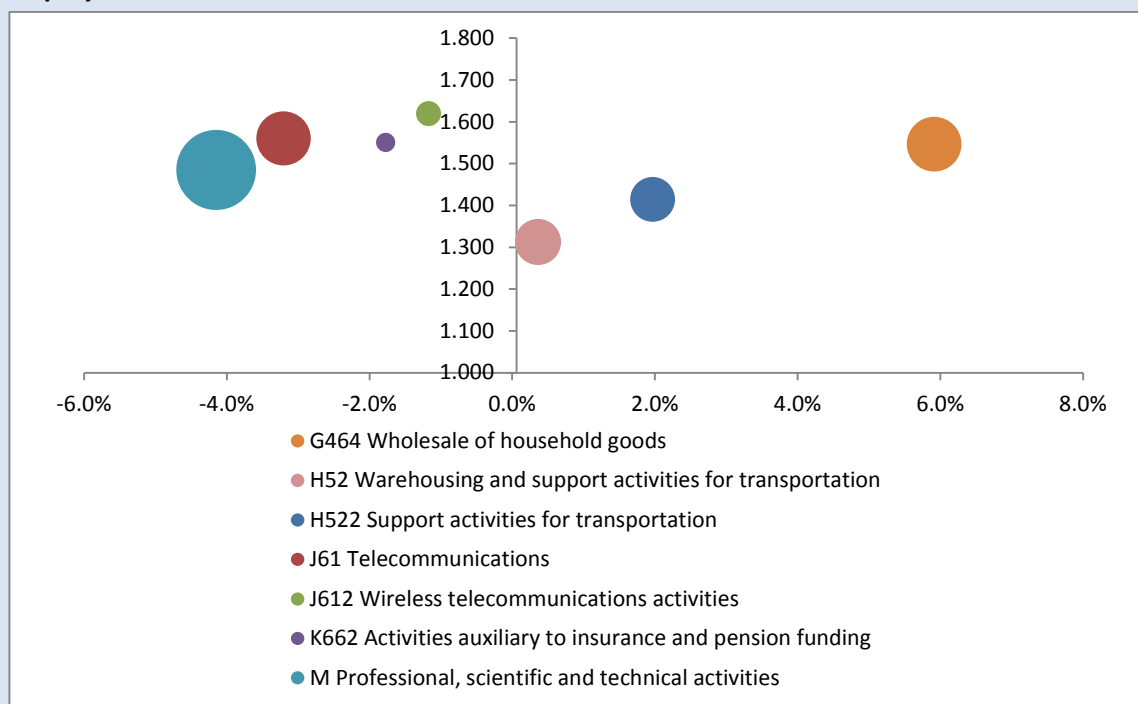
## 2.2 Chisinau: economic priority areas

For **Chisinau** all industries that have passed the thresholds in 2014-2016 are listed in Table 7. Industries in the public sector are excluded as the aim of any future public support should not be to further increase employment in the public sector. Such support should focus on supporting industries in the business sector. The industries in Table 7 are at the NACE 1-digit, 2-digit and 3-digit level and there is a clear overlap between some of them. Industries at the NACE 1-digit level are too broad for developing targeted public support and have been excluded. This results in the following list of potentially relevant sectors:

- C17 Manufacture of paper and paper products
- C172 Manufacture of articles of paper and paperboard
- C20 Manufacture of chemicals and chemical products
- C203 Manufacture of paints, varnishes and similar coatings, printing ink and mastics
- C231 Manufacture of glass and glass products
- C26 Manufacture of computer, electronic and optical products
- C265 Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks
- C28 Manufacture of machinery and equipment (not elsewhere classified)
- C31 Manufacture of furniture
- G464 Wholesale of household goods
- H52 Warehousing and support activities for transportation
- H522 Support activities for transportation
- J61 Telecommunications
- J612 Wireless telecommunications activities
- J62 Computer programming, consultancy and related activities
- K662 Activities auxiliary to insurance and pension funding
- M Professional, scientific and technical activities

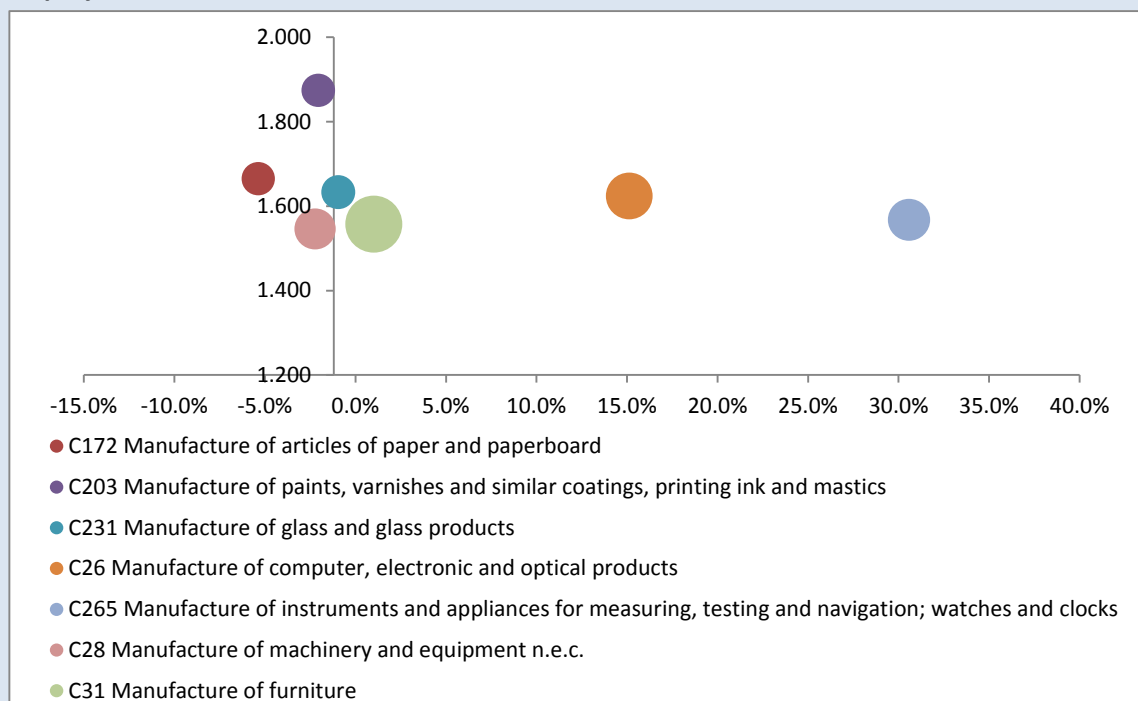
Of particular interest are Manufacture of computer, electronic and optical products (C26), Telecommunications (J61), and Computer programming, consultancy and related activities (J62), underlining the importance of the **ICT sector** for **Chisinau**. The ICT sector was also identified by MIEPO as one of the main economic sectors contributing to the economic development of Moldova. Employment in both C26 and J62 has grown strongly from 2014 to 2016 and wages are above average, in particular in ICT services J61 and J62. The positive developments in C26 rely strongly on those in C265 (Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks).

### Chisinau: Mapping economic priority areas, all industries: size and specialisation using employment data



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all industries.

### Chisinau: Mapping economic priority areas, manufacturing industries: size and specialisation using employment



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all manufacturing industries.

Final draft report: Mapping of economic, innovative and scientific potential in the Republic of Moldova

**Table 7 Economic mapping for Chisinau: industries passing threshold criteria**

NACE	Industry	Employment				Turnover				Wages	
		Volume	%-share	LQ	AAGR	Volume	%-share	LQ	Per worker	Volume	Per worker
		(persons)				(mln Lei)			(Lei)	(000s Lei)	(Lei)
Step 1	All industries	307,555			0.06%	205,575			668,417	15,861,304	51,572
G464	Wholesale of household goods	6,623	2.15%	1.547	0.66%	11,235	5.46%	1.308	1,696,211	330,116	49,841
H52	Warehousing and support activities for transportation	4,679	1.52%	1.313	0.36%	3,987	1.94%	1.216	852,139	348,543	74,486
H522	Support activities for transportation	4,439	1.44%	1.415	1.97%	3,753	1.83%	1.260	845,544	336,101	75,721
J	Information and communication	20,229	6.58%	1.575	1.58%	11,229	5.46%	1.358	555,106	2,097,107	103,670
J61	Telecommunications	6,498	2.11%	1.560	-3.21%	7,326	3.56%	1.363	1,127,419	781,177	120,212
J612	Wireless telecommunications activities	1,357	0.44%	1.620	-1.17%	4,105	2.00%	1.371	3,024,465	297,795	219,397
J62	Computer programming, consultancy and related activities	6,030	1.96%	1.597	9.56%	1,918	0.93%	1.347	318,153	702,415	116,487
K	Financial and insurance activities	3,448	1.12%	1.414	-0.61%	7,249	3.53%	1.344	2,102,249	251,864	73,039
K662	Activities auxiliary to insurance and pension funding	815	0.27%	1.551	-1.77%	5,325	2.59%	1.369	6,531,291	53,248	65,308
M	Professional, scientific and technical activities	14,078	4.58%	1.485	-4.15%	3,437	1.67%	1.261	244,169	862,430	61,261
P	Education	12,239	3.98%	1.475	-0.38%	1,407	0.68%	1.253	114,932	765,869	62,578
P854	Higher education	9,929	3.23%	1.489	-1.75%	1,137	0.55%	1.252	114,552	660,607	66,531
Step 2	Manufacturing	48,256	15.69%	0.858	-1.02%	23,841	11.60%	0.763	494,040	2,395,876	49,649
C17	Manufacture of paper and paper products	1,154	2.39%	1.666	-5.22%	826	3.46%	1.718	715,531	50,740	43,956
C172	Manufacture of articles of paper and paperboard	1,149	2.38%	1.665	-5.37%	824	3.46%	1.718	717,401	50,644	44,077
C20	Manufacture of chemicals and chemical products	1,653	3.42%	1.638	-1.79%	1,301	5.46%	1.570	787,151	126,772	76,707
C203	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	1,159	2.40%	1.874	-2.06%	1,122	4.71%	1.700	968,258	103,043	88,933
C231	Manufacture of glass and glass products	1,206	2.50%	1.634	-0.95%	1,240	5.20%	1.648	1,028,062	114,582	94,984
C26	Manufacture of computer, electronic and optical products	2,267	4.70%	1.624	15.12%	719	3.01%	1.743	316,991	131,358	57,935
C265	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1,853	3.84%	1.568	30.58%	557	2.34%	1.727	300,510	110,325	59,549
C28	Manufacture of machinery and equipment n.e.c.	1,759	3.64%	1.546	-2.23%	672	2.82%	1.540	381,988	111,804	63,573
C31	Manufacture of furniture	3,368	6.98%	1.558	1.02%	1,173	4.92%	1.579	348,438	129,416	38,429

## 2.3 North: economic priority areas

For **North** all industries that have passed the thresholds in 2014-2016 are listed in Table 8. The industries in Table 8 are at the NACE 1-digit, 2-digit and 3-digit level and there is a clear overlap between some of them. Total manufacturing (NACE C) is too broad for developing targeted public support and has been excluded. This results in the following list of potentially relevant sectors:

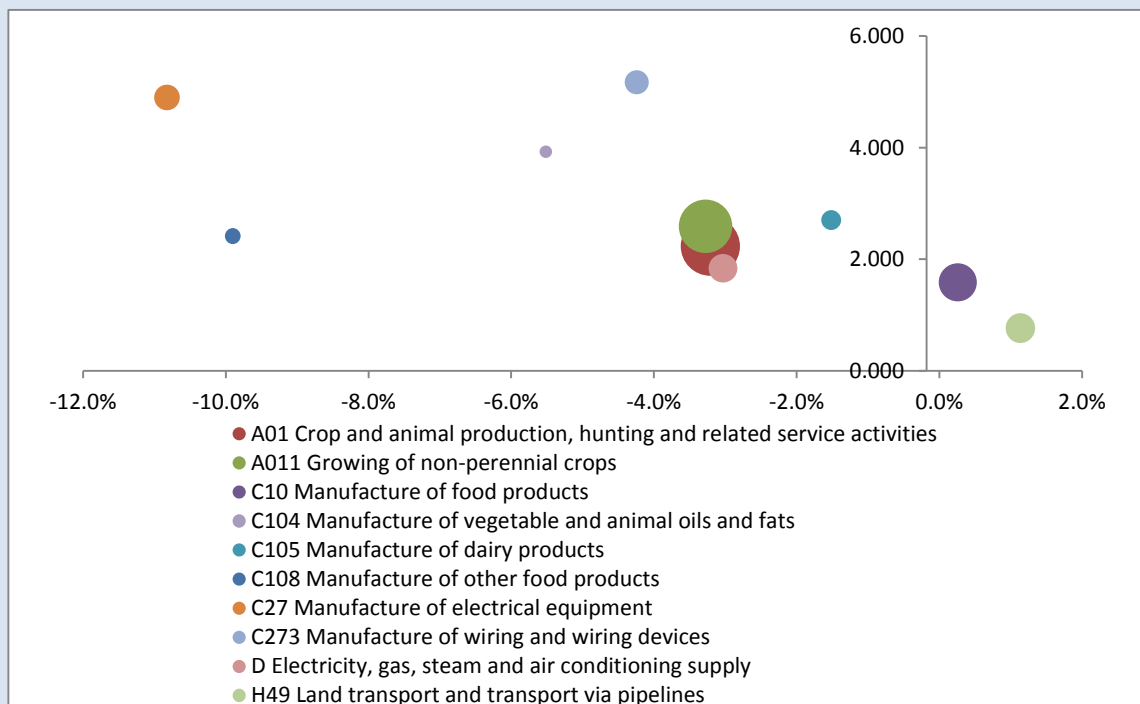
- A01 Crop and animal production, hunting and related service activities
- A011 Growing of non-perennial crops
- C10 Manufacture of food products
- C104 Manufacture of vegetable and animal oils and fats
- C105 Manufacture of dairy products
- C108 Manufacture of other food products
- C235 Manufacture of cement, lime and plaster
- C27 Manufacture of electrical equipment
- C273 Manufacture of wiring and wiring devices
- D Electricity, gas, steam and air conditioning supply
- H49 Land transport and transport via pipelines

For **North** Crop and animal production, hunting and related service activities (NACE A01) and Manufacture of food products (NACE C10) are important industries which account for a large share of total employment. **Agriculture and Food processing** has also been identified by MIEPO as one of the main economic sectors contributing to the economic development of Moldova. Wages and output per worker in C10 are above average and employment has grown marginally.

Manufacture of electrical equipment (C27()) is an important sector. Manufacture of wiring and wiring devices (C273) is part of the Automotive sector as identified by MIEPO.

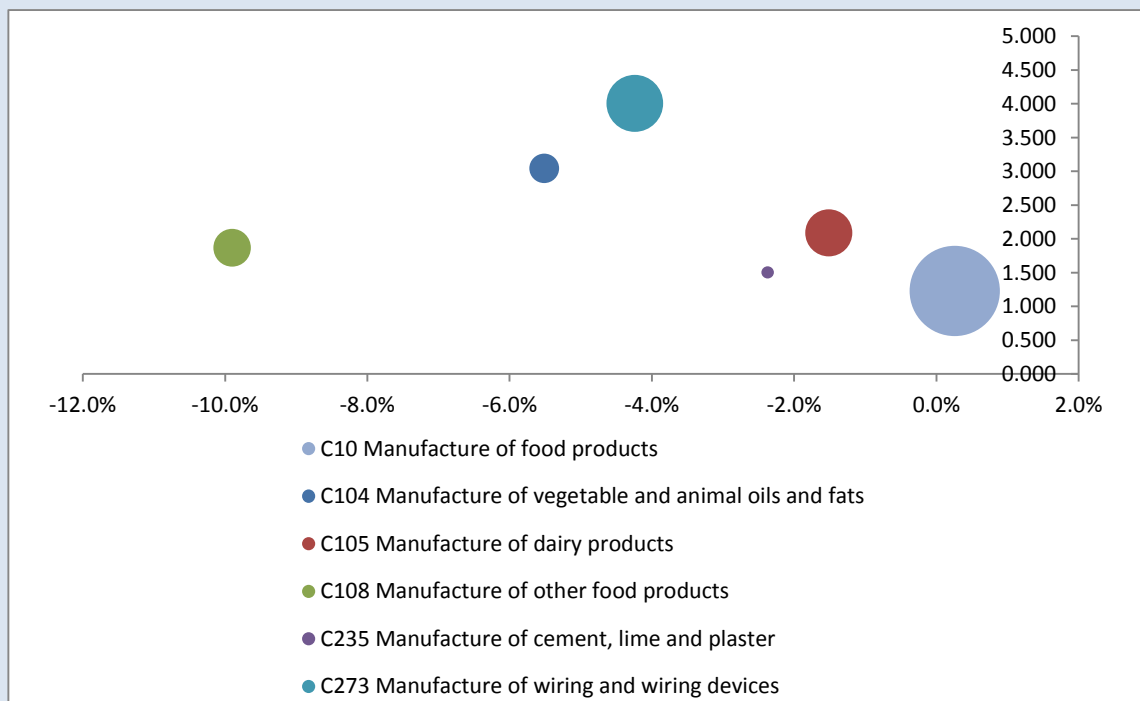


**North: Mapping economic priority areas, all industries: size and specialisation using employment data**



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all industries.

**North: Mapping economic priority areas, manufacturing industries: size and specialisation using employment**



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all manufacturing industries.

**Table 8 Economic mapping for North: industries passing threshold criteria**

NACE	Industry	Employment				Turnover				Wages	
		Volume	%-share	LQ	AAGR	Volume	%-share	LQ	Per worker	Volume	Per worker
		(persons)				(mln Lei)			(Lei)	(000s Lei)	(Lei)
Step 1	All industries	87,004			-0.18%	33,347			383,285	3,472,404	39,911
A	Agriculture, forestry and fishing	17,203	19.77%	2.166	-3.00%	4,754	14.26%	3.259	276,334	478,868	27,837
A01	Crop and animal production, hunting and related service activities	16,158	18.57%	2.232	-3.21%	4,684	14.05%	3.297	289,913	429,115	26,558
A011	Growing of non-perennial crops	13,195	15.17%	2.592	-3.28%	3,811	11.43%	3.962	288,848	348,021	26,376
C	Manufacturing	20,543	23.61%	1.291	4.88%	8,759	26.27%	1.727	426,393	1,005,119	48,928
C10	Manufacture of food products	6,684	7.68%	1.586	0.26%	5,102	15.30%	2.812	763,309	334,977	50,116
C104	Manufacture of vegetable and animal oils and fats	715	0.82%	3.930	-5.51%	841	2.52%	4.349	1,176,033	51,618	72,193
C105	Manufacture of dairy products	1,814	2.09%	2.701	-1.51%	1,241	3.72%	3.707	684,181	116,832	64,394
C108	Manufacture of other food products	1,162	1.34%	2.413	-9.90%	1,790	5.37%	5.304	1,540,741	69,868	60,127
C27	Manufacture of electrical equipment	3,013	3.46%	4.899	-10.82%	1,397	4.19%	7.193	463,633	228,955	75,981
C273	Manufacture of wiring and wiring devices	2,636	3.03%	5.174	-4.24%	1,366	4.10%	8.026	518,012	214,681	81,432
D	Electricity, gas, steam and air conditioning supply	3,787	4.35%	1.837	-3.03%	2,939	8.81%	1.158	775,981	319,504	84,361
H49	Land transport and transport via pipelines	4,085	4.70%	0.765	1.14%	1,601	4.80%	1.630	391,941	184,728	45,221
Step 2	Manufacturing	20,543	23.61%	1.291	4.88%	8,759	26.27%	1.727	426,393	1,005,119	48,928
C10	Manufacture of food products	6,684	32.54%	1.228	0.26%	5,102	58.25%	1.628	763,309	334,977	50,116
C104	Manufacture of vegetable and animal oils and fats	715	3.48%	3.043	-5.51%	841	9.60%	2.517	1,176,033	51,618	72,193
C105	Manufacture of dairy products	1,814	8.83%	2.091	-1.51%	1,241	14.17%	2.146	684,181	116,832	64,394
C108	Manufacture of other food products	1,162	5.66%	1.869	-9.90%	1,790	20.44%	3.070	1,540,741	69,868	60,127
C235	Manufacture of cement, lime and plaster	125	0.61%	1.503	-2.37%	352	4.01%	1.622	2,804,915	21,810	174,018
C27	Manufacture of electrical equipment	3,013	14.67%	3.794	-10.82%	1,397	15.95%	4.164	463,633	228,955	75,981
C273	Manufacture of wiring and wiring devices	2,636	12.83%	4.007	-4.24%	1,366	15.59%	4.646	518,012	214,681	81,432

## 2.4 Centre: economic priority areas

For **Centre** all industries that have passed the thresholds in 2014-2016 are listed in Table 9. Industries in the public sector have been excluded as the aim of any future public support should not be to further increase employment in the public sector. Such support should focus on supporting industries in the business sector. The industries in Table 9 are at the NACE 1-digit, 2-digit and 3-digit level and there is a clear overlap between some of them. Agriculture, forestry and fishing (NACE A) is broad for developing targeted public support and has been excluded. The results in the following list of potentially relevant sectors:

- A01 Crop and animal production, hunting and related service activities
- A014 Animal production
- A02 Forestry and logging
- A021 Silviculture<sup>19</sup> and other forestry activities
- C101 Processing and preserving of meat and production of meat products
- C13 Manufacture of textiles
- C139 Manufacture of other textiles
- C143 Manufacture of knitted and crocheted apparel
- C152 Manufacture of footwear
- C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations
- C212 Manufacture of pharmaceutical preparations
- C23 Manufacture of other non-metallic mineral products
- C235 Manufacture of cement, lime and plaster

For **Centre** Crop and animal production, hunting and related service activities (NACE A01) and Forestry and logging (A02) are important industries. Of particular interest are Animal production (A014) and Processing and preserving of meat and production of meat products (C101), indicating a strong role for the Meat industry. **Agriculture and Food processing** has been identified by MIEPO as one of the main economic sectors contributing to the economic development of Moldova.

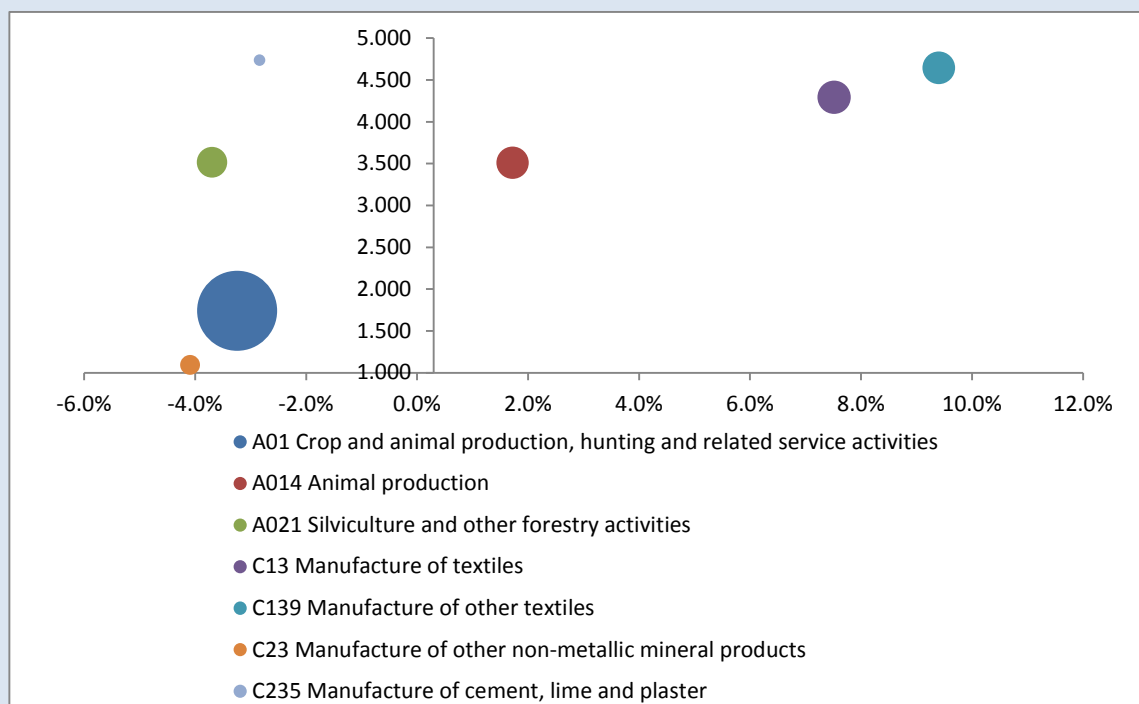
Manufacture of other textiles (C139), Manufacture of knitted and crocheted apparel (C143) and Manufacture of footwear (C152), are all part of the **Textile, Apparel, Footwear and Leather goods (TAFL)** sector, which has also been identified MIEPO as one of the main economic sectors of Moldova.

Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21) and Manufacture of other non-metallic mineral products (C23) are also strong economic areas.

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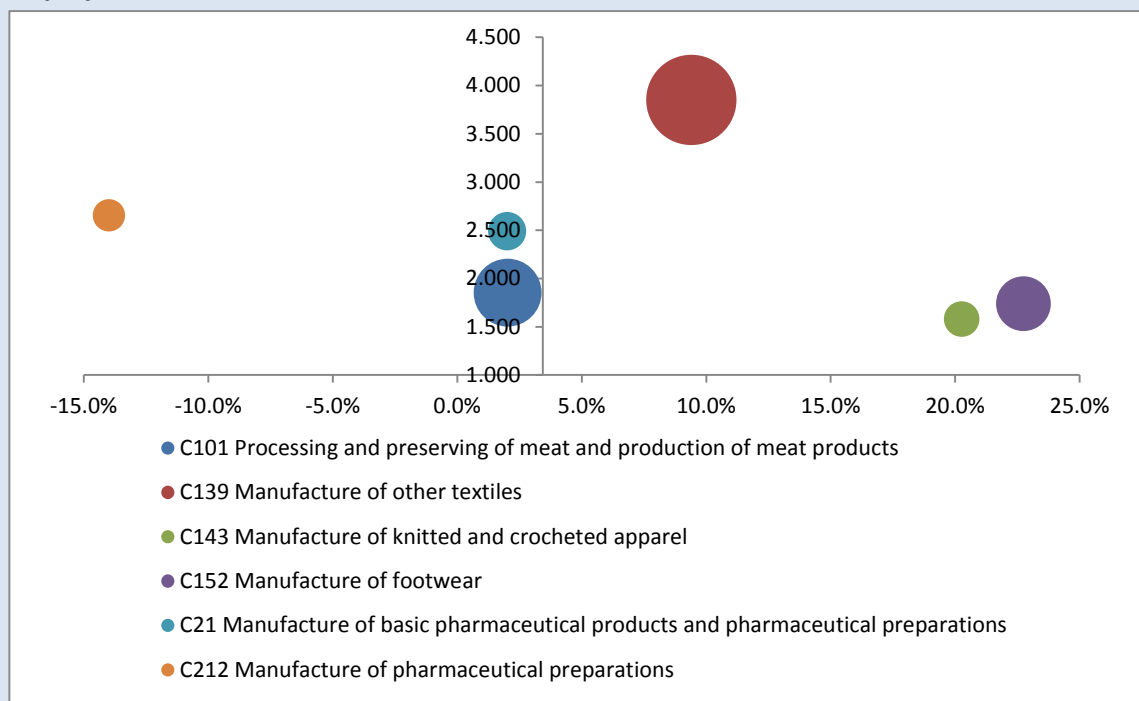
<sup>19</sup> Silviculture is the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.

### Centre: Mapping economic priority areas, all industries: size and specialisation using employment data



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all industries.

### Centre: Mapping economic priority areas, manufacturing industries: size and specialisation using employment



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all manufacturing industries.

**Table 9 Economic mapping for Centre: industries passing threshold criteria**

NACE	Industry	Employment				Turnover				Wages	
		Volume	%-share	LQ	AAGR	Volume	%-share	LQ	Per worker	Volume	Per worker
		(persons)				(mln Lei)			(Lei)	(000s Lei)	(Lei)
Step 1	All industries	68,935			0.30%	28,692			416,219	2,383,792	34,580
A	Agriculture, forestry and fishing	11,884	17.24%	1.889	-3.29%	3,183	11.10%	2.537	267,884	345,648	29,086
A01	Crop and animal production, hunting and related service activities	9,990	14.49%	1.742	-3.24%	3,028	10.55%	2.477	303,091	253,450	25,371
A014	Animal production	1,964	2.85%	3.511	1.72%	1,216	4.24%	4.983	619,039	71,164	36,234
A02	Forestry and logging	1,742	2.53%	3.490	-3.66%	141	0.49%	4.796	81,076	88,824	50,999
A021	Silviculture and other forestry activities	1,737	2.52%	3.516	-3.70%	140	0.49%	4.920	80,866	88,806	51,116
C13	Manufacture of textiles	2,078	3.01%	4.294	7.51%	1,702	5.93%	8.362	818,800	118,427	56,982
C139	Manufacture of other textiles	1,985	2.88%	4.646	9.40%	1,647	5.74%	8.495	829,915	112,646	56,758
C23	Manufacture of other non-metallic mineral products	734	1.06%	1.092	-4.09%	875	3.05%	2.066	1,191,799	43,048	58,649
C235	Manufacture of cement, lime and plaster	242	0.35%	4.737	-2.84%	707	2.47%	6.550	2,918,638	32,788	135,300
Q862	Medical and dental practice activities	4,617	6.70%	1.771	-3.12%	479	1.67%	2.084	103,747	234,941	50,882
Step 2	Manufacturing	15,202	22.05%	1.206	3.44%	6,517	22.71%	1.494	428,710	602,074	39,604
C101	Processing and preserving of meat and production of meat products	1,117	7.35%	1.852	2.02%	858	13.17%	2.059	768,607	37,998	34,028
C13	Manufacture of textiles	2,078	13.67%	3.560	7.51%	1,702	26.11%	5.597	818,800	118,427	56,982
C139	Manufacture of other textiles	1,985	13.06%	3.852	9.40%	1,647	25.27%	5.686	829,915	112,646	56,758
C143	Manufacture of knitted and crocheted apparel	308	2.03%	1.579	20.26%	24	0.36%	1.143	77,081	12,161	39,483
C152	Manufacture of footwear	727	4.78%	1.739	22.74%	83	1.27%	1.553	114,173	31,983	43,994
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	358	2.35%	2.491	2.00%	285	4.37%	2.960	796,182	35,517	99,209
C212	Manufacture of pharmaceutical preparations	252	1.66%	2.654	-13.99%	237	3.64%	3.852	940,395	30,894	122,596

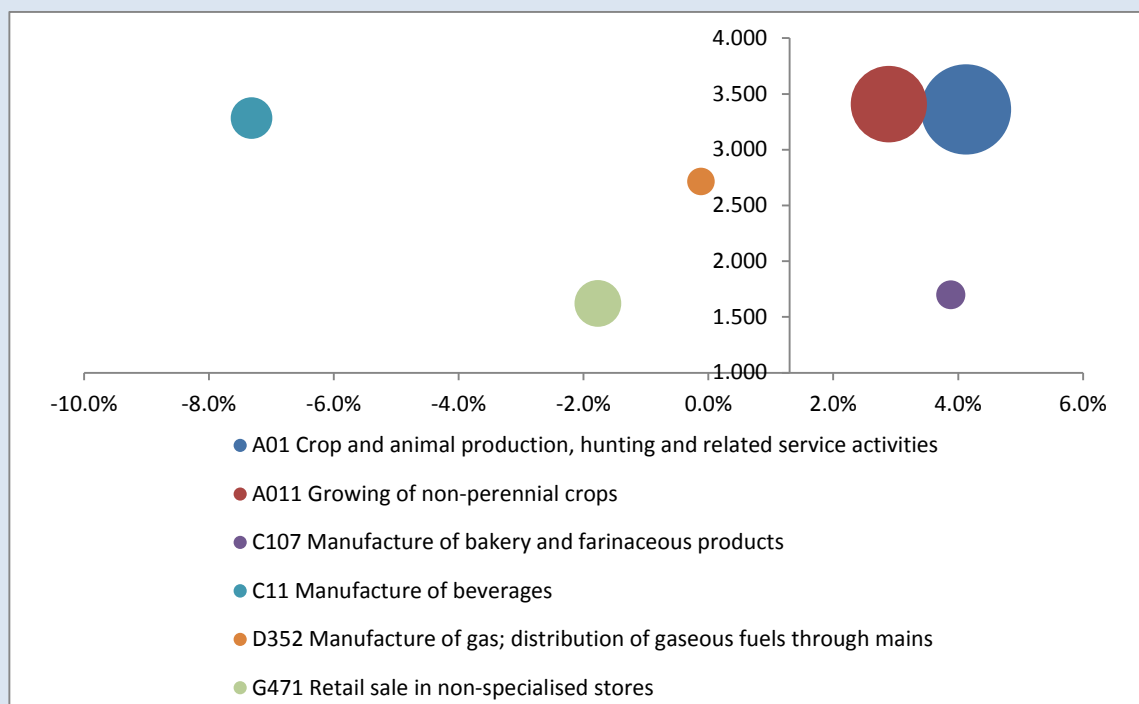
## 2.5 South: economic priority areas

For **South** all industries that have passed the thresholds in 2014-2016 are listed in Table 10. Industries in the public sector should be excluded as the aim of any future public support should not be to further increase employment in the public sector. Such support should focus on supporting industries in the business sector. The industries in Table 10 are at the NACE 1-digit, 2-digit and 3-digit level and there is a clear overlap between some of them. Agriculture, forestry and fishing (NACE A) is too broad for developing targeted public support and has been excluded. This results in the following list of potentially relevant sectors:

- A01 Crop and animal production, hunting and related service activities
- A011 Growing of non-perennial crops
- C106 Manufacture of grain mill products, starches and starch products
- C107 Manufacture of bakery and farinaceous products
- C11 Manufacture of beverages
- D352 Manufacture of gas; distribution of gaseous fuels through mains
- G471 Retail sale in non-specialised stores

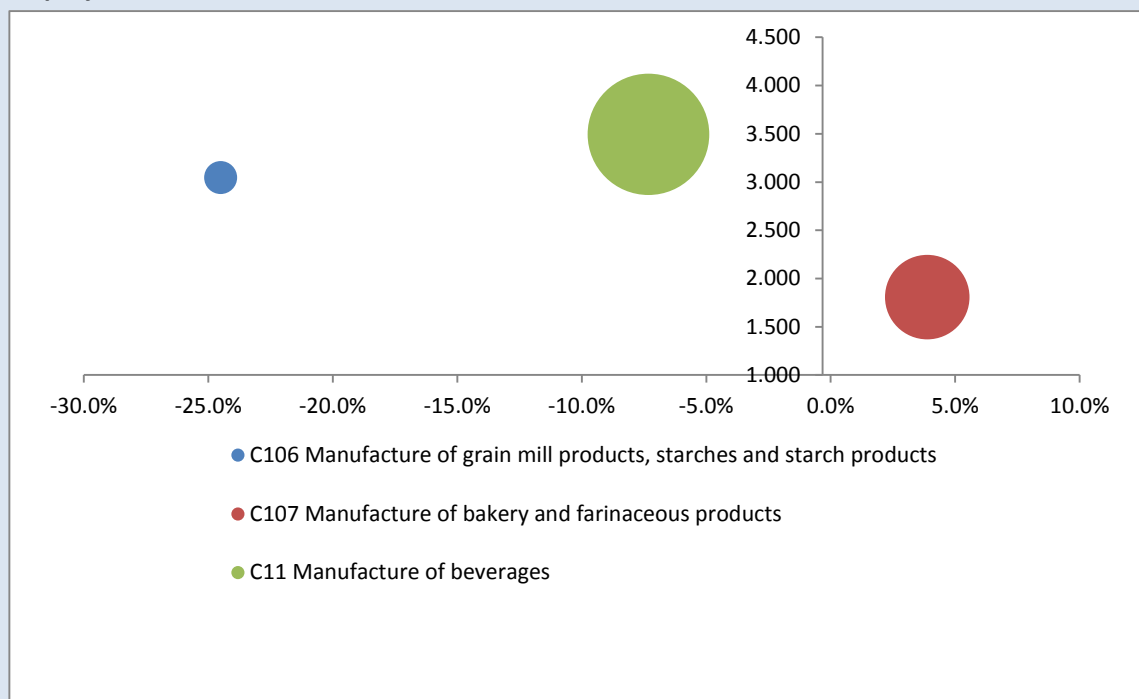
For **South** the Growing of non-perennial crops (A011) is an important industry. Important 'food industries' include Manufacture of grain mill products, starches and starch products (C106), Manufacture of bakery and farinaceous products (C107) and Manufacture of beverages (C11), the latter also including the production of wine. **Agriculture and Food processing** has been identified by MIEPO as one of the main economic sectors contributing to the economic development of Moldova.

### South: Mapping economic priority areas, all industries: size and specialisation using employment data



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all industries.

### South: Mapping economic priority areas, manufacturing industries: size and specialisation using employment



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all manufacturing industries.

**Table 10 Economic mapping for South: industries passing threshold criteria**

NACE	Industry	Employment				Turnover				Wages	
		Volume (persons)	%-share	LQ	AAGR	Volume (mln Lei)	%-share	LQ	Per worker (Lei)	Volume (000s Lei)	Per worker (Lei)
Step 1	All industries	32,509			1.03%	8,513			261,864	1,059,414	32,588
A	Agriculture, forestry and fishing	9,780	30.08%	3.296	4.20%	2,304	27.07%	6.189	235,626	273,446	27,961
A01	Crop and animal production, hunting and related service activities	9,090	27.96%	3.360	4.13%	2,253	26.47%	6.212	247,866	241,089	26,523
A011	Growing of non-perennial crops	6,483	19.94%	3.408	2.89%	1,810	21.26%	7.369	279,119	176,251	27,185
C107	Manufacture of bakery and farinaceous products	937	2.88%	1.699	3.88%	316	3.71%	4.441	337,422	43,693	46,648
C110	Manufacture of beverages	1,933	5.95%	3.284	-7.32%	1,155	13.57%	7.187	597,583	60,681	31,398
D352	Manufacture of gas; distribution of gaseous fuels through mains	833	2.56%	2.715	-0.12%	271	3.19%	1.204	325,672	75,171	90,241
G471	Retail sale in non-specialised stores	2,444	7.52%	1.622	-1.77%	634	7.44%	1.986	259,195	51,852	21,213
Q861	Hospital activities	2,902	8.93%	1.574	-3.79%	271	3.19%	2.707	93,450	126,874	43,720
Step 2	Manufacturing	5,586	17.18%	0.940	-0.32%	1,852	21.76%	1.431	331,607	180,600	32,331
C106	Manufacture of grain mill products, starches and starch products	143	2.56%	3.045	-24.51%	55	2.95%	3.187	382,092	2,709	18,947
C107	Manufacture of bakery and farinaceous products	937	16.77%	1.808	3.88%	316	17.06%	3.103	337,422	43,693	46,648
C11	Manufacture of beverages	1,933	34.60%	3.495	-7.32%	1,155	62.35%	5.022	597,583	60,681	31,398



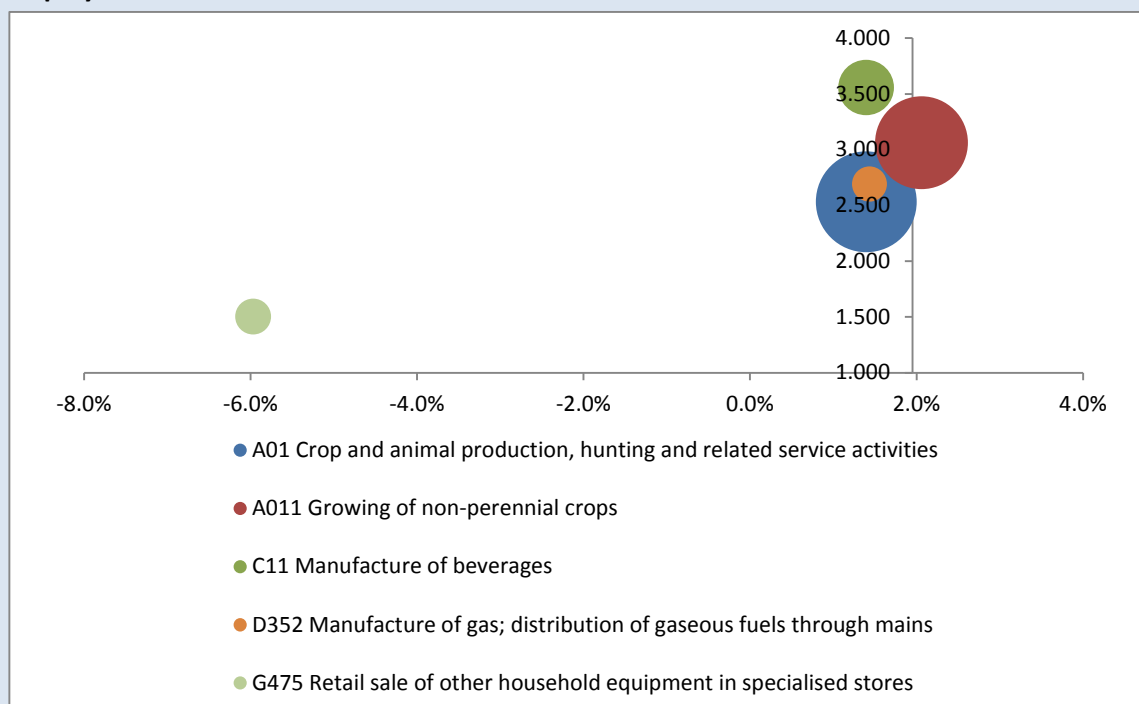
## 2.6 Gagauzia: economic priority areas

For **Gagauzia** all industries that have passed the thresholds in 2014-2016 are listed in Table 11. The industries in Table 11 are at the NACE 1-digit, 2-digit and 3-digit level and there is a clear overlap between some of them. Agriculture, forestry and fishing (NACE A) is too broad for developing targeted public support and has been excluded. This results in the following list of potentially relevant sectors:

- A01 Crop and animal production, hunting and related service activities
- A011 Growing of non-perennial crops
- C106 Manufacture of grain mill products, starches and starch products
- C11 Manufacture of beverages
- C19 Manufacture of coke and refined petroleum products
- C192 Manufacture of refined petroleum products
- C231 Manufacture of glass and glass products
- D352 Manufacture of gas; distribution of gaseous fuels through mains
- G475 Retail sale of other household equipment in specialised stores

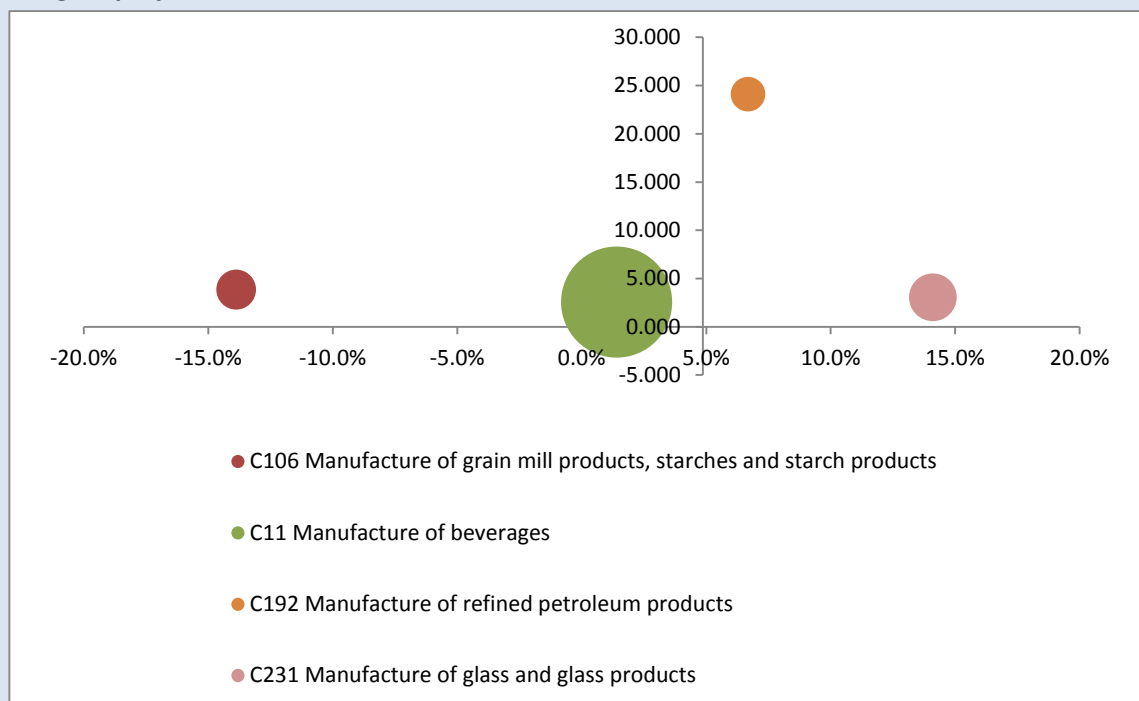
For **Gagauzia** the Growing of non-perennial crops (A011) is an important industry. Food processing is also an important industry, in particular Manufacture of grain mill products, starches and starch products (C106). Manufacture of beverages (C11) is another important industry, including the production of wine. **Agriculture and Food processing** has been identified by MIEPO as one of the main economic sectors contributing to the economic development of Moldova.

### Gagauzia: Mapping economic priority areas, all industries: size and specialisation using employment data



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all industries.

### Gagauzia: Mapping economic priority areas, manufacturing industries: size and specialisation using employment



Horizontal axis: average annual growth rate. Vertical axis: Location Quotient. Size of bubble: employment share. Vertical axis crosses horizontal axis at the average annual growth rate of all manufacturing industries.

**Table 11 Economic mapping for Gagauzia: industries passing threshold criteria**

NACE	Industry	Employment				Turnover				Wages	
		Volume (persons)	%-share	LQ	AAGR	Volume (mln Lei)	%-share	LQ	Per worker (Lei)	Volume (000s Lei)	Per worker (Lei)
Step 1	All industries	15,164			1.95%	5,899			388,992	482,033	31,788
A	Agriculture, forestry and fishing	3,351	22.10%	2.421	1.44%	755	12.81%	2.928	225,421	86,999	25,959
A01	Crop and animal production, hunting and related service activities	3,196	21.08%	2.533	1.40%	747	12.66%	2.972	233,684	81,093	25,371
A011	Growing of non-perennial crops	2,718	17.92%	3.063	2.06%	619	10.49%	3.635	227,631	69,715	25,653
C11	Manufacture of beverages	977	6.44%	3.558	1.39%	774	13.12%	6.951	792,492	33,678	34,482
D352	Manufacture of gas; distribution of gaseous fuels through mains	385	2.54%	2.692	1.43%	139	2.36%	0.890	360,546	35,417	91,912
G475	Retail sale of other household equipment in specialised stores	405	2.67%	1.503	-5.97%	274	4.65%	2.104	676,533	8,668	21,385
Step 2	Manufacturing	3,877	25.57%	1.398	4.87%	1,913	32.43%	2.133	493,357	122,480	31,591
C106	Manufacture of grain mill products, starches and starch products	125	3.23%	3.846	-13.89%	109	5.72%	6.183	873,480	4,399	35,102
C110	Manufacture of beverages	977	25.19%	2.544	1.39%	774	40.47%	3.259	792,492	33,678	34,482
C19	Manufacture of coke and refined petroleum products	94	2.42%	22.289	6.67%	507	26.50%	22.369	5,391,418	4,155	44,197
C192	Manufacture of refined petroleum products	94	2.42%	24.107	6.67%	507	26.50%	22.419	5,391,418	4,155	44,197
C231	Manufacture of glass and glass products	181	4.67%	3.051	14.10%	103	5.37%	1.701	567,153	7,704	42,565

## 2.7 Summary assessment based on economic NACE 3-digit data

Table 12 summarizes the potential priority domains for smart specialisation. The table confirms that Chisinau and the other four regions are different and may have different relevant domains for smart specialisation. For North, Centre, South and Gagauzia, Agriculture and Food processing, is a common priority area. But there are differences, the Growing of non-perennial crops is less relevant in Centre, which relies more on a strong Meat industry, including Animal production and the Processing and preserving of meat and production of meat products. Centre also has a strong Forestry and logging industry. In the Manufacture of food products ('Food processing') there are different patterns of specialisation. The Manufacture of beverages, including wine, is a priority domain in South and Gagauzia.

Textile, Apparel, Footwear and Leather goods (TAFL) is a priority domain in Centre, with specializations in three NACE 2-digit industries. Energy is a priority domain in North, South and Gagauzia. For Chisinau the ICT sector is the most relevant industry for receiving policy support. These broad groupings coincide with four of the six main economic sectors identified by the Moldovan Investment and Export Promotion Organization (MIEPO).

The Moldova 2020 development strategy prioritized the development of renewable energy and increased energy efficiency. Assuming activities in NACE industries D include such activities, Renewable energy is a potential priority area in North, South, and Gagauzia.

Other potential priority areas include the following activities in manufacturing (cf. Table 12):

- Manufacture of paper and paper products (C17) in Chisinau;
- Chemicals and related activities:
  - Manufacture of coke and refined petroleum products (C19) in Gagauzia;
  - Manufacture of chemicals and chemical products (C20) in Chisinau;
  - Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21) in Centre;
- Machinery and electrical equipment:
  - Manufacture of electrical equipment (C27) in North;
  - Manufacture of machinery and equipment not elsewhere classified (C28) in Chisinau.

**Table 12 Potential economic priority domains for smart specialization**

	Chisinau	North	Centre	South	Gagauzia
<b>Agriculture and Food processing</b>		X	X	X	X
A01 Crop and animal production, hunting and related service		X	X	X	X
A011 Growing of non-perennial crops		X		X	X
A014 Animal production			X		
A02 Forestry and logging			X		
A021 Silviculture and other forestry activities			X		
C10 Manufacture of food products		X			
C101 Processing and preserving of meat and production of meat			X		
C104 Manufacture of vegetable and animal oils and fats		X			
C105 Manufacture of dairy products		X			
C106 Manufacture of grain mill products, starches and starch				X	X
C107 Manufacture of bakery and farinaceous products				X	
C108 Manufacture of other food products		X			
C11 Manufacture of beverages				X	X
<b>Textile, Apparel, Footwear and Leather goods (TAFL)</b>			X		
C13 Manufacture of textiles			X		
C139 Manufacture of other textiles			X		
C143 Manufacture of knitted and crocheted apparel			X		
C152 Manufacture of footwear			X		
<b>ICT</b>	X				
J61 Telecommunications	X				
J612 Wireless communications	X				
J62 Computer programming, consultancy and related activities	X				
C26 Manufacture of computer, electronic and optical products	X				
C265 Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	X				
<b>Renewable energy</b>		X		X	X
D Electricity, gas, steam and air conditioning supply		X			
D352 Manufacture of gas; distribution of gaseous fuels through mains				X	X
<b>Other</b>					
C17 Manufacture of paper and paper products	X				
C172 Manufacture of articles of paper and paperboard	X				
C19 Manufacture of coke and refined petroleum products					X
C192 Manufacture of refined petroleum products					X
C20 Manufacture of chemicals and chemical products	X				
C203 Manufacture of paints, varnishes and similar coatings, printing ink and mastics	X				
C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations			X		
C212 Manufacture of basic pharmaceutical preparations			X		
C23 Manufacture of other non-metallic mineral products			X		
C231 Manufacture of glass and glass products	X				X
C235 Manufacture of cement, lime and plaster		X	X		
C27 Manufacture of electrical equipment		X			
C273 Manufacture of wiring and wiring devices		X			
C28 Manufacture of machinery and equipment not elsewhere classified	X				
C31 Manufacture of furniture	X				
K662 Activities auxiliary to insurance and pension funding	X				
M Professional, scientific and technical activities	X				

## 2.8 Traded clusters and emerging industries

Clusters can be defined as “groups of specialised enterprises (often SMEs) and other related supporting actors that cooperate closely together in a particular location”<sup>20</sup>. Clusters are commonly concentrated on one or more sectors within a specific region. They also emphasize networking and cooperation between companies and institutions, internal and external to the region<sup>21</sup>. Clusters are key drivers of innovation, enabling “open innovation” and the creation of new ideas in networks of companies and institutions in cooperation.

The European Commission has recognized the importance of clusters for driving regional developments. In 2006 the European Commission launched the European Cluster Observatory providing statistical information, analysis and mapping of clusters and cluster policy in Europe, in particular for the EU Member States<sup>22</sup>. The main objective of the European Cluster Observatory is to help EU Member States and respective regions to design better smart specialisation and cluster strategies to help companies develop competitive advantages in emerging industries through clusters. In its first phase (2006-2013), the European Cluster Observatory identified 2017 regional clusters for 38 traded sectors across the EU. Of these, 155 had critical mass in terms of size, specialisation and focus. In its second phase (2014-2016), the European Cluster Observatory focused on cross-sectoral linkages and competitiveness and entrepreneurship opportunities in emerging industries, identifying 51 traded cluster categories using combinations of NACE 4-digit industries<sup>23</sup>. The European Cluster Observatory also identified 10 (cross-sectoral) emerging industries using a combination of methods as explained in Ketels et al. (2014)<sup>24</sup>.

Using more detailed NACE 4-digit employment data for 2015, employment shares and Location Quotients can be calculated for each of the Moldovan regions using the definitions of the European Cluster Observatory. Results for traded clusters are shown in Table 14, where clusters have been highlighted if they passed the thresholds on relative size and specialisation.

For Chisinau the following clusters have passed both thresholds:

- Business Services, including J62 Computer programming, consultancy and related activities, one of the ICT industries identified in the economic mapping;
- Education and Knowledge Creation, including only activities in the public sector, which are excluded from the economic mapping;
- Marketing, Design, and Publishing, including industries not captured by the economic mapping.

For North the following clusters have passed both thresholds on relative size and specialisation:

- Apparel, including C14 Manufacture of wearing apparel, including industries not captured by the economic mapping;

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<sup>20</sup> Definition taken from EU Cluster Portal (<http://ec.europa.eu/growth/smes/cluster/>).

<sup>21</sup> The concept of clusters and cluster policies and their role for competitiveness and innovation: main statistical results and lessons learned. Available at: <http://bookshop.europa.eu/en/the-concept-of-clusters-and-cluster-policies-and-their-role-for-competitiveness-and-innovation-pbNBNA23591/>

<sup>22</sup> [http://ec.europa.eu/growth/smes/cluster/observatory\\_en](http://ec.europa.eu/growth/smes/cluster/observatory_en)

<sup>23</sup> These clusters were originally defined for the US using data at the 6-digit industry level (NAICS). The European Cluster Observatory has transferred the US definitions using a concordance table between NAICS and NACE with the restriction that data for EU Member States is available for NACE 4-digit industries only.

<sup>24</sup> Ketels, C. and S. Protsiv, "Methodology and Findings Report for a Cluster Mapping of Related Sectors", European Cluster Observatory report, October 2014.

**Table 13 Traded cluster performance: 2015 employment data at NACE Rev 2 level 4**

	MD	Chisinau		North		Centre		South		Gagauzia	
	Size %	Size %	LQ	Size %	LQ	Size %	LQ	Size %	LQ	Size %	LQ
<b>All clusters</b>	<b>38.7</b>	<b>43.1%</b>		<b>33.6</b>		<b>31.1</b>		<b>23.6</b>		<b>46.8</b>	
Aerospace Vehicles and Defence	--	--	--	--	--	--	--	--	--	--	--
Agricultural Inputs and Services	0.05	0.03	0.575	0.12	2.431	0.05	1.021	0.05	1.086	0.05	0.936
Apparel	2.99	1.91	0.637	6.16	2.058	2.42	0.807	3.12	1.041	8.80	2.940
Appliances	0.02	0.03	1.683	--	--	--	--	--	--	--	--
Automotive	0.00	0.00	1.473	--	--	0.00	0.872	--	--	--	--
Biopharmaceuticals	0.17	0.14	0.860	0.05	0.326	0.44	2.638	0.03	0.179	0.24	1.453
Business Services	4.53	6.80	1.502	1.26	0.277	1.02	0.226	0.63	0.138	2.87	0.634
Coal Mining	--	--	--	--	--	--	--	--	--	--	--
Communications Equipment and Services	0.44	0.72	1.622	0.05	0.104	0.01	0.016	0.02	0.045	0.19	0.442
Construction Products and Services	0.72	0.56	0.776	1.00	1.384	1.00	1.375	0.37	0.509	1.73	2.393
Distribution and Electronic Commerce	5.41	6.67	1.231	3.45	0.637	4.44	0.820	1.89	0.349	3.60	0.666
Downstream Chemical Products	0.12	0.13	1.119	0.07	0.565	0.14	1.174	--	--	0.27	2.281
Downstream Metal Products	0.16	0.14	0.916	0.20	1.298	0.15	0.929	0.24	1.552	0.03	0.207
Education and Knowledge Creation	2.51	3.76	1.494	0.04	0.015	0.40	0.160	0.89	0.355	5.44	2.165
Electric Power Generation and Transmission	0.44	0.73	1.656	0.03	0.057	0.01	0.028	0.02	0.037	--	--
Environmental Services	1.12	0.61	0.545	1.70	1.507	1.69	1.499	2.59	2.306	2.34	2.084
Financial Services	0.62	0.86	1.393	0.15	0.243	0.12	0.188	0.10	0.160	1.90	3.086
Fishing and Fishing Products	0.07	0.10	1.436	0.01	0.174	0.06	0.815	--	--	--	--
Food Processing and Manufacturing	4.33	2.89	0.667	6.30	1.453	5.57	1.285	7.16	1.652	10.05	2.320
Footwear	0.48	0.47	0.988	0.35	0.734	0.92	1.928	0.07	0.152	0.01	0.027
Forestry	--	--	--	--	--	--	--	--	--	--	--
Furniture	0.79	0.99	1.267	0.29	0.363	0.84	1.071	0.13	0.164	0.55	0.703
Hospitality and Tourism	0.93	1.23	1.317	0.72	0.769	0.03	0.028	0.24	0.261	2.01	2.150
Information Technology and Analytical Instruments	0.62	0.85	1.379	0.65	1.050	--	--	--	--	--	--
Insurance Services	0.11	0.17	1.606	0.01	0.128	0.00	0.013	--	--	0.08	0.726
Jewellery and Precious Metals	0.03	0.05	1.347	0.02	0.615	0.02	0.656	--	--	--	--
Leather and Related Products	0.16	0.25	1.582	--	--	0.07	0.419	--	--	--	--
Lighting and Electrical Equipment	0.71	0.08	0.116	3.80	5.387	0.02	0.021	--	--	--	--
Livestock Processing	0.72	0.41	0.580	0.78	1.088	2.07	2.894	0.46	0.640	0.35	0.490
Marketing, Design, and Publishing	1.33	2.14	1.612	0.15	0.110	0.05	0.037	0.05	0.035	0.69	0.518
Medical Devices	0.07	0.10	1.404	0.07	0.962	--	--	--	--	--	--
Metal Mining	--	--	--	--	--	--	--	--	--	--	--
Metalworking Technology	0.37	0.44	1.168	0.14	0.387	0.51	1.381	0.11	0.283	0.30	0.801
Music and Sound Recording	0.02	0.04	1.627	0.00	0.195	--	--	--	--	--	--
Non-metal Mining	0.46	0.78	1.680	0.01	0.012	--	--	--	--	--	--
Oil and Gas Production and Transportation	0.14	0.01	0.047	0.69	4.871	--	--	--	--	0.62	4.388
Paper and Packaging	0.46	0.71	1.557	0.04	0.090	0.17	0.360	0.01	0.014	0.10	0.227
Performing Arts	0.45	0.70	1.553	0.02	0.046	0.05	0.119	0.01	0.029	0.75	1.672
Plastics	0.79	0.99	1.247	0.54	0.681	0.40	0.501	0.62	0.784	0.60	0.753
Printing Services	0.24	0.35	1.441	0.07	0.301	0.14	0.574	0.04	0.151	0.01	0.027
Production Technology and Heavy Machinery	0.40	0.49	1.236	0.44	1.097	0.17	0.438	0.01	0.033	0.16	0.391
Recreational and Small Electric Goods	0.13	0.10	0.782	0.39	3.074	0.00	0.032	--	--	0.01	0.051
Textile Manufacturing	0.94	0.49	0.521	0.38	0.405	3.28	3.485	1.56	1.652	0.68	0.717
Tobacco	0.10	0.13	1.351	--	--	0.07	0.709	0.01	0.068	0.29	3.010
Transportation and Logistics	3.55	3.84	1.082	2.83	0.796	3.96	1.117	2.66	0.750	1.77	0.500
Upstream Chemical Products	0.03	0.03	0.895	0.01	0.369	0.07	2.056	0.03	0.965	0.06	1.712
Upstream Metal Manufacturing	0.15	0.19	1.280	0.08	0.585	0.11	0.778	0.02	0.114	0.10	0.672
Video Production and Distribution	0.17	0.25	1.512	0.07	0.402	0.03	0.183	--	--	0.03	0.197
Vulcanized and Fired Materials	0.38	0.54	1.435	0.06	0.159	0.22	0.590	0.22	0.597	--	--
Water Transportation	0.00	0.00	1.052	0.00	0.726	0.00	1.308	0.00	1.043	--	--

	MD	Chisinau		North		Centre		South		Gagauzia	
Wood Products	0.28	0.24	0.858	0.38	1.353	0.38	1.360	0.26	0.916	0.07	0.255

- Lighting and Electrical Equipment, including C27 Manufacture of electrical equipment, which also emerged as a specialised industry in the economic mapping;
- Food Processing and Manufacturing almost passed the LQ threshold and, given its size, is added to the list of clusters for North. It also coincides with Agriculture and Food processing identified in the economic mapping.

For Centre the following clusters have passed both thresholds on relative size and specialisation:

- Livestock Processing, which captures C101 Processing and preserving of meat and production of meat, one of the industries in Agriculture and Food processing as identified in the economic mapping;
- Textile Manufacturing, confirming the identification of Textiles in the economic mapping.

For South the following clusters have passed both thresholds on relative size and specialisation:

- Environmental Services, confirming the identification of Renewable energy in the economic mapping;
- Food Processing and Manufacturing, including several industries identified as Agriculture and Food processing in the economic mapping.

For Gagauzia the following clusters have passed both thresholds on relative size and specialisation:

- Apparel, including industries not captured by the economic mapping;
- Education and Knowledge Creation, including only activities in the public sector, which are excluded from the economic mapping;
- Environmental Services, confirming the identification of Renewable energy in the economic mapping;
- Food Processing and Manufacturing, including several industries identified as Agriculture and Food processing in the economic mapping;
- Hospitality and Tourism, including industries not captured by the economic mapping.

**Table 14 Specialisation in Emerging industries (2015 employment data at NACE Rev 2 level 4)**

	MD	Chisinau		North		Centre		South		Gagauzia	
		Size %	LQ	Size %	LQ	Size %	LQ	Size %	LQ	Size %	LQ
<b>Emerging Industries</b>	<b>33.7</b>	<b>41.5</b>		<b>25.4</b>		<b>19.5</b>		<b>15.0</b>		<b>24.2</b>	
Advanced Packaging	1.19	1.69	1.423	0.14	0.342	0.59	0.500	0.32	0.272	0.29	0.246
Biopharmaceuticals	1.19	1.34	1.119	0.05	0.421	1.66	1.390	0.66	0.552	1.19	0.995
Blue Growth Industries	5.61	6.07	1.083	4.68	0.834	4.75	0.847	5.09	0.908	6.87	1.225
Creative Industries	6.04	8.92	1.477	1.47	0.244	1.10	0.182	0.67	0.111	3.59	0.594
Digital Industries	3.26	5.06	1.552	1.07	0.329	0.25	0.076	0.05	0.016	1.01	0.309
Environmental Industries	4.23	4.24	1.003	4.57	1.079	3.78	0.894	3.81	0.899	5.06	1.196
Experience Industries	4.18	5.92	1.416	1.36	0.326	1.51	0.361	1.03	0.246	4.19	1.002
Logistical Services	4.14	4.45	1.075	3.30	0.796	4.83	1.167	3.02	0.728	1.85	0.447
Medical Devices	2.13	2.26	1.062	4.31	2.023	0.28	0.133	0.06	0.028	0.01	0.003
Mobility Technologies	1.70	1.57	0.924	3.71	2.182	0.75	0.443	0.27	0.159	0.14	0.084



Table 14 summarizes emerging industries performance where emerging industries have been highlighted if they passed the thresholds on relative size and specialisation. For Chisinau four emerging industries combine critical mass and specialization: Advanced Packaging, Creative Industries, Digital Industries, and Experience Industries. For North two emerging industries combine critical mass and specialization: Medical Devices and Mobility Technologies. For none of the other regions at least one emerging industry stands out.

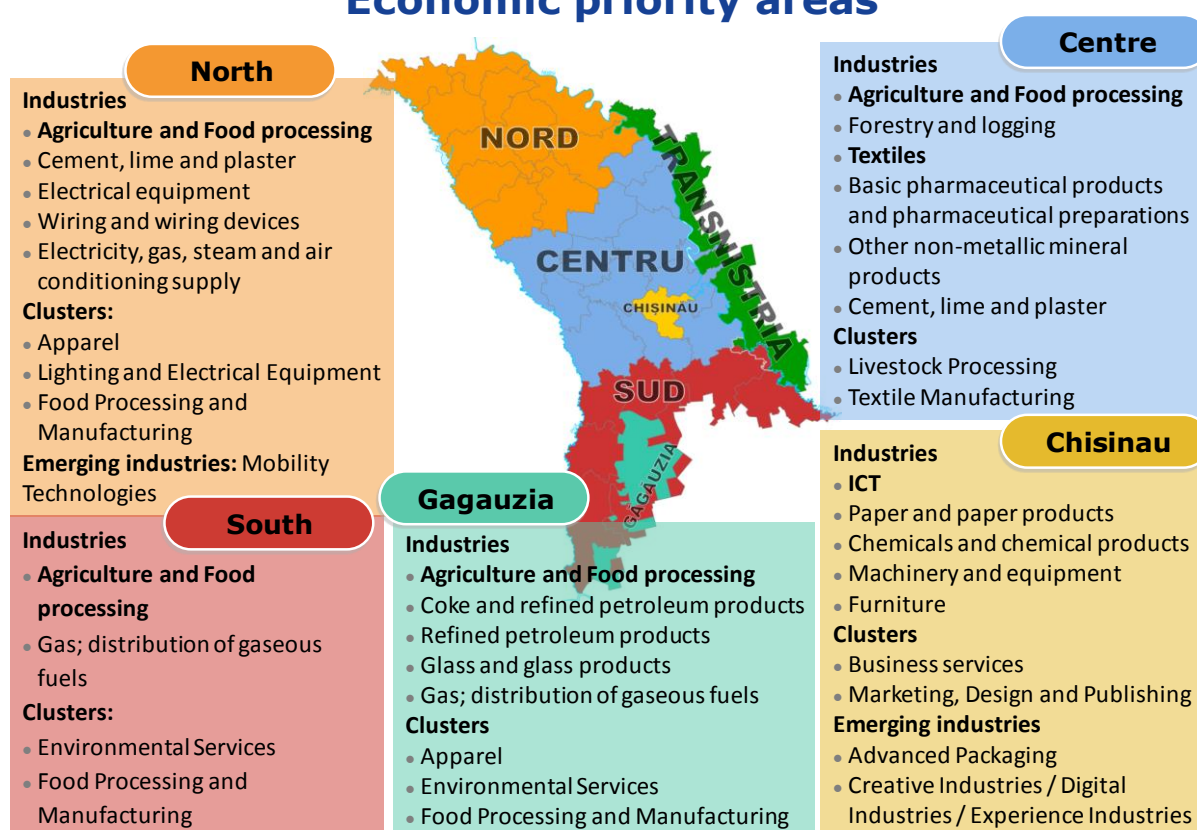
A possible explanation that only a few emerging regions pass both threshold levels, is the fact that most agricultural activities are excluded from the definitions from the emerging industries, which makes it more difficult for an emerging industry in the *Rural regions* to pass the size thresholds, as total employment does include employment in agriculture.

## 2.9 Summary assessment of economic priority areas

The potential priority domains for smart specialisation have been identified in the economic mapping. For Chisinau ICT is the most important economic area; other areas of importance include Manufacture of paper and paper products, Manufacture of chemicals and chemical products, Manufacture of glass and glass products, Manufacture of machinery and equipment (not elsewhere classified), and Manufacture of furniture. The cluster analysis, using more detailed employment data and definitions from the European Cluster Observatory, confirmed the importance of ICT.

For North, Centre, South and Gagauzia comparable priority areas for smart specialization have been identified. For all four regions Agriculture and Food processing are very important, but there are some differences as to which specific industries are included (cf. Table 12 for details). Textiles, Apparel, Footwear and Leather (TAFL) and Renewable energy are also priority areas for smart specialization in several of these four regions. The cluster analysis has confirmed several of these areas, e.g. Apparel and Food processing for North, Livestock processing and Textile manufacturing for Centre, Environmental services and Food processing for South, and Environmental services and Food processing for Gagauzia.

## Economic priority areas



## 3. Innovative potential

### 3.1 Innovation activities

For the mapping of the innovation potential, data have been used from the statistical survey on the innovation activity of enterprises in the Republic of Moldova in the years 2015-2016. This survey was conducted for the first time by the National Bureau of Statistics in 2017<sup>25</sup>. NACE 3-digit data at the regional level have been made available by the National Bureau of Statistics for the following:

- Total number of firms;
- Number of firms which introduced at least one innovation (product or process or organisational or marketing);
- Number of firms which introduced at least one product innovation;
- Number of firms which introduced at least one process innovation;
- Number of firms which introduced at least one marketing innovation;
- Number of firms which introduced at least one organisational innovation;
- Number of firms that introduced a product innovation new to the firm's market;
- Number of firms that introduced a product innovation new to the firm;
- Number of firms with own R&D activities;

<sup>25</sup> Cf. <http://www.statistica.md/newsview.php?l=en&idc=168&id=5882>

- Number of firms with external R&D activities.

Table 15 provides summary statistics for several indicators. For Moldova almost 21% of firms have introduced at least one innovation (product, process, organisational or marketing). About 9% of all firms have introduced a product or a process innovation, almost 11% an organisational innovation, and 12.5 a marketing innovation. So-called ‘non-technological innovation’ used by more firms than ‘technological innovation’. Of the firms with product innovations, 45% have introduced an innovation that was new to their market and almost 54% have introduced an innovation that was new to the firm. About 10% of all firms have own R&D expenditures and less than 4% purchased external R&D.

**Table 15 Innovation activities in the regions of the Republic of Moldova**

	Moldova	Chisinau	North	Center	South	Gagauzia
Sample size (# firms)	3232	1999	442	166	166	117
Innovators (% of all firms)	20.8%	19.7%	24.7%	20.5%	25.9%	20.5%
Product innovators (% of all firms)	9.3%	8.4%	10.9%	11.8%	9.6%	8.5%
Process innovators (% of all firms)	9.3%	7.7%	12.4%	11.0%	15.1%	7.7%
Organisational innovators (% of all firms)	10.7%	11.0%	10.6%	10.4%	8.4%	10.3%
Marketing innovators (% of all firms)	12.5%	12.7%	13.3%	12.4%	8.4%	11.1%
New-to-market innovations (% of product innovators)	45.0%	55.4%	29.2%	30.0%	62.5%	10.0%
New-to-firm innovations (% of product innovators)	53.6%	54.2%	60.4%	43.3%	43.8%	90.0%
Own R&D expenditures	10.1%	9.4%	16.5%	11.5%	0.0%	4.2%
External R&D expenditures	3.6%	4.8%	1.8%	1.0%	2.3%	4.2%

Source: Moldovan innovation survey, National Bureau of Statistics of the Republic of Moldova.

Note: Results are calculated aggregating NACE 3-digit results. No industry weights have been used.

There are differences in innovativeness across the regions. In North and South about 25% of firms are innovators, in Center, Chisinau and Gagauzia about 20% of firms are innovators. The highest share of firms with product innovations is for Center (11.8%), for firms with process innovations for South (15.1%), for firms with organisational innovations for Chisinau (11.0%) and for firms with marketing innovations for North (13.3%). These results however should be interpreted with care as the sample size for each region is relatively small and the breakdown by industry might not be representative at the regional level.

Innovation survey data have been collected for 10 NACE 1-digit industries in the business sector<sup>26</sup>. The agricultural sector and government sector are not included in the innovation survey. The average number of firms in each NACE 1-digit industry for Moldova is about 325, at NACE 2-digit about 70 and at NACE 3-digit about 25 (Table 3). These numbers are much lower at regional level, with, on average, only about 5 firms at NACE 3-digit industry for North, Centre, South and Gagauzia. These relatively small sample sizes require that results must be interpreted with care. The industry coverage also differs by regions, with most NACE 3-digit industries covered for Chisinau but only about one-fourth in Gagauzia and South.

<sup>26</sup> NACE B Mining and quarrying, NACE C Manufacturing, NACE D Electricity, gas, steam and air conditioning supply, NACE E Water supply; sewerage; waste management and remediation activities, NACE G Wholesale trade, except of motor vehicles and motorcycles, NACE H Transporting and storage, NACE J Information and communication, NACE K Financial and insurance activities, NACE L Real estate activities, and NACE M Professional, scientific and technical activities.

**Table 16 Average numbers of firms per industry**

	Moldova	Chisinau	North	Centre	South	Gagauzia
NACE 1-digit (number of industries covered by innovation survey)	325* (10)	200* (10)	50* (9)	55* (9)	25* (7)	15* (8)
NACE 2-digit (number of industries covered by innovation survey)	70* (44)	50* (41)	10* (38)	15* (30)	10* (16)	5* (20)
NACE 3-digit (number of industries covered by innovation survey)	25* (124)	15* (112)	5* (72)	5* (64)	5* (31)	5* (32)

Source: Moldovan innovation survey, National Bureau of Statistics of the Republic of Moldova.

\* Average number of firms rounded to next five-fold.

Using the data on innovative firms and the methodology explained in Section 1.3, for each region industries with an innovation potential can be identified.

For Chisinau, 33 industries with innovation potential have been identified at NACE 1-digit, 2-digit and 3-digit (Table 17). Of the 17 industries identified in the economic mapping, 10 industries also have innovation potential, these are highlighted in green in the table below. The table also shows the shares of innovators, the different types of innovators, new-to-market and net-to-firm sales and R&D activities.

**Table 17 Chisinau: industries with innovation potential**

NACE	Industry	Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
C152	Manufacture of footwear	1.370	29%	7%	14%	14%	14%	100%	100%	0%	0%
C17	Manufacture of paper and paper products	1.712	20%	5%	5%	15%	15%	100%	100%	5%	5%
C172	Manufacture of articles of paper and paperboard	1.712	20%	5%	5%	15%	15%	100%	100%	5%	5%
C18	Printing and reproduction of recorded media	1.712	17%	8%	4%	17%	13%	100%	50%	0%	0%
C181	Printing and service activities related to printing	1.712	17%	8%	4%	17%	13%	100%	50%	0%	0%
C20	Manufacture of chemicals and chemical products	1.370	27%	20%	13%	7%	20%	67%	67%	7%	7%
C251	Manufacture of structural metal products	1.370	20%	5%	5%	5%	20%	0%	100%	0%	0%
C26	Manufacture of computer, electronic and optical products	1.498	50%	36%	21%	14%	14%	80%	0%	14%	0%
C265	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1.370	50%	38%	0%	13%	0%	67%	0%	13%	0%
C33	Repair and installation of machinery and equipment	1.332	24%	14%	7%	7%	7%	50%	50%	3%	0%
G464	Wholesale of household goods	1.649	21%	2%	7%	14%	14%	33%	67%	1%	0%
G466	Wholesale of other machinery, equipment and supplies	1.370	16%	0%	0%	8%	12%	--	--	0%	0%
G467	Other specialised wholesale	1.310	15%	2%	6%	9%	9%	33%	67%	0%	0%
G469	Non-specialised wholesale trade	1.284	17%	9%	2%	9%	15%	50%	38%	0%	0%
H522	Support activities for transportation	1.427	8%	3%	3%	7%	5%	0%	50%	0%	0%
J	Information and communication	1.603	20%	14%	9%	13%	11%	67%	40%	4%	3%
J58	Publishing activities	1.712	22%	14%	11%	8%	14%	60%	40%	3%	0%
J581	Publishing of books, periodicals and other publishing activities	1.712	29%	19%	14%	10%	19%	50%	50%	0%	0%
J61	Telecommunications	1.401	31%	24%	17%	28%	21%	57%	43%	3%	7%
J62	Computer programming, consultancy and related activities	1.622	18%	14%	7%	11%	8%	79%	29%	4%	3%
J63	Information service activities	1.712	25%	8%	8%	17%	13%	100%	50%	8%	8%
J631	Data processing, hosting and related activities; web portals	1.712	29%	12%	12%	18%	18%	100%	50%	12%	12%
K	Financial and insurance activities	1.484	27%	12%	16%	14%	18%	67%	50%	4%	4%
K64	Financial service activities, except insurance and pension funding	1.401	33%	15%	19%	22%	26%	50%	75%	4%	7%
K649	Other financial service activities, except insurance and pension funding	1.468	27%	14%	18%	14%	23%	67%	67%	5%	5%
K66	Activities auxiliary to financial services and insurance activities	1.712	18%	9%	14%	5%	9%	100%	0%	5%	0%
M	Professional, scientific and technical activities	1.662	25%	11%	9%	14%	9%	73%	40%	3%	0%
M71	Architectural and engineering activities; technical testing and analysis	1.712	30%	16%	13%	17%	9%	73%	36%	3%	0%
M711	Architectural and engineering activities and related technical consultancy	1.712	20%	5%	5%	13%	3%	50%	50%	0%	0%
M712	Technical testing and analysis	1.712	43%	30%	23%	23%	17%	78%	33%	7%	0%
M73	Advertising and market research	1.712	20%	5%	4%	11%	9%	67%	67%	2%	0%

NACE	Industry	Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
M731	Advertising	1.712	21%	9%	3%	9%	9%	67%	67%	3%	0%
M732	Market research and public opinion polling	1.712	19%	0%	5%	14%	10%	--	--	0%	0%

For North, 24 industries have been identified at NACE 1-digit, 2-digit and 3-digit (Table 18). Of the 11 industries identified in the economic mapping, six industries also have innovation potential, these are highlighted in green in the table below. The table also shows the shares of innovators, the different types of innovators, new-to-market and net-to-firm sales and R&D activities.

**Table 18 North: industries with innovation potential**

		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
B	Mining and quarrying	2.315	23%	0%	8%	0%	15%	--	--	0%	0%
B081	Quarrying of stone, sand and clay	2.315	23%	0%	8%	0%	15%	--	--	0%	0%
C10	Manufacture of food products	1.950	47%	27%	25%	16%	28%	29%	59%	5%	0%
C101	Processing and preserving of meat and production of meat products	2.375	63%	25%	13%	50%	50%	50%	50%	0%	0%
C103	Processing and preserving of fruit and vegetables	1.544	50%	25%	25%	0%	50%	0%	100%	25%	0%
C104	Manufacture of vegetable and animal oils and fats	3.087	33%	33%	0%	0%	33%	50%	0%	0%	0%
C105	Manufacture of dairy products	3.087	86%	71%	86%	43%	71%	40%	60%	29%	0%
C107	Manufacture of bakery and farinaceous products	1.579	37%	17%	17%	3%	10%	20%	80%	0%	0%
C108	Manufacture of other food products	2.315	50%	17%	50%	17%	17%	0%	100%	0%	0%
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	2.058	27%	27%	27%	9%	9%	0%	100%	0%	0%
C162	Manufacture of products of wood, cork, straw and plaiting materials	1.764	20%	20%	20%	10%	10%	0%	100%	0%	0%
C259	Manufacture of other fabricated metal products	3.087	50%	25%	25%	25%	25%	100%	0%	0%	0%
C27	Manufacture of electrical equipment	1.764	67%	0%	33%	33%	0%	--	--	0%	0%
C32	Other manufacturing	4.631	60%	0%	0%	40%	20%	--	--	0%	0%
C324	Manufacture of games and toys	6.174	100%	0%	0%	67%	33%	--	--	0%	0%
C331	Repair of fabricated metal products, machinery and equipment	1.764	67%	33%	33%	67%	67%	100%	0%	33%	0%
D	Electricity, gas, steam and air conditioning supply	2.744	40%	20%	30%	0%	10%	0%	100%	0%	10%
D351	Electric power generation, transmission and distribution	4.116	50%	25%	25%	0%	25%	0%	100%	0%	25%
D352	Manufacture of gas; distribution of gaseous fuels through mains	2.058	67%	33%	67%	0%	0%	0%	100%	0%	0%

		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
E	Water supply; sewerage; waste management and remediation activities	1.764	22%	4%	15%	7%	4%	0%	0%	4%	0%
E36	Water collection, treatment and supply	1.544	19%	6%	13%	6%	0%	0%	0%	6%	0%
E38	Waste collection, treatment and disposal activities; materials recovery	2.058	43%	0%	29%	14%	14%	--	--	0%	0%
E381	Waste collection	1.764	33%	0%	17%	17%	17%	--	--	0%	0%
H494	Freight transport by road and removal services	1.879	15%	4%	10%	8%	6%	0%	100%	2%	0%

For Centre, 17 industries have been identified at NACE 1-digit, 2-digit and 3-digit (Table 19). Of the 13 industries identified in the economic mapping, five industries also have innovation potential, these are highlighted in green in the table below. The table also shows the shares of innovators, the different types of innovators, new-to-market and net-to-firm sales and R&D activities.

**Table 19 Centre: industries with innovation potential**

		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
B	Mining and quarrying	3.236	17%	4%	0%	4%	13%	0%	100%	0%	0%
B081	Quarrying of stone, sand and clay	3.236	17%	4%	0%	4%	13%	0%	100%	0%	0%
C10	Manufacture of food products	1.771	32%	21%	17%	21%	25%	35%	59%	2%	0%
C101	Processing and preserving of meat and production of meat products	1.991	19%	10%	10%	10%	19%	50%	100%	0%	0%
C106	Manufacture of grain mill products, starches and starch products	3.883	60%	60%	60%	20%	40%	33%	33%	20%	0%
C107	Manufacture of bakery and farinaceous products	2.257	45%	27%	18%	33%	30%	22%	67%	3%	0%
C108	Manufacture of other food products	1.618	67%	33%	33%	67%	67%	0%	0%	0%	0%
C13	Manufacture of textiles	3.698	67%	17%	50%	50%	33%	100%	100%	17%	0%
C139	Manufacture of other textiles	3.236	60%	20%	40%	60%	40%	100%	100%	20%	0%
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1.849	29%	14%	14%	14%	29%	100%	0%	14%	0%
C212	Manufacture of pharmaceutical preparations	2.588	50%	25%	25%	25%	50%	100%	0%	25%	0%
C236	Manufacture of articles of concrete, cement and plaster	2.157	43%	29%	29%	14%	29%	100%	0%	0%	0%
E	Water supply; sewerage; waste management and remediation activities	2.773	25%	17%	14%	17%	11%	17%	50%	0%	0%
E36	Water collection, treatment and supply	3.236	24%	16%	8%	16%	12%	0%	50%	0%	0%
E38	Waste collection, treatment and disposal activities; materials recovery	2.157	27%	18%	27%	18%	9%	50%	50%	0%	0%
E381	Waste collection	1.849	20%	20%	20%	20%	10%	50%	50%	0%	0%
H493	Other passenger land transport	1.618	11%	7%	7%	5%	5%	0%	25%	4%	0%

For South, 13 industries have been identified at NACE 1-digit, 2-digit and 3-digit (Table 20). Of the seven industries identified in the economic mapping, three industries also have innovation potential, these are highlighted in green in the table below. The table also shows the shares of innovators, the different types of innovators, new-to-market and net-to-firm sales and R&D activities. Noteworthy is that in none of the selected industries firms are involved in R&D.

**Table 20 South: industries with innovation potential**

		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
C103	Processing and preserving of fruit and vegetables	1.956	33%	0%	33%	0%	0%	--	--	0%	0%
C106	Manufacture of grain mill products, starches and starch products	3.130	20%	20%	20%	0%	0%	100%	100%	0%	0%
C11	Manufacture of beverages	4.531	50%	23%	32%	18%	23%	60%	40%	0%	0%
C14	Manufacture of wearing apparel	2.174	42%	25%	17%	0%	17%	67%	0%	0%	0%
C141	Manufacture of wearing apparel, except fur apparel	2.020	50%	25%	13%	0%	25%	100%	0%	0%	0%
C143	Manufacture of knitted and crocheted apparel	3.130	25%	25%	25%	0%	0%	0%	0%	0%	0%
C233	Manufacture of clay building materials	5.217	100%	0%	100%	100%	100%	--	--	0%	0%
C237	Cutting, shaping and finishing of stone	3.913	100%	0%	100%	0%	100%	--	--	0%	0%
D	Electricity, gas, steam and air conditioning supply	5.217	60%	20%	40%	20%	0%	0%	100%	0%	0%
D352	Manufacture of gas; distribution of gaseous fuels through mains	7.826	75%	25%	50%	25%	0%	0%	100%	0%	0%
E	Water supply; sewerage; waste management and remediation activities	2.236	15%	0%	5%	10%	0%	--	--	0%	0%
E36	Water collection, treatment and supply	3.913	20%	0%	7%	13%	0%	--	--	0%	0%
G462	Wholesale of agricultural raw materials and live animals	2.762	33%	0%	22%	0%	11%	--	--	0%	0%

For Gagauzia, 22 industries have been identified at NACE 1-digit, 2-digit and 3-digit (Table 21). Of the nine industries identified in the economic mapping, five industries also have innovation potential, these are highlighted in green in the table below. The table also shows the shares of innovators, the different types of innovators, new-to-market and net-to-firm sales and R&D activities. Noteworthy is that in none of the selected industries, except in Manufacture of beverages, firms are involved in R&D.

**Table 21 Gagauzia: industries with innovation potential**

		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
C103	Processing and preserving of fruit and vegetables	3.505	33%	0%	0%	0%	33%	--	--	0%	0%

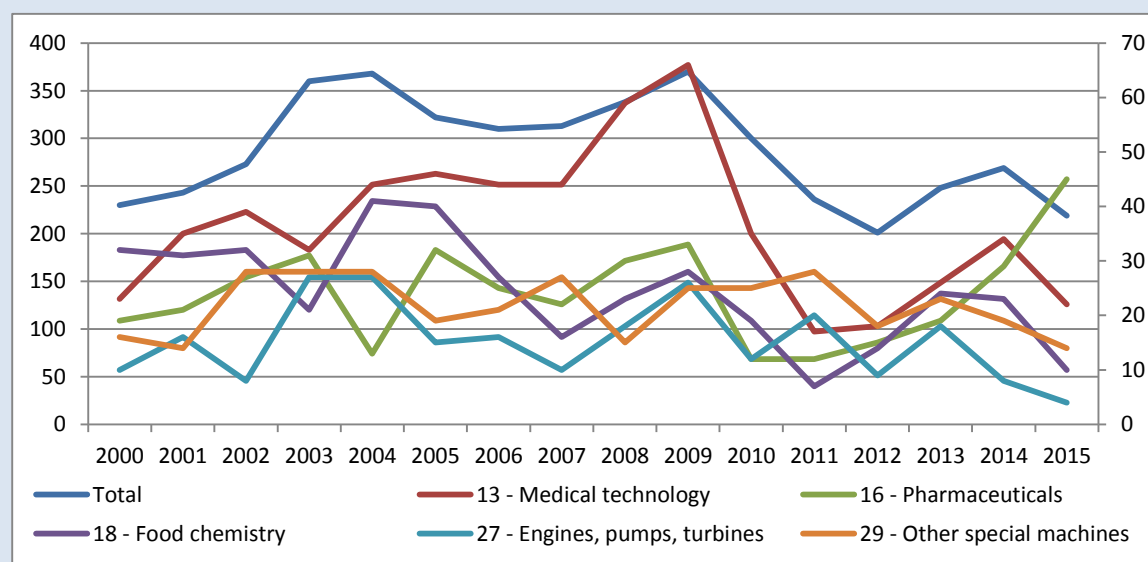


		Degree of specialisation (LQ)	Innovators	Product innovators	Process innovators	Organisational innovators	Marketing innovators	New to market innovation	New to firm innovation	Own R&D activities	External R&D activities
C104	Manufacture of vegetable and animal oils and fats	7.010	100%	100%	100%	100%	100%	0%	100%	0%	0%
C105	Manufacture of dairy products	2.337	100%	0%	0%	0%	100%	--	--	0%	0%
C106	Manufacture of grain mill products, starches and starch products	5.608	50%	50%	0%	50%	0%	0%	100%	0%	0%
C11	Manufacture of beverages	2.214	19%	13%	13%	6%	6%	50%	50%	6%	6%
C12	Manufacture of tobacco products	28.04	100%	100%	100%	100%	100%	0%	100%	0%	0%
C14	Manufacture of wearing apparel	1.558	29%	0%	14%	14%	14%	--	--	0%	0%
C143	Manufacture of knitted and crocheted apparel	5.608	100%	0%	100%	0%	100%	--	--	0%	0%
C19	Manufacture of coke and refined petroleum products	28.04	100%	0%	0%	50%	100%	--	--	0%	0%
C192	Manufacture of refined petroleum products	28.04	100%	0%	0%	50%	100%	--	--	0%	0%
C22	Manufacture of rubber and plastic products	1.753	25%	0%	0%	0%	25%	--	--	0%	0%
C222	Manufacture of plastics products	1.753	25%	0%	0%	0%	25%	--	--	0%	0%
C231	Manufacture of glass and glass products	9.347	100%	100%	0%	0%	0%	0%	100%	0%	0%
E	Water supply; sewerage; waste management and remediation activities	2.671	13%	7%	7%	13%	0%	0%	100%	0%	0%
E38	Waste collection, treatment and disposal activities; materials recovery	6.231	100%	50%	50%	100%	0%	0%	100%	0%	0%
E381	Waste collection	8.012	100%	50%	50%	100%	0%	0%	100%	0%	0%
G462	Wholesale of agricultural raw materials and live animals	4.949	43%	14%	14%	14%	14%	0%	100%	0%	0%
H52	Warehousing and support activities for transportation	4.006	33%	0%	33%	33%	0%	--	--	0%	0%
H522	Support activities for transportation	4.674	100%	0%	100%	100%	0%	--	--	0%	0%
K	Financial and insurance activities	1.869	100%	0%	0%	100%	0%	--	--	0%	0%
K64	Financial service activities, except insurance and pension funding	2.549	100%	0%	0%	100%	0%	--	--	0%	0%
K642	Activities of holding companies	7.010	100%	0%	0%	100%	0%	--	--	0%	0%

### 3.2 Patent activities<sup>27</sup>

Data on patent applications in 35 technology fields are available from the World Intellectual Property Office (WIPO) for the period 2001 to 2015. The number of total patent applications in the Republic of Moldova is showing a cyclical pattern over time (Figure 8), with the number of applications declining between 2009 and 2012 and increasing in 2013 and 2014.

**Figure 8 Total number of patent applications**



Source: Source: WIPO statistics database. Total patent applications are shown on the vertical axis on the left, patent applications by field on the vertical axis on the right.

The top-5 technology fields with most patent applications are: Medical technology, Pharmaceuticals, Food chemistry, Other special machines, and Engines, pumps, and turbines (Table 22). Although patents are an imperfect indicator for innovation<sup>28</sup>, high patent activities in Food chemistry match the results of the economic mapping for the four *Rural regions* having an economic specialisation in Agriculture and Food processing. These top-5 technology fields are relatively consistent over time, but in the most recent 2011-2015 period patent applications in Organic fine chemistry have replaced those in Engine, pumps, and turbines among the top-5 technology fields. Organic fine chemistry has

<sup>27</sup> Patent activities can also be seen as scientific activities, but as many patents contain new knowledge derives from applied research activities, patent activities can also be seen as innovation activities. Given the lack of detailed innovation survey data for the Republic of Moldova, patent data are in this report analyses as part of the mapping of the innovation potential of the Republic of Moldova.

<sup>28</sup> Mostly firms in manufacturing apply for patents; the share of firms in services applying for a patent is much smaller. In manufacturing there are also significant differences, with very high patent intensities in e.g. Pharmaceuticals and low patent intensities in other manufacturing industries. Results from the Community Innovation Survey also show that high shares of innovating firms use other methods to protect their intellectual property, including e.g. secrecy. Another issue is that patents can be costly to maintain, which makes applying for a patent less attractive for small firms.

been among the fastest growing technology fields<sup>29</sup>, together with Micro-structural and nano-technology.

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<sup>29</sup> Growth here is defined as the percentage increase between the number of patent applications in 2011-2015 and those in 2001-2005.

Table 22 Patent applications by technology field

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2001-2015	2001-2005	2006-2010	2011-2015				
1 - Electrical machinery, apparatus, energy	12	5	7	14	20	8	5	7	7	13	11	4	6	6	7	5	<b>125</b>	<b>2.9%</b>	54	3.4%	43	2.6%	28	2.4%
2 - Audio-visual technology	4	3	4	4	3	3	5	1	1	2	6	1	1	1	2	2	<b>39</b>	<b>0.9%</b>	17	1.1%	15	0.9%	7	0.6%
3 - Telecommunications			1		6	1	2		3	2		1	4	1		1	<b>22</b>	<b>0.5%</b>	8	0.5%	7	0.4%	7	0.6%
4 - Digital communication			1							1		1	1		2	1	<b>7</b>	<b>0.2%</b>	1	0.1%	1	0.1%	5	0.4%
5 - Basic communication processes				1	1	3	1		3	1	3	2	1	2	1	1	<b>20</b>	<b>0.5%</b>	5	0.3%	8	0.5%	7	0.6%
6 - Computer technology	1	3	2	2	5	3	1	2	5	6	4	4	4	3	2	1	<b>47</b>	<b>1.1%</b>	15	1.0%	18	1.1%	14	1.2%
7 - IT methods for management							1		3	1		1	1		1	1	<b>9</b>	<b>0.2%</b>	0	0.0%	5	0.3%	4	0.3%
8 - Semiconductors	5	2	6	4	9	3	2	4	4	4	6	5	4	3	5	1	<b>62</b>	<b>1.4%</b>	24	1.5%	20	1.2%	18	1.5%
9 - Optics	6		1	4	7	1	3	2	4	3	3	1	2	1	1		<b>33</b>	<b>0.8%</b>	13	0.8%	15	0.9%	5	0.4%
10 - Measurement	5	8	7	18	18	14	17	17	10	10	9	17	13	17	11	5	<b>191</b>	<b>4.4%</b>	65	4.2%	63	3.9%	63	5.4%
11 - Analysis of biological materials	3	2	2	2	2	1	2	2	2	3	2	1	1	2	1	2	<b>27</b>	<b>0.6%</b>	9	0.6%	11	0.7%	7	0.6%
12 - Control	1	3	2	2	5	8	4	4	1	3	5	4	5	1	3		<b>50</b>	<b>1.1%</b>	20	1.3%	17	1.0%	13	1.1%
13 - Medical technology	23	35	39	32	44	46	44	44	59	66	35	17	18	26	34	22	<b>561</b>	<b>12.8%</b>	196	12.5%	248	15.2%	117	10.0%
14 - Organic fine chemistry	9	6	7	13	6	12	7	7	14	16	15	10	10	18	29	29	<b>199</b>	<b>4.6%</b>	44	2.8%	59	3.6%	96	8.2%
15 - Biotechnology	3	7	8	18	11	8	7	9	12	7	15	7	3	15	10	17	<b>154</b>	<b>3.5%</b>	52	3.3%	50	3.1%	52	4.4%
16 - Pharmaceuticals	19	21	27	31	13	32	25	22	30	33	12	12	15	19	29	45	<b>366</b>	<b>8.4%</b>	124	7.9%	122	7.5%	120	10.2%
17 - Macromolecular chemistry, polymers		2	3	2		1	2	1	2	3	1	1	1	2	1	1	<b>23</b>	<b>0.5%</b>	8	0.5%	9	0.6%	6	0.5%
18 - Food chemistry	32	31	32	21	41	40	27	16	23	28	19	7	14	24	23	10	<b>356</b>	<b>8.1%</b>	165	10.5%	113	6.9%	78	6.6%
19 - Basic materials chemistry	13	9	5	9	8	11	16	11	17	10	10	10	7	10	12	5	<b>150</b>	<b>3.4%</b>	42	2.7%	64	3.9%	44	3.8%
20 - Materials, metallurgy	8	7	3	9	10	6	10	8	12	11	11	7	5	6	5	5	<b>115</b>	<b>2.6%</b>	35	2.2%	52	3.2%	28	2.4%
21 - Surface technology, coating	5	3	4	5	7	10	10	23	10	11	12	10	7	4	5	4	<b>125</b>	<b>2.9%</b>	29	1.9%	66	4.0%	30	2.6%
22 - Micro-structural and nano-technology					3	2	3	1	4	3	2	2	1	2	2	4	<b>29</b>	<b>0.7%</b>	5	0.3%	13	0.8%	11	0.9%
23 - Chemical engineering	8	6	6	15	16	8	8	15	23	15	14	6	6	6	9	9	<b>162</b>	<b>3.7%</b>	51	3.3%	75	4.6%	36	3.1%
24 - Environmental technology	6	8	6	11	13	14	11	21	14	12	13	10	4	6	8	3	<b>154</b>	<b>3.5%</b>	52	3.3%	71	4.4%	31	2.6%
25 - Handling	6	7	2	7	7	2	4	4	1	2	2	2	6	4	4	2	<b>56</b>	<b>1.3%</b>	25	1.6%	13	0.8%	18	1.5%
26 - Machine tools	7	4	13	16	10	7	9	13	6	10	9	14	10	9	6	4	<b>140</b>	<b>3.2%</b>	50	3.2%	47	2.9%	43	3.7%
27 - Engines, pumps, turbines	10	16	8	27	27	15	16	10	18	26	12	20	9	18	8	4	<b>234</b>	<b>5.4%</b>	93	5.9%	82	5.0%	59	5.0%
28 - Textile and paper machines	2		1	2	3	1		2	2	2	1	3	3			1	<b>21</b>	<b>0.5%</b>	7	0.4%	7	0.4%	7	0.6%
29 - Other special machines	16	14	28	28	28	19	21	27	15	25	25	28	18	23	19	14	<b>332</b>	<b>7.6%</b>	117	7.5%	113	6.9%	102	8.7%
30 - Thermal processes and apparatus	4	6	10	9	12	6	5	4	9	11	10	5	5	4	5	5	<b>106</b>	<b>2.4%</b>	43	2.7%	39	2.4%	24	2.0%
31 - Mechanical elements	4	2	4	3	5	8	10	14	8	13	9	3	2	3	3	3	<b>90</b>	<b>2.1%</b>	22	1.4%	54	3.3%	14	1.2%
32 - Transport	5	4	7	7	6	7	4	7	4	2	4	1	1		5	2	<b>61</b>	<b>1.4%</b>	31	2.0%	21	1.3%	9	0.8%
33 - Furniture, games	6	9	5	3	2	5	4	4	4	1	3	4	2	2	2	3	<b>53</b>	<b>1.2%</b>	24	1.5%	16	1.0%	13	1.1%
34 - Other consumer goods	3	10	7	4	5	9	5	3	6	5	2	5	3	2	3	2	<b>71</b>	<b>1.6%</b>	35	2.2%	21	1.3%	15	1.3%
35 - Civil engineering	3	8	7	8	3	7	7	8	2	9	13	10	8	8	11	5	<b>114</b>	<b>2.6%</b>	33	2.1%	39	2.4%	42	3.6%
	<b>230</b>	<b>243</b>	<b>273</b>	<b>360</b>	<b>368</b>	<b>322</b>	<b>310</b>	<b>313</b>	<b>338</b>	<b>370</b>	<b>300</b>	<b>236</b>	<b>201</b>	<b>248</b>	<b>269</b>	<b>219</b>	<b>4370</b>		<b>1566</b>		<b>1631</b>		<b>1173</b>	

Regional data on patents are available from Moldova's State Agency on Intellectual Property (AGEPI). Most patents, about 85%, originate from Chisinau (Table 23)<sup>30</sup>. North and South account for about 12% of all patent applications, South and account for about 3% of all patent applications.

**Table 23 Patent applications by region**

	National inventors	%-share	National applications	%-share
<b>Chisinau</b>	3872	85.5%	1685	83.3%
<b>North</b>	205	4.5%	131	6.5%
<b>Centre</b>	334	7.4%	139	6.9%
<b>South</b>	79	1.7%	40	2.0%
<b>Gagauzia</b>	39	0.9%	27	1.3%
<b>Total</b>	4529		2022	

Source: AGEPI ([http://www.db.agepi.md/Inventions/panorama/1#columnchart\\_16](http://www.db.agepi.md/Inventions/panorama/1#columnchart_16)). Numbers are aggregate numbers for multiple years, but which years is not specified.

Table 24 shows the top technology fields by national applications. Areas which are related to the economic areas identified in the economic mapping are highlighted in bold. The high number of patent applications in these areas confirms the importance of Agriculture and Food processing for North, Centre, South and Gagauzia.

**Table 24 Top areas of interest of national applicants**

Subclass	Total	Description
C12N	399	Micro-organisms or enzymes; compositions thereof; propagating, preserving, or maintaining micro-organisms; mutation or genetic engineering; culture media
C07C	392	Acyclic or carbocyclic compounds
<b>A01G</b>	<b>379</b>	<b>Horticulture; cultivation of vegetables, flowers, rice, fruit, vines, hops, or seaweed; forestry; watering</b>
<b>C12G</b>	<b>377</b>	<b>Wine; other alcoholic beverages; preparation thereof</b>
<b>A23L</b>	<b>357</b>	<b>Foods, foodstuffs, or non-alcoholic beverages, not covered by subclasses A21D or A23B-A23J; their preparation or treatment, e.g. cooking, modification of nutritive qualities, physical treatment; preservation of foods or foodstuffs, in general</b>
A01N	345	Preservation of bodies of humans or animals or plants or parts thereof; biocides, e.g. as disinfectants, as pesticides or as herbicides; pest repellants or attractants; plant growth regulators
G01N	335	Investigating or analyzing materials by determining their chemical or physical properties
B01D	226	Separation
H01L	223	Semiconductor devices; electric solid-state devices not otherwise provided for
B01J	210	Chemical or physical processes, e.g. catalysis, colloid chemistry; their relevant apparatus
G01R	197	Measuring electric variables; measuring magnetic variables
F03D	188	Wind motors
C01G	187	Compounds containing metals not covered by subclasses C01D or C01F
B65D	181	Containers for storage or transport of articles or materials, e.g. bags, barrels, bottles, boxes, cans, cartons, crates, drums, jars, tanks, hoppers, forwarding containers; accessories, closures, or fittings therefor; packaging elements; packages
<b>A01C</b>	<b>176</b>	<b>Planting; sowing; fertilizing</b>
<b>A01H</b>	<b>164</b>	<b>New plants or processes for obtaining them; plant reproduction by tissue culture techniques</b>

Source: AGEPI ([http://www.db.agepi.md/Inventions/panorama/1#columnchart\\_16](http://www.db.agepi.md/Inventions/panorama/1#columnchart_16)), Table 19. Numbers are aggregate numbers for multiple years, but which years is not specified.

<sup>30</sup> A possible explanation is that patent activities of enterprises with establishments in multiple regions and having their head office in Chisinau, register all patent activities in Chisinau, irrespective of where these actually take place.

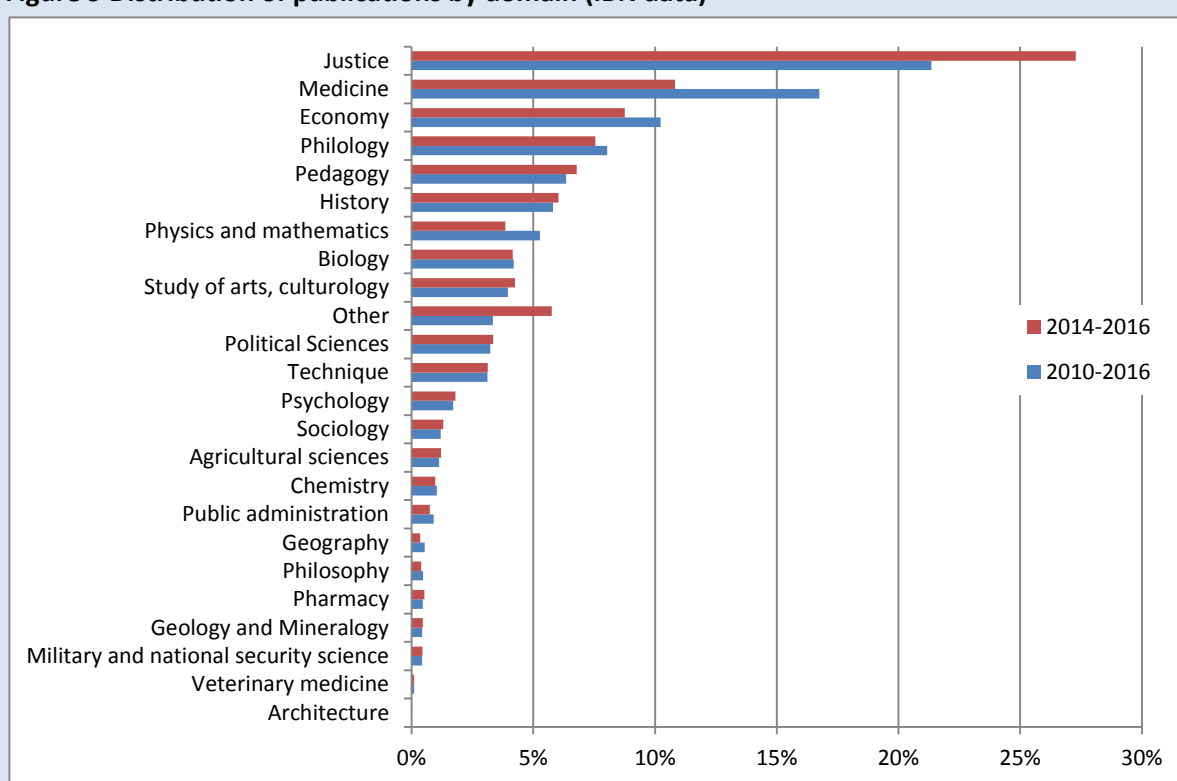
## 4. Scientific potential

### 4.1 Scientific publications

For scientific publications the focus will be on numbers of published articles since 2010. Country level data will be used from two sources: national publications are available from Instrumental Bibliometric Național (IBN)<sup>31</sup>, international publications are available from Scimago Journal & Country Rank (SJR)<sup>32</sup>. Data showing publications per region are not available.

Between 2010 and 2016 there were more than 36,000 national publications, of which almost 75% were in the following seven domains: Justice, Medicine, Economy, Philology, Pedagogy, History, and Physics and Mathematics (Figure 9). Most of these domains do not seem very relevant for the preliminary priority areas identified in the economic mapping. Technique represents about 3% of all national publications, and Agricultural sciences and Chemistry each represent about 1% of all publications.

**Figure 9 Distribution of publications by domain (IBN data)**



Data source: Instrumental Bibliometric Național (IBN)

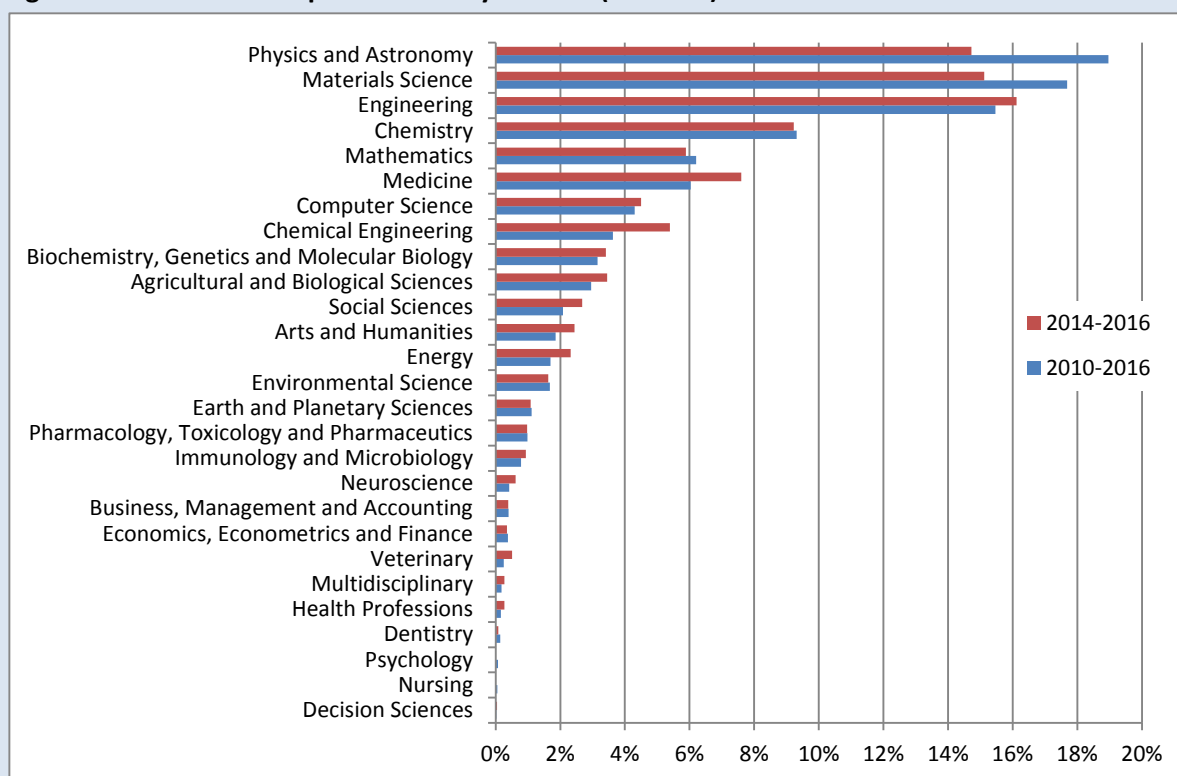
<sup>31</sup> National Bibliometric Instrument is a scientific electronic library which stores, classifies and measures public data regarding scientific publications of researchers from the Republic of Moldova. The data refers specifically to scientific articles published in national scientific journals of A, B and C categories (especially those found in electronic format), evaluated and accredited according to the requirements approved by the Supreme Council for Science and Technological Development (SCSTD) and the National Council for Accreditation and Attestation (CNAA).

<sup>32</sup> The Scimago Journal & Country Rank is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.).

Data on international publications are available from SJR. The total number of publications is much lower compared to IBN with almost 5,500 publications between 2010 and 2016, but these publications can be considered to be of higher quality as they have been published in international journals. The distribution across domains is also very different compared to that for national publications. The largest domain is Physics and Astronomy, followed by Materials Science, Engineering, Chemistry, Mathematics and Medicine. These six domains account for almost 75% of all international publications (Figure 10).

The output of international publications is more relevant for the preliminary priority domains identified in the economic mapping with relatively more publications in e.g. Agricultural and Biological Sciences, Energy, and Environmental Sciences.

**Figure 10 Distribution of publications by domain (SJR data)**



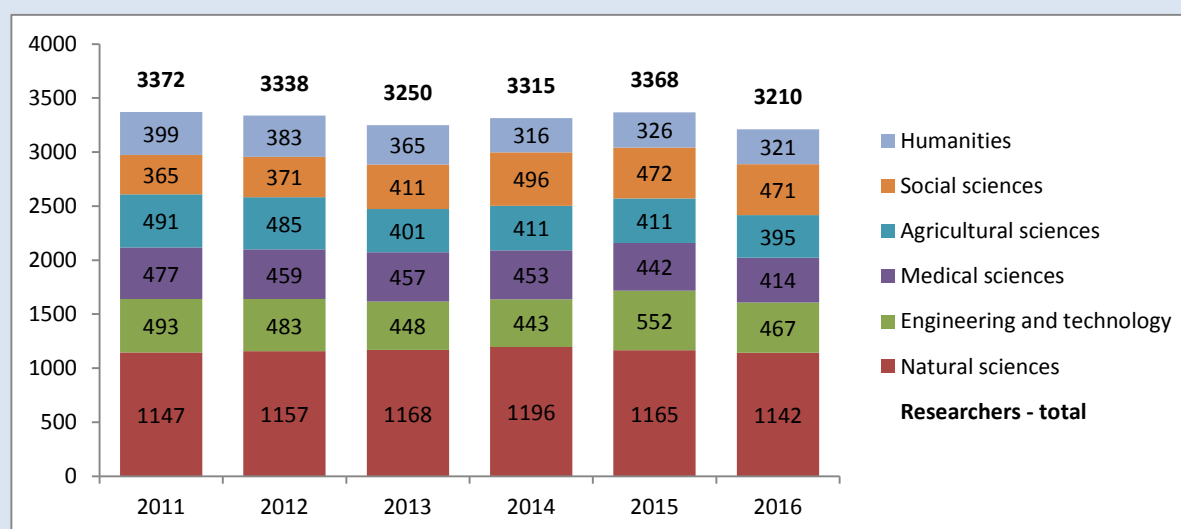
Data source: Scimago Journal & Country Rank (SJR)

## 4.2 Educational attainment

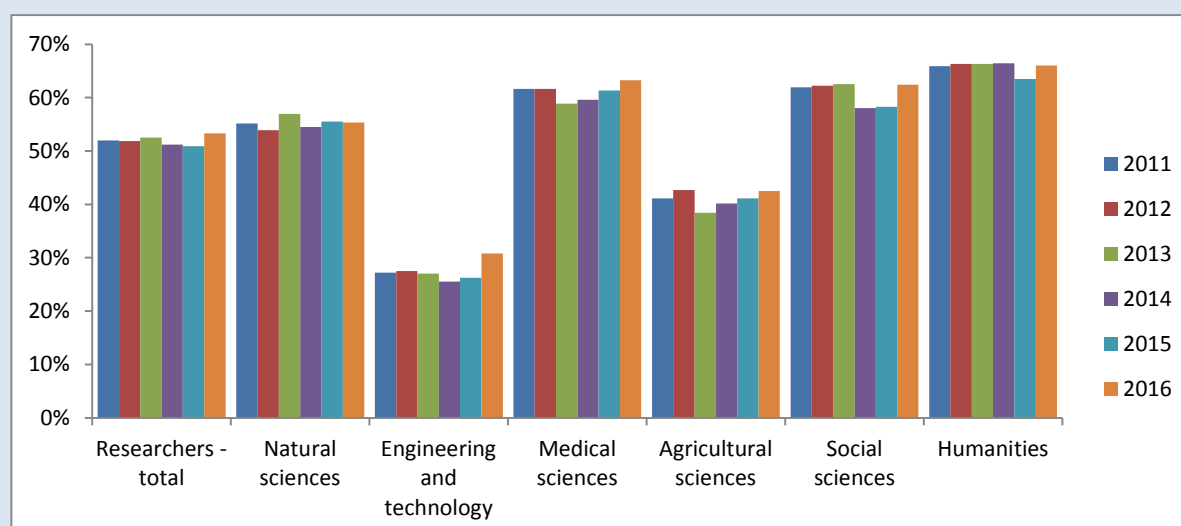
### 4.2.1 Researchers by R&D activity

The number of researchers has been above 3,000 between 2011 and 2016, with the largest number in 2015 (3,368) (Figure 11). Most researchers, about 35% of all researchers, are found in Natural sciences. Of all researchers more than half hold a PhD degree (Figure 12). The share of PhD holders is lowest in Engineering and technology. This relatively low share can be explained by the fact that in business having a PhD is much less important than in academia. In Humanities, Medical sciences and Social sciences, the share of PhD holders is more than 60%, but most researchers in these domains work at universities or research institutes. The growing shares of PhD holders in almost all domains show that the average formal skill levels of researchers in Moldova are increasing.

**Figure 11 Distribution of researchers**



**Figure 12 Share of PhD holders**





#### 4.2.2 Number of highly-skilled students and graduates

At the level of secondary vocational education (ISCED 4), there are above share shares, compared to population (cf. Table 2), of students in Chisinau and North (Table 25). Almost 37% of students or pupils are in Chisinau, with comparable percentage share for the number of new students and graduates. For post-secondary vocational education, Chisinau accounts for 60% of all students, 63% of all new students and 56% of all graduates (Table 26). For tertiary education (ISCED 6) Chisinau accounts for almost 90% of all students, all new students and all graduates (Table 27). These numbers clearly show that the educational activities are concentrated in the capital city of Moldova, with Chisinau attracting large numbers of students from the four other regions. Chisinau clearly benefits with an above average supply of newly skilled workers, whereas the other regions will have more difficulties in providing a sufficiently large supply of newly skilled workers. This is most visible for Centre, where there are no students in tertiary education.

**Table 25 Secondary vocational education (ISCED 4) (2015-2016)**

	Admission	%-share	Pupils	%-share	Graduates	%-share
<b>Moldova</b>	9,367	--	16,098	--	9,220	--
Chisinau	3,440	36.7%	5,934	36.9%	3,332	36.1%
North	3,039	32.4%	5,318	33.0%	2,879	31.2%
Centre	1,362	14.5%	2,278	14.2%	1,479	16.0%
South	1,196	12.8%	2,019	12.5%	1,179	12.8%
Gagauzia	330	3.5%	549	3.4%	351	3.8%

**Table 26 Post-secondary vocational education (ISCED 5) (2015-2016)**

	Admission	%-share	Pupils	%-share	Graduates	%-share
<b>Moldova</b>	8,927	--	30,428	--	6,252	--
Chisinau	5,585	62.6%	18,275	60.1%	3,528	56.4%
North	1,986	22.2%	7,086	23.3%	1,613	25.8%
Centre	732	8.2%	2,859	9.4%	658	10.5%
South	357	4.0%	1,336	4.4%	273	4.4%
Gagauzia	267	3.0%	872	2.9%	180	2.9%

**Table 27 Tertiary education (ISCED 6) (2015-2016)**

	Admission	%-share	Pupils	%-share	Graduates	%-share
<b>Moldova</b>	24,378	--	81,669	--	23,630	--
Chisinau	21,767	89.3%	73,011	89.4%	21,046	89.1%
North	1,627	6.7%	5,354	6.6%	1,516	6.4%
Centre	--	--	--	--	--	--
South	556	2.3%	1,882	2.3%	468	2.0%
Gagauzia	428	1.8%	1,422	1.7%	600	2.5%

Most graduates in tertiary education are in Economic science, Education science, Law, and Engineering and related activities, both in the share of graduates with a bachelor or a master degree (Table 28). Remarkable is the very small share of graduates in Environment protection. An increase in the number of graduates in Environment protection would be needed to support the growing

priority area of Renewable energy. The number of graduates in Agricultural science is small but stable. Interesting would be to match the data on graduates with data on unemployment rates after 2 and 5 years of graduation, to have a better view if the supply of graduates matched the demand by employers.

**Table 28 Graduates by high education, by cycle and fields of study**

	Total													
	Cycle I, bachelor							Cycle II, master						
	2010	2011	2012	2013	2014	2015	2010-15	2010	2011	2012	2013	2014	2015	2010-15
<b>Total</b>	<b>21989</b>	<b>21948</b>	<b>20132</b>	<b>17144</b>	<b>17062</b>	<b>17073</b>	--	<b>4536</b>	<b>5100</b>	<b>5904</b>	<b>6338</b>	<b>6409</b>	<b>5915</b>	--
of which:														
Economic science	6968	6147	5575	5116	4875	4805	29%	1828	1645	1731	1786	1711	1370	29%
Education science	3037	3535	3289	2726	2598	2979	16%	322	602	600	779	962	999	12%
Law	3044	2970	2188	2056	2212	2541	13%	706	822	1119	1269	1254	1145	18%
Engineering and related activities	1948	2113	2150	1942	1564	1399	10%	178	271	300	331	339	343	5%
Humanities	828	774	749	674	686	637	4%	321	298	385	300	330	234	5%
Architecture and building	743	879	876	718	580	544	4%	26	178	291	301	274	238	4%
Public services	770	639	618	501	468	434	3%	59	69	87	87	77	89	1%
Manufacturing and processing	598	632	520	515	405	399	3%	39	101	156	108	89	106	2%
Social service	510	561	495	395	403	369	2%	56	73	68	92	83	74	1%
Exact science	507	641	516	330	298	275	2%	167	175	185	182	174	172	3%
Political science	610	342	396	341	412	418	2%	286	174	211	284	345	336	5%
Social science	389	429	370	330	359	303	2%	166	180	247	219	218	229	4%
Natural science	373	434	470	253	233	265	2%	123	139	112	130	125	90	2%
Arts	330	368	367	334	292	279	2%	58	65	94	105	100	91	1%
Agricultural science	287	336	348	349	291	297	2%	32	42	72	83	93	121	1%
Communication science	384	333	282	268	320	301	2%	72	84	82	76	63	65	1%
Physical training and sports	224	280	337	368	311	326	2%	45	79	54	72	80	93	1%
Security services	–	–	242	237	302	268	1%	6	18	18	23	21	20	0%
Chemical technology and biotechnology	120	122	177	115	154	112	1%	24	19	26	12	23	18	0%
Military	90	85	107	124	216	84	1%	–	–	–	19	–	28	0%
Transport services	–	26	50	51	46	26	0%	–	–	–	–	–	–	0%
Veterinary medicine	–	–	–	60	37	–	0%	–	47	52	60	–	–	0%
Environment protection	–	15	10	1	–	12	0%	22	19	14	20	11	16	0%

### 4.2.3 Infrastructure for higher education

Regional differences in the training of skilled students are a direct result of differences in the availability of educational institutions. The number of institutions for secondary vocational education is highest in North and for post-secondary vocational education in Chisinau. For tertiary education 26 out of 31 institutions are in Chisinau where there are no institutions in Center (Table 29).

**Table 29 Number of educational institutions (2015-2016)**

	Secondary vocational education (ISCED 4)		Post-secondary vocational education (ISCED 5)		Tertiary education (ISCED 6)	
	Number	%-share	Number	%-share	Number	%-share
<b>Moldova</b>	47	--	45		31	--
Chisinau	12	25.5%	19	42.2%	26	83.9%
North	16	34.0%	15	33.3%	2	6.5%
Centre	8	17.0%	7	15.6%	0	0.0%
South	8	17.0%	2	4.4%	2	6.5%
Gagauzia	3	6.4%	2	4.4%	1	3.2%

Besides differences in the number of education institutions, there are also differences in focus or specialisation of these institutions. For post-secondary vocational education, almost all specializations are offered by at least one college in Chisinau (Annex 4). There are seven Centers of Excellence in Construction, Light industry, Computer Science and Information technologies, Services and food processing, Transport, Energy, and Economics and finance. The other colleges include the Pedagogical College "Alexei Mateevici", Technological College of Chisinau, College of Ecology from Chisinau, Cooperative College of Moldova, ASEM National Trade College, Technical College of UTM, and Mondostud-Art College. In most cases a specialisation is found at one college only. Specializations are less well covered in the other four regions as the number of colleges is much smaller.

ICT is an important economic area in Chisinau. Relevant specializations in managing web applications, computers, programming and analysis of program products, computer networks are found at the Centre of Excellence in Computer Science and information technologies. Agriculture and Food processing is an important economic area in all four *Rural regions*. However, there are no colleges which show relevant specializations<sup>33</sup>. If there is a need for such specializations to promote Agriculture and Food processing, then the creation of a new Centre of Excellence should be considered. Textiles, Apparel, Footwear and Leather goods (TAFL) is another important economic area in all four *Rural regions*. Relevant specializations are found in different colleges. Modeling and technology of clothing, leather and substitutes is taught at two colleges in Chisinau, Modeling, design and technology of knitwear is taught at two colleges in Chisinau and one college in North, Modeling, design and technology of garments from fabrics is taught at three colleges in Chisinau and two colleges in North.

Chisinau hosts most institutions in higher education. Relevant specializations for the identified economic priority areas are being taught at least one institution (Annex 5). E.g. UTM offers specialisations in Engineering and engineering trades, including specialisations in

<sup>33</sup> The College of Ecology from Chisinau does offer specialisations in Fisheries and aquaculture and Forestry, but these are only relevant for a small share of Agriculture and Food processing, e.g. for Centre where Forestry and logging is included Agriculture and Food processing.

Telecommunications, Computers, and Information technologies. Uniagrara offers eight specialisations in Agriculture, but we also see specialisations in Agriculture in other institutions in Chisinau, North and Gagauzia.

## 5. Priority domains

### 5.1 Proposed priority domains for smart specialisation

Table 30 summarizes the priority domains for smart specialisation for the economic, scientific and innovation potential. The results of the mapping exercise are graphically summarized in Figures 13 to 17. The potential economic priority domains for smart specialisation have been identified in the economic mapping. Several of these have been confirmed for having an innovation potential, highlighted in bold in the following.

For Chisinau **ICT** is the most important area; other areas of importance include **Manufacture of paper and paper products**, **Manufacture of chemicals and chemical products**, Manufacture of glass and glass products, Manufacture of machinery and equipment not elsewhere classified, and Manufacture of furniture. The cluster analysis using more detailed employment data and definitions from the European Cluster Observatory, confirmed the importance of **ICT**.

For North, Centre, South and Gagauzia comparable economic areas for smart specialization have been identified. Several of these have been confirmed for having an innovation potential, highlighted in bold in the following. For all four **regions Agriculture and Food processing** is very important, but there are some differences as to which specific industries are included (cf. Table 12 for details). **Textiles, Apparel, Footwear and Leather (TAFL)** is a priority area in North and Centre, and **Renewable energy** is a priority area in North, South and Gagauzia. The cluster analysis has confirmed several of these areas, e.g. Apparel and Food processing for North, Livestock processing and Textile manufacturing for Centre, Environmental services and Food processing for South, and Apparel, Environmental services and Food processing for Gagauzia.

Patents are an imperfect proxy for measuring innovation. Most patent activities are in Chisinau accounting for about 85% of Moldovan patent applications. Patent applications can be broken down into different technology fields, but their relevance for measuring innovation capabilities relevant for supporting the identified economic areas is limited. However, the fact that Food chemistry is among the technology fields with most patent applications, does seem to support the development of Agriculture and Food processing.

Data on scientific potential are not available at the regional level. These data are also less relevant at the regional level as knowledge is a public good which can be easily accessed. The output of international publications appears to be relevant for the identified economic domains with relatively more publications in Agricultural and Biological Sciences, Energy, and Environmental Sciences.

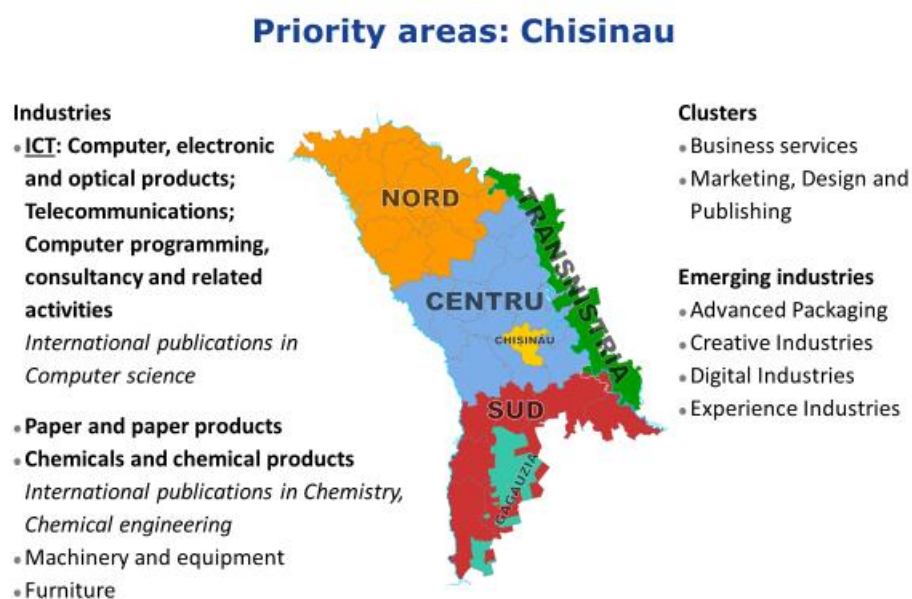
The education system shows a concentration of activities in Chisinau, which hosts about 90% of universities and other institutions in higher education. Relevant specializations are being taught at least one of these institutions. For post-secondary education there is a lack of specialized courses in Agriculture and Food processing.

Table 30 Potential priority domains for smart specialisation

	Economic potential (E) and Innovation potential (I)					Scientific potential
	Chisinau	North	Centre	South	Gagauzia	
<b>Agriculture and Food processing</b>		E	E	E	E	
A01 Crop and animal production, hunting and related service activities		E	E	E	E	International publications: Agricultural and biological sciences
A011 Growing of non-perennial crops		E		E	E	
A014 Animal production			E			
A02 Forestry and logging			E			
A021 Silviculture and other forestry activities			E			
C10 Manufacture of food products		E & I				
C101 Processing and preserving of meat and production of meat products			E & I			
C104 Manufacture of vegetable and animal oils and fats		E & I				
C105 Manufacture of dairy products		E & I				
C106 Manufacture of grain mill products, starches and starch products				E & I	E & I	
C107 Manufacture of bakery and farinaceous products				E		
C108 Manufacture of other food products		E & I				
C11 Manufacture of beverages				E & I	E & I	
<b>Textile, Apparel, Footwear and Leather goods (TAFL)</b>		E	E			
C13 Manufacture of textiles			E & I			
C139 Manufacture of other textiles			E & I			
C141 Manufacture of wearing apparel, except fur apparel		E				
C143 Manufacture of knitted and crocheted apparel			E			
C152 Manufacture of footwear			E			
<b>ICT</b>	E					
J61 Telecommunications	E & I					
J612 Wireless communications	E					
J62 Computer programming, consultancy and related activities	E & I					
C26 Manufacture of computer, electronic and optical products	E & I					International publications: Computer science
C265 Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	E & I					
<b>Renewable energy</b>		E		E	E	International publications: Energy
D Electricity, gas, steam and air conditioning supply		E & I				
D352 Manufacture of gas; distribution of gaseous fuels through mains				E & I	E	
<b>Other</b>						
C17 Manufacture of paper and paper products	E & I					
C172 Manufacture of articles of paper and paperboard	E & I					
C19 Manufacture of coke and refined petroleum products					E & I	
C192 Manufacture of refined petroleum products					E & I	
C20 Manufacture of chemicals and chemical products	E & I					International publications:

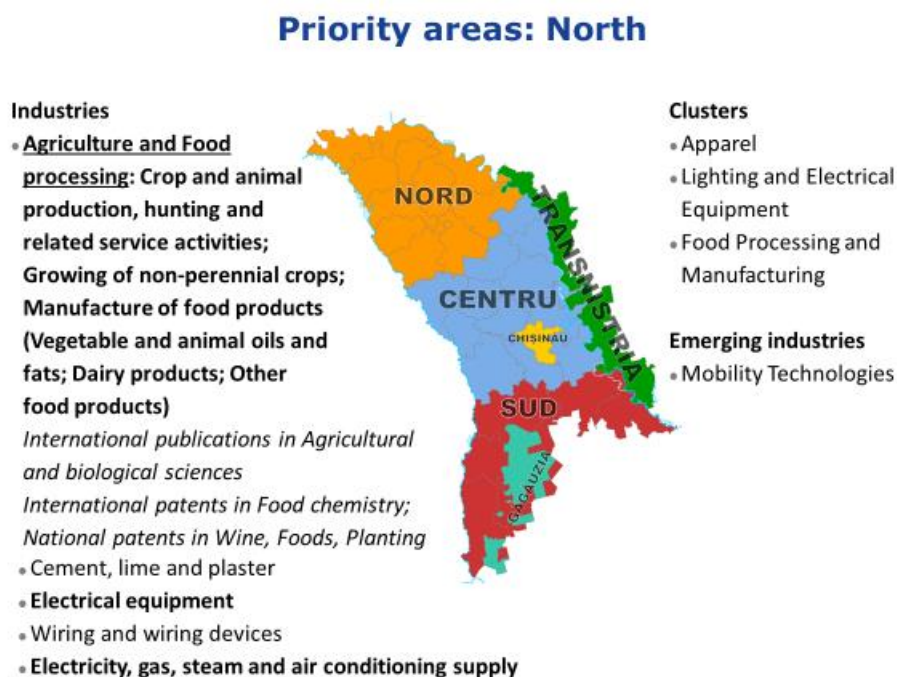
	Economic potential (E) and Innovation potential (I)					Scientific potential
	Chisinau	North	Centre	South	Gagauzia	
C203 Manufacture of paints, varnishes and similar coatings, printing ink and mastics	E					Chemistry, Chemical engineering
C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations			E & I			
C212 Manufacture of basic pharmaceutical preparations			E & I			
C23 Manufacture of other non-metallic mineral products			E			
C231 Manufacture of glass and glass products	E				E & I	
C235 Manufacture of cement, lime and plaster		E	E			
C27 Manufacture of electrical equipment		E & I				
C273 Manufacture of wiring and wiring devices		E				
C28 Manufacture of machinery and equipment not elsewhere classified	E					
C31 Manufacture of furniture	E					
C33 Repair of installation of machinery and equipment	E					
C331 Repair of fabricated metal products, machinery and equipment	E					
K662 Activities auxiliary to insurance and pension funding	E					
M Professional, scientific and technical activities	E & I					

Figure 13 Economic, innovative and scientific priority areas in Chisinau



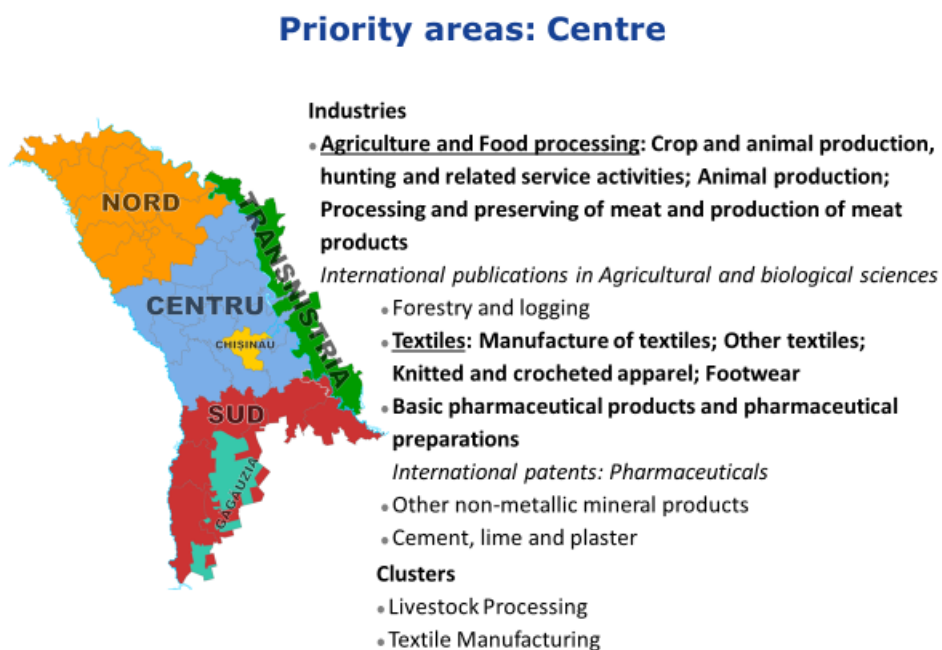
Industries with both an economic and innovation potential are highlighted in bold. Scientific areas are shown in italics.

Figure 14 Economic, innovative and scientific priority areas in North



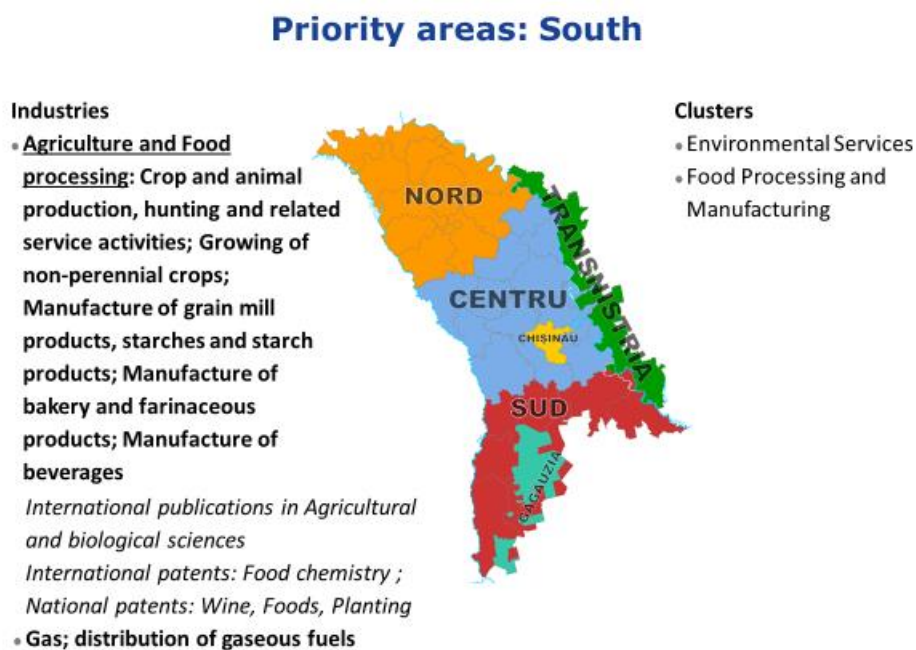
Industries with both an economic and innovation potential are highlighted in bold. Scientific areas are shown in italics.

Figure 15 Economic, innovative and scientific priority areas in Centre



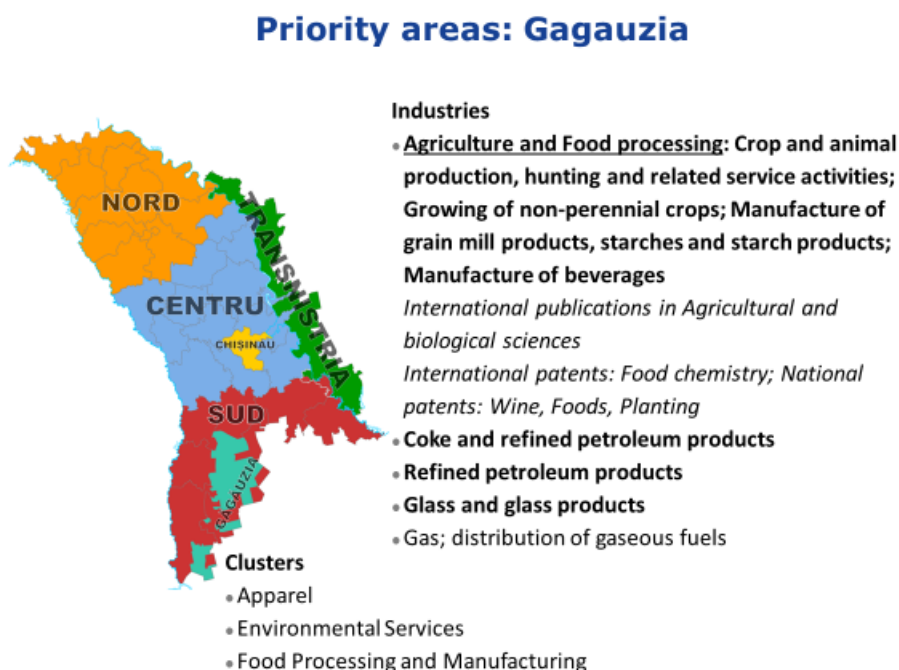
Industries with both an economic and innovation potential are highlighted in bold. Scientific areas are shown in italics.

Figure 16 Economic, innovative and scientific priority areas in South



Industries with both an economic and innovation potential are highlighted in bold. Scientific areas are shown in italics.

Figure 17 Economic, innovative and scientific priority areas in Gagauzia



Industries with both an economic and innovation potential are highlighted in bold. Scientific areas are shown in italics.



## 5.2 Recommendations for further mapping analysis and next steps

The mapping exercise in this study has relied on the most recent economic data for 2014-2016. Due to a reclassification of the statistical definitions of industrial activities, data before 2014 cannot be combined with data from 2014 and after. The available time series data have been too short to also use the growth performance of industries in the selection process for identifying economic priority areas. Longer time series will be needed, e.g. at least for five years, to be able to include growth as an additional selection criterion in the mapping analysis. The economic mapping should be updated once long enough time series are available, which would be in 2019, assuming 2014-2018 data will be available. The mapping can then be repeated once every two or three years.

The mapping of the innovation potential could be updated with the results of the next edition of the Moldovan innovation survey. The analysis could be limited to the NACE 2 digit to avoid working with small sample size, such that more detailed statistics (e.g. product-process innovators, marketing-organisational innovators, innovators with or without R&D activities) could also be used.

For the mapping of scientific potential available data are adequate. What would be needed is an analysis linking the output of the national science system to the demands of domestic industry, to identify if science delivers the new knowledge needed by Moldovan firms to increase their competitiveness.

Table 31 provides recommendations for possible updates of the mapping exercise in 2018 and 2019.

**Table 31 Potential priority domains for smart specialisation**

	Mapping of economic priority areas	Mapping of innovation priority areas	Mapping of scientific priority areas
<b>Update in 2018</b>	Repeat analysis using NACE 3-digit data for 4 years (2014-2017) Ask for NACE 4-digit data for 2016 and/or 2017: update cluster analysis	No update foreseen Ask AGEPI for patent data by patent fields for individual years and update the identification of most important patent fields	Ask IBN for scientific publications for more detailed science fields, update the identification of most important science fields
<b>Update in 2019</b>	Update and repeat analysis using NACE 3-digit data for 5 years (2014-2018), introduce growth performance as 4 <sup>th</sup> criterion in the selection process Ask for NACE 4-digit data for 2017 and/or 2018: update cluster analysis, possibly introduce growth performance as an additional criterion	Possible update using innovation survey data depending if and when the results of the next edition of the innovation survey will become available Ask AGEPI for patent data by patent fields for individual years and update the identification of most important patent fields	Ask IBN for scientific publications for more detailed science fields, update the identification of most important science fields

## **Annexes**

Annex 1: Cluster definitions for 51 traded cluster categories (European Cluster Observatory)

Annex 2: Emerging industries definitions (European Cluster Observatory)

Annex 3: Economic structure of regions in the Republic of Moldova

Annex 4: Specializations of colleges (ISCED 5)

Annex 5: Specializations of higher education (ISCED 6)

## Annex 1: Cluster definitions for 51 cluster categories (European Cluster Observatory)

Cluster	NACE	Industry Name
<b>Aerospace Vehicles and Defence</b>	30.30	Manufacture of air and spacecraft and related machinery
<b>Agricultural Inputs and Services</b>	01.61	Support activities for crop production
	01.62	Support activities for animal production
	01.63	Post-harvest crop activities
	01.64	Seed processing for propagation
	20.15	Manufacture of fertilisers and nitrogen compounds
<b>Apparel</b>	14.11	Manufacture of leather clothes
	14.12	Manufacture of workwear
	14.13	Manufacture of other outerwear
	14.14	Manufacture of underwear
	14.19	Manufacture of other wearing apparel and accessories
	14.20	Manufacture of articles of fur
<b>Appliances</b>	27.51	Manufacture of electric domestic appliances
	27.52	Manufacture of non-electric domestic appliances
<b>Automotive</b>	24.53	Casting of light metals
	24.54	Casting of other non-ferrous metals
	28.13	Manufacture of other pumps and compressors
	29.10	Manufacture of motor vehicles
	29.20	Manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers
	29.31	Manufacture of electrical and electronic equipment for motor vehicles
	29.32	Manufacture of other parts and accessories for motor vehicles
	30.40	Manufacture of military fighting vehicles
<b>Biopharmaceuticals</b>	21.10	Manufacture of basic pharmaceutical products
	21.20	Manufacture of pharmaceutical preparations
<b>Business Services</b>	49.32	Taxi operation
	62.01	Computer programming activities
	62.02	Computer consultancy activities
	62.03	Computer facilities management activities
	62.09	Other information technology and computer service activities
	63.11	Data processing, hosting and related activities
	64.20	Activities of holding companies
	70.10	Activities of head offices
	70.22	Business and other management consultancy activities
	71.11	Architectural activities
	71.12	Engineering activities and related technical consultancy
	71.20	Technical testing and analysis
	74.30	Translation and interpretation activities
	74.90	Other professional, scientific and technical activities n.e.c.
	77.12	Renting and leasing of trucks
	77.40	Leasing of intellectual property and similar products, except copyrighted works
	78.10	Activities of employment placement agencies
	78.30	Other human resources provision
	81.10	Combined facilities support activities
82.20	Activities of call centres	
82.30	Organisation of conventions and trade shows	
<b>Coal Mining</b>	05.10	Mining of hard coal
	05.20	Mining of lignite
	09.90	Support activities for other mining and quarrying
<b>Communications Equipment and Services</b>	26.30	Manufacture of communication equipment
	61.20	Wireless telecommunications activities
	61.30	Satellite telecommunications activities
	61.90	Other telecommunications activities
<b>Construction Products and Services</b>	23.14	Manufacture of glass fibres
	23.51	Manufacture of cement
	23.52	Manufacture of lime and plaster

Cluster	NACE	Industry Name
	23.61	Manufacture of concrete products poses
	23.62	Manufacture of plaster products for construction purposes
	23.64	Manufacture of mortars
	23.65	Manufacture of fibre cement
	23.70	Cutting, shaping and finishing of stone
	23.99	Manufacture of other non-metallic mineral products n.e.c.
	24.20	Manufacture of tubes, pipes, hollow profiles fittings, of steel
	25.30	Manufacture of steam generators, except central heating hot water boilers
	35.30	Steam and air conditioning supply
	42.12	Construction of railways and underground railways
	42.22	Construction of utility projects for electricity and telecommunications
	42.91	Construction of water projects
<b>Distribution and Electronic Commerce</b>	46.11	Agents involved in the sale of agricultural raw materials, live animals, textile raw materials goods
	46.12	Agents involved in the sale of fuels, ores, metals and industrial chemicals
	46.13	Agents involved in the sale of timber and building materials
	46.14	Agents involved in the sale of machinery, industrial equipment, ships and aircraft
	46.15	Agents involved in the sale of furniture, household goods, hardware and ironmongery
	46.16	Agents involved in the sale of textiles, clothing, fur, footwear and leather goods
	46.17	Agents involved in the sale of food, beverages and tobacco
	46.18	Agents specialised in the sale of other particular products
	46.19	Agents involved in the sale of a variety of goods
	46.21	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds
	46.22	Wholesale of flowers and plants
	46.23	Wholesale of live animals
	46.24	Wholesale of hides, skins and leather
	46.31	Wholesale of fruit and vegetables
	46.32	Wholesale of meat and meat products
	46.34	Wholesale of beverages
	46.35	Wholesale of tobacco products
	46.38	Wholesale of other food, including fish, crustaceans and molluscs
	46.41	Wholesale of textiles
	46.42	Wholesale of clothing and footwear
	46.43	Wholesale of electrical household appliances
	46.44	Wholesale of china and glassware and cleaning materials
	46.45	Wholesale of perfume and cosmetics
	46.46	Wholesale of pharmaceutical goods
	46.47	Wholesale of furniture, carpets and lighting equipment
	46.48	Wholesale of watches and jewellery
	46.49	Wholesale of other household goods
	46.51	Wholesale of computers, computer peripheral equipment and software
	46.52	Wholesale of electronic and telecommunications equipment and parts
	46.61	Wholesale of agricultural machinery, equipment and supplies
	46.62	Wholesale of machine tools
	46.63	Wholesale of mining, construction and civil engineering machinery
	46.64	Wholesale of machinery for the textile industry and of sewing and knitting machines
	46.65	Wholesale of office furniture
	46.66	Wholesale of other office machinery and equipment
	46.69	Wholesale of other machinery and equipment
	46.71	Wholesale of solid, liquid and gaseous fuels and related products
	46.72	Wholesale of metals and metal ores
	46.76	Wholesale of other intermediate products
	47.91	Retail sale via mail order houses or via Internet
	52.10	Warehousing and storage
	77.31	Renting and leasing of agricultural machinery and equipment
	77.32	Renting and leasing of construction and civil engineering machinery and equipment
	77.33	Renting and leasing (including computers)
	77.34	Renting and leasing of water transport equipment
	77.35	Renting and leasing of air transport equipment
	77.39	Renting and leasing of other machinery, equipment and tangible goods n.e.c.

Cluster	NACE	Industry Name
	82.92	Packaging activities
<b>Downstream Chemical Products</b>	20.12	Manufacture of dyes and pigments
	20.30	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
	20.41	Manufacture of soap and detergents, cleaning and polishing preparations
	20.42	Manufacture of perfumes and toilet preparations
	20.51	Manufacture of explosives
	20.52	Manufacture of glues
	20.53	Manufacture of essential oils
	20.59	Manufacture of other chemical products n.e.c.
<b>Downstream Metal Products</b>	25.29	Manufacture of other tanks, reservoirs and containers of metal
	25.40	Manufacture of weapons and ammunition
	25.71	Manufacture of cutlery
	25.72	Manufacture of locks and hinges
	25.91	Manufacture of steel drums and similar containers
	25.92	Manufacture of light metal packaging
	25.99	Manufacture of other fabricated metal products n.e.c.
<b>Education and Knowledge Creation</b>	72.11	Research and experimental development on biotechnology
	72.19	Other research and experimental development on natural sciences and engineering
	72.20	Research and experimental development on social sciences and humanities
	85.41	Post-secondary non-tertiary education
	85.42	Tertiary education
	85.52	Cultural education
	85.59	Other education n.e.c.
	85.60	Educational support activities
	94.12	Activities of professional membership organisations
<b>Electric Power Generation and Transmission</b>	35.11	Production of electricity
	35.12	Transmission of electricity
<b>Environmental Services</b>	36.00	Water collection, treatment and supply
	38.12	Collection of hazardous waste
	38.22	Treatment and disposal of hazardous waste
	38.32	Recovery of sorted materials
<b>Financial Services</b>	64.11	Central banking
	64.30	Trusts, funds and similar financial entities
	64.91	Financial leasing
	64.92	Other credit granting
	64.99	Other financial service activities, except insurance and pension funding n.e.c.
	66.11	Administration of financial markets
	66.12	Security and commodity contracts brokerage
	66.19	Other activities auxiliary to financial services, except insurance and pension funding
	66.30	Fund management activities
<b>Fishing and Fishing Products</b>	03.11	Marine fishing
	03.12	Freshwater fishing
	10.20	Processing and preserving of fish, crustaceans and molluscs
<b>Food Processing and Manufacturing</b>	10.31	Processing and preserving of potatoes
	10.32	Manufacture of fruit and vegetable juice
	10.39	Other processing and preserving of fruit and vegetables
	10.41	Manufacture of oils and fats
	10.42	Manufacture of margarine and similar edible fats
	10.51	Operation of dairies and cheese making
	10.52	Manufacture of ice cream
	10.61	Manufacture of grain mill products
	10.62	Manufacture of starches and starch products
	10.72	Manufacture of rusks and biscuits manufacture of preserved pastry goods and cakes
	10.73	Manufacture of macaroni, noodles, couscous and similar farinaceous products
	10.81	Manufacture of sugar
	10.82	Manufacture of cocoa, chocolate and sugar confectionery
	10.83	Processing of tea and coffee
	10.84	Manufacture of condiments and seasonings
	10.85	Manufacture of prepared meals and dishes
	10.86	Manufacture of homogenised food preparations and dietetic food

Cluster	NACE	Industry Name
	10.89	Manufacture of other food products n.e.c.
	10.91	Manufacture of prepared feeds for farm animals
	10.92	Manufacture of prepared pet foods
	11.01	Distilling, rectifying and blending of spirits
	11.02	Manufacture of wine from grape
	11.03	Manufacture of cider and other fruit wines
	11.04	Manufacture of other non-distilled fermented beverages
	11.05	Manufacture of beer
	11.06	Manufacture of malt
	11.07	Manufacture of soft drinks production of mineral waters and other bottled waters
<b>Footwear</b>	15.11	Tanning and dressing of leather dressing and dyeing of fur
	15.20	Manufacture of footwear
<b>Forestry</b>	02.10	Silviculture and other forestry activities
	02.20	Logging
	02.30	Gathering of wild growing non-wood products
	02.40	Support services to forestry
<b>Furniture</b>	31.01	Manufacture of office and shop furniture
	31.02	Manufacture of kitchen furniture
	31.03	Manufacture of mattresses
	31.09	Manufacture of other furniture
<b>Hospitality and Tourism</b>	01.70	Hunting, trapping and related service activities
	55.10	Hotels and similar accommodation
	55.20	Holiday and other short-stay accommodation
	55.30	Camping grounds, recreational parks
	55.90	Other accommodation
	77.21	Renting and leasing of recreational and sports goods
	79.11	Travel agency activities
	79.12	Tour operator activities
	79.90	Other reservation service and related activities
	91.02	Museums activities
	91.03	Operation of historical sites and buildings and similar visitor attractions
	91.04	Botanical and zoological gardens and nature reserves activities
	92.00	Gambling and betting activities
	93.11	Operation of sports facilities
	93.12	Activities of sport clubs
	93.19	Other sports activities
	93.21	Activities of amusement parks and theme parks
	93.29	Other amusement and recreation activities
<b>Information Technology and Analytical Instruments</b>	26.11	Manufacture of electronic components
	26.12	Manufacture of loaded electronic boards
	26.20	Manufacture of computers and peripheral equipment
	26.40	Manufacture of consumer electronics
	26.51	Manufacture of instruments and appliances for measuring, testing and navigation
	26.52	Manufacture of watches and clocks
	26.70	Manufacture of optical instruments equipment
	26.80	Manufacture of magnetic and optical media
	58.21	Publishing of computer games
	58.29	Other software publishing
<b>Insurance Services</b>	65.11	Life insurance
	65.12	Non-life insurance
	65.20	Reinsurance
	66.21	Risk and damage evaluation
	66.29	Other activities auxiliary to insurance and pension funding
<b>Jewellery and Precious Metals</b>	32.11	Striking of coins
	32.12	Manufacture of jewellery and related articles
	32.13	Manufacture of imitation jewellery and related articles
<b>Leather and Related Products</b>	15.12	Manufacture of luggage, handbags and the like, saddlery and harness
<b>Lighting and Electrical Equipment</b>	27.11	Manufacture of electric motors, generators and transformers
	27.12	Manufacture of electricity distribution and control apparatus
	27.20	Manufacture of batteries and accumulators

Cluster	NACE	Industry Name
	27.31	Manufacture of fibre optic cables
	27.32	Manufacture of other electronic and electric wires and cables
	27.33	Manufacture of wiring devices
	27.40	Manufacture of electric lighting equipment
	27.90	Manufacture of other electrical equipment
<b>Livestock Processing</b>	10.11	Processing and preserving of meat
	10.12	Processing and preserving of poultry meat
	10.13	Production of meat and poultry meat products
<b>Marketing, Design, and Publishing</b>	58.11	Book publishing
	58.12	Publishing of directories and mailing lists
	58.14	Publishing of journals and periodicals
	58.19	Other publishing activities
	63.12	Web portals
	63.91	News agency activities
	63.99	Other information service activities n.e.c.
	70.21	Public relations and communication activities
	73.11	Advertising agencies
	73.12	Media representation
	73.20	Market research and public opinion polling
	74.10	Specialised design activities
	91.01	Library and archives activities
<b>Medical Devices</b>	26.60	Manufacture of irradiation, electromedical and electrotherapeutic equipment
	32.50	Manufacture of medical and dental instruments and supplies
<b>Metal Mining</b>	07.10	Mining of iron ores
	07.21	Mining of uranium and thorium ores
	07.29	Mining of other non-ferrous metal ores
<b>Metalworking Technology</b>	23.91	Production of abrasive products
	25.11	Manufacture of metal structures and parts of structures
	25.12	Manufacture of doors and windows of metal
	25.61	Treatment and coating of metals
	25.62	Machining
	25.73	Manufacture of tools
	25.94	Manufacture of fasteners and screw machine products
	28.41	Manufacture of metal forming machinery
	28.91	Manufacture of machinery for metallurgy
<b>Music and Sound Recording</b>	59.20	Sound recording and music publishing activities
<b>Non-metal Mining</b>	08.11	Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
	08.12	Operation of gravel and sand pits mining of clays and kaolin
	08.91	Mining of chemical and fertiliser minerals
	08.92	Extraction of peat
	08.93	Extraction of salt
	08.99	Other mining and quarrying n.e.c.
<b>Oil and Gas Production and Transportation</b>	06.10	Extraction of crude petroleum
	06.20	Extraction of natural gas
	09.10	Support activities for petroleum and natural gas extraction
	19.10	Manufacture of coke oven products
	19.20	Manufacture of refined petroleum products
	49.50	Transport via pipeline
<b>Paper and Packaging</b>	17.11	Manufacture of pulp
	17.12	Manufacture of paper and paperboard
	17.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard
	17.22	Manufacture of household and sanitary goods and of toilet requisites
	17.23	Manufacture of paper stationery
	17.24	Manufacture of wallpaper
	17.29	Manufacture of other articles of paper and paperboard
<b>Performing Arts</b>	90.01	Performing arts
	90.02	Support activities to performing arts
	90.03	Artistic creation
	90.04	Operation of arts facilities

Cluster	NACE	Industry Name
<b>Plastics</b>	20.16	Manufacture of plastics in primary forms
	22.21	Manufacture of plastic plates, sheets, tubes and profiles
	22.22	Manufacture of plastic packing goods
	22.23	Manufacture of builders' ware of plastic
	22.29	Manufacture of other plastic products
	28.96	Manufacture of plastics and rubber machinery
<b>Printing Services</b>	18.11	Printing of newspapers
	18.12	Other printing
	18.13	Pre-press and pre-media services
	18.14	Binding and related services
<b>Production Technology and Heavy Machinery</b>	25.21	Manufacture of central heating radiators and boilers
	28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
	28.12	Manufacture of fluid power equipment
	28.14	Manufacture of other taps and valves
	28.15	Manufacture of bearings, gears, gearing and driving elements
	28.21	Manufacture of ovens, furnaces and furnace burners
	28.22	Manufacture of lifting and handling equipment
	28.24	Manufacture of power-driven hand tools
	28.25	Manufacture of non-domestic cooling and ventilation equipment
	28.29	Manufacture of other general-purpose machinery n.e.c.
	28.30	Manufacture of agricultural and forestry machinery
	28.49	Manufacture of other machine tools
	28.92	Manufacture of machinery for mining, quarrying and construction
	28.93	Manufacture of machinery for food, beverage and tobacco processing
	28.94	Manufacture of machinery for textile, apparel and leather production
	28.95	Manufacture of machinery for paper and paperboard production
28.99	Manufacture of other special-purpose machinery n.e.c.	
30.20	Manufacture of railway locomotives and rolling stock	
30.99	Manufacture of other transport equipment n.e.c.	
<b>Recreational and Small Electric Goods</b>	28.23	Manufacture of office machinery and equipment (except computers and peripheral equipment)
	30.91	Manufacture of motorcycles
	30.92	Manufacture of bicycles and invalid carriages
	32.20	Manufacture of musical instruments
	32.30	Manufacture of sports goods
	32.40	Manufacture of games and toys
	32.91	Manufacture of brooms and brushes
	32.99	Other manufacturing n.e.c.
	<b>Textile Manufacturing</b>	13.10
13.20		Weaving of textiles
13.30		Finishing of textiles
13.91		Manufacture of knitted and crocheted fabrics
13.92		Manufacture of made-up textile articles, except apparel
13.93		Manufacture of carpets and rugs
13.94		Manufacture of cordage, rope, twine and netting
13.95		Manufacture of non-wovens and articles made from non-wovens, except apparel
13.96		Manufacture of other technical and industrial textiles
13.99		Manufacture of other textiles n.e.c.
14.31		Manufacture of knitted and crocheted hosiery
14.39		Manufacture of other knitted and crocheted apparel
20.60	Manufacture of man-made fibres	
<b>Tobacco</b>	12.00	Manufacture of tobacco products
<b>Transportation and Logistics</b>	33.16	Repair and maintenance of aircraft and spacecraft
	49.39	Other passenger land transport n.e.c.
	49.41	Freight transport by road
	51.10	Passenger air transport
	51.21	Freight air transport
	51.22	Space transport
	52.21	Service activities incidental to land transportation
	52.23	Service activities incidental to air transportation
	52.24	Cargo handling



Cluster	NACE	Industry Name
	52.29	Other transportation support activities
<b>Upstream Chemical Products</b>	20.11	Manufacture of industrial gases
	20.13	Manufacture of other inorganic basic chemicals
	20.14	Manufacture of other organic basic chemicals
	20.17	Manufacture of synthetic rubber in primary forms
	20.20	Manufacture of pesticides and other agrochemical products
<b>Upstream Metal Manufacturing</b>	24.10	Manufacture of basic iron and steel and of ferro-alloys
	24.31	Cold drawing of bars
	24.32	Cold rolling of narrow strip
	24.33	Cold forming or folding
	24.34	Cold drawing of wire
	24.41	Precious metals production
	24.42	Aluminum production
	24.43	Lead, zinc and tin production
	24.44	Copper production
	24.45	Other non-ferrous metal production
	24.46	Processing of nuclear fuel
	24.51	Casting of iron
	24.52	Casting of steel
	25.50	Forging, pressing, stamping and roll-forming of metal powder metallurgy
	25.93	Manufacture of wire products, chain and springs
<b>Video Production and Distribution</b>	18.20	Reproduction of recorded media
	59.11	Motion picture, video and television programme production activities
	59.12	Motion picture, video and television programme postproduction activities
	59.13	Motion picture, video and television programme distribution activities
<b>Vulcanized and Fired Materials</b>	22.11	Manufacture of rubber tyres and tubes retreading and rebuilding of rubber tyres
	22.19	Manufacture of other rubber products
	23.11	Manufacture of flat glass
	23.12	Shaping and processing of flat glass
	23.13	Manufacture of hollow glass
	23.19	Manufacture and processing of other glass, including technical glassware
	23.20	Manufacture of refractory products
	23.31	Manufacture of ceramic tiles and flags
	23.32	Manufacture of bricks, tiles and construction products, in baked clay
	23.41	Manufacture of ceramic household and ornamental articles
	23.43	Manufacture of ceramic insulators and insulating fittings
	23.44	Manufacture of other technical ceramic products
	23.49	Manufacture of other ceramic products
<b>Water Transportation</b>	30.11	Building of ships and floating structures
	30.12	Building of pleasure and sporting boats
	33.15	Repair and maintenance of ships and boats
	38.31	Dismantling of wrecks
	50.10	Sea and coastal passenger water transport
	50.20	Sea and coastal freight water transport
	50.30	Inland passenger water transport
	50.40	Inland freight water transport
	52.22	Service activities incidental to water transportation
<b>Wood Products</b>	16.10	Sawmilling and planing of wood
	16.21	Manufacture of veneer sheets and wood-based panels
	16.22	Manufacture of assembled parquet floors
	16.23	Manufacture of other builders' carpentry and joinery
	16.24	Manufacture of wooden containers
	16.29	Manufacture of other products of wood manufacture articles of cork, straw and plaiting materials

## Annex 2: Emerging industries definitions (European Cluster Observatory)

Emerging Industry	NACE	NACE Name
<b>Advanced Packaging</b>	17.11	Manufacture of pulp
	17.12	Manufacture of paper and paperboard
	17.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard
	17.22	Manufacture of household and sanitary goods and of toilet requisites
	17.23	Manufacture of paper stationery
	17.24	Manufacture of wallpaper
	17.29	Manufacture of other articles of paper and paperboard
	22.21	Manufacture of plastic plates, sheets, tubes and profiles
	22.22	Manufacture of plastic packing goods
	22.29	Manufacture of other plastic products
	24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
	25.61	Treatment and coating of metals
	25.73	Manufacture of tools
	25.99	Manufacture of other fabricated metal products n.e.c.
	28.99	Manufacture of other special-purpose machinery n.e.c.
	29.32	Manufacture of other parts and accessories for motor vehicles
	31.01	Manufacture of office and shop furniture
	46.76	Wholesale of other intermediate products
	<b>Biopharmaceuticals</b>	11.01
17.22		Manufacture of household and sanitary goods and of toilet requisites
20.13		Manufacture of other inorganic basic chemicals
20.14		Manufacture of other organic basic chemicals
20.30		Manufacture of paints, varnishes and similar coatings, printing ink and mastics
20.41		Manufacture of soap and detergents, cleaning and polishing preparations
20.59		Manufacture of other chemical products n.e.c.
21.10		Manufacture of basic pharmaceutical products
21.20		Manufacture of pharmaceutical preparations
46.46		Wholesale of pharmaceutical goods
72.11		Research and experimental development on biotechnology
72.19	Other research and experimental development on natural sciences and engineering	
<b>Blue Growth Industries</b>	03.11	Marine fishing
	03.12	Freshwater fishing
	09.10	Support activities for petroleum and natural gas extraction
	10.20	Processing and preserving of fish, crustaceans and molluscs
	22.19	Manufacture of other rubber products
	25.99	Manufacture of other fabricated metal products n.e.c.
	28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
	28.22	Manufacture of lifting and handling equipment
	30.11	Building of ships and floating structures
	30.12	Building of pleasure and sporting boats
	33.15	Repair and maintenance of ships and boats
	35.11	Production of electricity
	35.12	Transmission of electricity
	36.00	Water collection, treatment and supply
	42.91	Construction of water projects
	46.14	Agents involved in the sale of machinery, industrial equipment, ships and aircraft
	49.41	Freight transport by road
	50.10	Sea and coastal passenger water transport
	50.20	Sea and coastal freight water transport
	50.30	Inland passenger water transport
	50.40	Inland freight water transport
	52.10	Warehousing and storage
	52.22	Service activities incidental to water transportation
	52.23	Service activities incidental to air transportation
	52.24	Cargo handling
	52.29	Other transportation support activities
	71.12	Engineering activities and related technical consultancy
71.20	Technical testing and analysis	
72.19	Other research and experimental development on natural sciences and engineering	

<b>Emerging Industry</b>	<b>NACE</b>	<b>NACE Name</b>
	73.11	Advertising agencies
	77.32	Renting and leasing of construction and civil engineering machinery and equipment
	77.34	Renting and leasing of water transport equipment
	79.11	Travel agency activities
<b>Creative Industries</b>	18.20	Reproduction of recorded media
	49.32	Taxi operation
	58.11	Book publishing
	58.12	Publishing of directories and mailing lists
	58.14	Publishing of journals and periodicals
	58.19	Other publishing activities
	59.11	Motion picture, video and television programme production activities
	59.12	Motion picture, video and television programme post-production activities
	59.13	Motion picture, video and television programme distribution activities
	59.20	Sound recording and music publishing activities
	62.01	Computer programming activities
	62.02	Computer consultancy activities
	62.03	Computer facilities management activities
	62.09	Other information technology and computer service activities
	63.11	Data processing, hosting and related activities
	63.12	Web portals
	63.91	News agency activities
	63.99	Other information service activities n.e.c.
	64.20	Activities of holding companies
	70.10	Activities of head offices
	70.21	Public relations and communication activities
	70.22	Business and other management consultancy activities
	71.11	Architectural activities
	71.12	Engineering activities and related technical consultancy
	71.20	Technical testing and analysis
	73.11	Advertising agencies
	73.12	Media representation
	73.20	Market research and public opinion polling
	74.10	Specialised design activities
	74.30	Translation and interpretation activities
	74.90	Other professional, scientific and technical activities n.e.c.
	77.12	Renting and leasing of trucks
	77.40	Leasing of intellectual property and similar products, except copyrighted works
	78.10	Activities of employment placement agencies
	78.30	Other human resources provision
	81.10	Combined facilities support activities
	82.20	Activities of call centres
	82.30	Organisation of conventions and trade shows
	91.01	Library and archives activities
<b>Digital Industries</b>	22.29	Manufacture of other plastic products
	25.61	Treatment and coating of metals
	25.73	Manufacture of tools
	26.11	Manufacture of electronic components
	26.12	Manufacture of loaded electronic boards
	26.20	Manufacture of computers and peripheral equipment
	26.30	Manufacture of communication equipment
	26.40	Manufacture of consumer electronics
	26.51	Manufacture of instruments and appliances for measuring, testing and navigation
	26.52	Manufacture of watches and clocks
	26.70	Manufacture of optical instruments and photographic equipment
	26.80	Manufacture of magnetic and optical media
	27.12	Manufacture of electricity distribution and control apparatus
	27.90	Manufacture of other electrical equipment
	28.24	Manufacture of power-driven hand tools
	28.29	Manufacture of other general-purpose machinery n.e.c.
	28.99	Manufacture of other special-purpose machinery n.e.c.
	32.50	Manufacture of medical and dental instruments and supplies

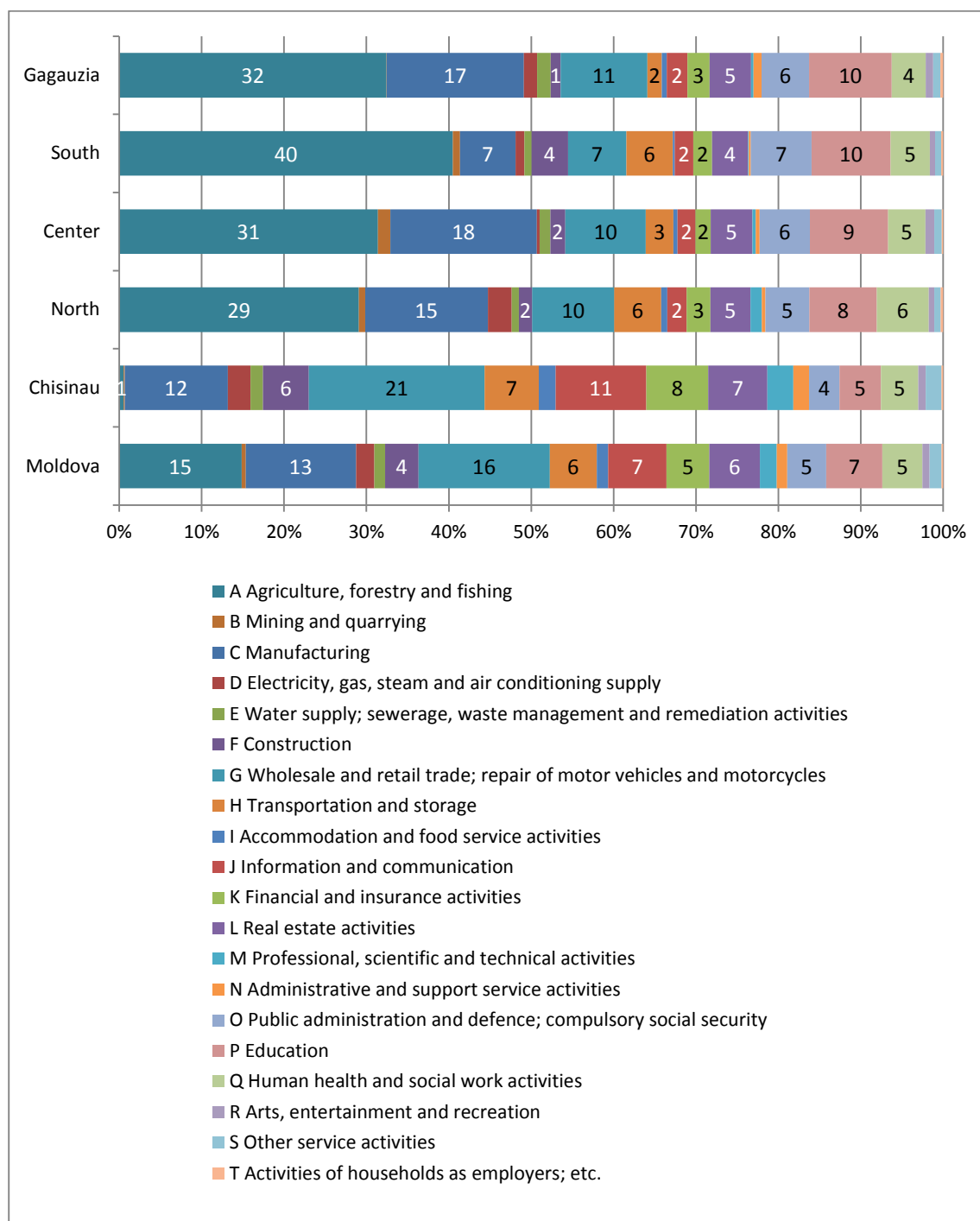
<b>Emerging Industry</b>	<b>NACE</b>	<b>NACE Name</b>
	46.43	Wholesale of electrical household appliances
	46.51	Wholesale of computers, computer peripheral equipment and software
	46.52	Wholesale of electronic and telecommunications equipment and parts
	46.66	Wholesale of other office machinery and equipment
	46.69	Wholesale of other machinery and equipment
	58.11	Book publishing
	58.21	Publishing of computer games
	58.29	Other software publishing
	61.20	Wireless telecommunications activities
	61.30	Satellite telecommunications activities
	61.90	Other telecommunications activities
	62.01	Computer programming activities
	62.02	Computer consultancy activities
	62.09	Other information technology and computer service activities
	70.21	Public relations and communication activities
	73.20	Market research and public opinion polling
<b>Environmental Industries</b>	06.20	Extraction of natural gas
	09.10	Support activities for petroleum and natural gas extraction
	16.21	Manufacture of veneer sheets and wood-based panels
	16.29	Manufacture of other products of wood manufacture of articles of cork, straw and plaiting materials
	17.22	Manufacture of household and sanitary goods and of toilet requisites
	20.14	Manufacture of other organic basic chemicals
	20.15	Manufacture of fertilisers and nitrogen compounds
	20.16	Manufacture of plastics in primary forms
	20.59	Manufacture of other chemical products n.e.c.
	22.29	Manufacture of other plastic products
	23.49	Manufacture of other ceramic products
	23.51	Manufacture of cement
	24.10	Manufacture of basic iron and steel and of ferro-alloys
	25.21	Manufacture of central heating radiators and boilers
	25.30	Manufacture of steam generators, except central heating hot water boilers
	25.99	Manufacture of other fabricated metal products n.e.c.
	26.51	Manufacture of instruments and appliances for measuring, testing and navigation
	28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
	28.29	Manufacture of other general-purpose machinery n.e.c.
	28.99	Manufacture of other special-purpose machinery n.e.c.
	35.11	Production of electricity
	35.12	Transmission of electricity
	36.00	Water collection, treatment and supply
	38.12	Collection of hazardous waste
	38.22	Treatment and disposal of hazardous waste
	38.31	Dismantling of wrecks
	38.32	Recovery of sorted materials
	46.21	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds
	46.22	Wholesale of flowers and plants
	49.50	Transport via pipeline
	52.22	Service activities incidental to water transportation
	52.29	Other transportation support activities
	71.12	Engineering activities and related technical consultancy
	72.11	Research and experimental development on biotechnology
	72.19	Other research and experimental development on natural sciences and engineering
<b>Experience Industries</b>	01.70	Hunting, trapping and related service activities
	46.18	Agents specialised in the sale of other particular products
	46.42	Wholesale of clothing and footwear
	46.49	Wholesale of other household goods
	47.91	Retail sale via mail order houses or via Internet
	49.39	Other passenger land transport n.e.c.
	50.30	Inland passenger water transport
	50.40	Inland freight water transport
	52.22	Service activities incidental to water transportation

<b>Emerging Industry</b>	<b>NACE</b>	<b>NACE Name</b>
	52.23	Service activities incidental to air transportation
	55.10	Hotels and similar accommodation
	55.20	Holiday and other short-stay accommodation
	55.30	Camping grounds, recreational vehicle parks and trailer parks
	55.90	Other accommodation
	58.29	Other software publishing
	62.01	Computer programming activities
	62.09	Other information technology and computer service activities
	63.12	Web portals
	70.21	Public relations and communication activities
	70.22	Business and other management consultancy activities
	77.21	Renting and leasing of recreational and sports goods
	79.11	Travel agency activities
	79.12	Tour operator activities
	79.90	Other reservation service and related activities
	82.30	Organisation of conventions and trade shows
	90.01	Performing arts
	90.02	Support activities to performing arts
	90.03	Artistic creation
	90.04	Operation of arts facilities
	91.02	Museums activities
	91.03	Operation of historical sites and buildings and similar visitor attractions
	91.04	Botanical and zoological gardens and nature reserves activities
	92.00	Gambling and betting activities
	93.11	Operation of sports facilities
	93.12	Activities of sport clubs
	93.19	Other sports activities
	93.21	Activities of amusement parks and theme parks
	93.29	Other amusement and recreation activities
<b>Logistical Services</b>	33.16	Repair and maintenance of aircraft and spacecraft
	49.32	Taxi operation
	49.39	Other passenger land transport n.e.c.
	49.41	Freight transport by road
	51.10	Passenger air transport
	51.21	Freight air transport
	51.22	Space transport
	52.21	Service activities incidental to land transportation
	52.23	Service activities incidental to air transportation
	52.24	Cargo handling
	52.29	Other transportation support activities
	61.30	Satellite telecommunications activities
<b>Medical Devices</b>	23.32	Manufacture of bricks, tiles and construction clay
	25.40	Manufacture of weapons and ammunition
	25.73	Manufacture of tools
	26.11	Manufacture of electronic components
	26.12	Manufacture of loaded electronic boards
	26.40	Manufacture of consumer electronics
	26.51	Manufacture of instruments and appliances for measuring, testing and navigation
	26.52	Manufacture of watches and clocks
	26.60	Manufacture of irradiation, electromedical equipment
	26.70	Manufacture of optical instruments and photographic equipment
	27.12	Manufacture of electricity distribution and control apparatus
	27.31	Manufacture of fibre optic cables
	27.32	Manufacture of other electronic and electric wires and cables
	27.33	Manufacture of wiring devices
	27.51	Manufacture of electric domestic appliances
	27.90	Manufacture of other electrical equipment
	28.12	Manufacture of fluid power equipment
	28.13	Manufacture of other pumps and compressors
	28.25	Manufacture of non-domestic cooling and ventilation equipment
	28.29	Manufacture of other general-purpose machinery n.e.c.

<b>Emerging Industry</b>	<b>NACE</b>	<b>NACE Name</b>
	28.95	Manufacture of machinery for paper and paperboard production
	28.99	Manufacture of other special-purpose machinery n.e.c.
	32.50	Manufacture of medical and dental instruments and supplies
	46.46	Wholesale of pharmaceutical goods
	62.03	Computer facilities management activities
<b>Mobility Technologies</b>	22.21	Manufacture of plastic plates, sheets, tubes and profiles
	22.29	Manufacture of other plastic products
	24.10	Manufacture of basic iron and steel and of ferro-alloys
	24.53	Casting of light metals
	24.54	Casting of other non-ferrous metals
	25.30	Manufacture of steam generators, except central heating hot water boilers
	25.50	Forging, pressing, stamping and roll-forming of metal powder metallurgy
	25.61	Treatment and coating of metals
	25.62	Machining
	25.73	Manufacture of tools
	25.94	Manufacture of fasteners and screw machine products
	25.99	Manufacture of other fabricated metal products n.e.c.
	26.11	Manufacture of electronic components
	27.11	Manufacture of electric motors, generators and transformers
	27.12	Manufacture of electricity distribution and control apparatus
	27.32	Manufacture of other electronic and electric wires and cables
	27.33	Manufacture of wiring devices
	27.51	Manufacture of electric domestic appliances
	27.90	Manufacture of other electrical equipment
	28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
	28.12	Manufacture of fluid power equipment
	28.13	Manufacture of other pumps and compressors
	28.15	Manufacture of bearings, gears, gearing and driving elements
	28.22	Manufacture of lifting and handling equipment
	28.24	Manufacture of power-driven hand tools
	28.25	Manufacture of non-domestic cooling and ventilation equipment
	28.29	Manufacture of other general-purpose machinery n.e.c.
	28.30	Manufacture of agricultural and forestry machinery
	28.41	Manufacture of metal forming machinery
	28.49	Manufacture of other machine tools
	28.92	Manufacture of machinery for mining, quarrying and construction
	28.94	Manufacture of machinery for textile, apparel and leather production
	28.95	Manufacture of machinery for paper and paperboard production
	28.96	Manufacture of plastics and rubber machinery
	28.99	Manufacture of other special-purpose machinery n.e.c.
	29.10	Manufacture of motor vehicles
	29.20	Manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers
	29.31	Manufacture of electrical and electronic equipment for motor vehicles
	29.32	Manufacture of other parts and accessories for motor vehicles
	30.20	Manufacture of railway locomotives and rolling stock
	30.30	Manufacture of air and spacecraft and related machinery
	30.40	Manufacture of military fighting vehicles
	30.92	Manufacture of bicycles and invalid carriages
	46.69	Wholesale of other machinery and equipment

### Annex 3: Economic structure of regions in the Republic of Moldova

Average 2013-2014 shares for regional value added



Source: National Bureau of Statistics of the Republic of Moldova

## Annex 4: Specialisations of colleges (ISCED 5)

	Chisinau														Centre		South	North					Gagauzia		
	Centre of Excellence in Construction	Centre of Excellence in the Light industry	Centre of Excellence in Computer Science and information technologies	Centre of Excellence in Services and food processing	Centre of Excellence in Transport	Centre of Excellence in Energy and electronics	Pedagogical College "Alexei Mateevici" from Chisinau	Technological College of Chisinau	College of Ecology from Chisinau	Centre of Excellence in Economics and finance	Cooperative College of Moldova	ASEM National Trade College	Technical College of UTM	Mondo Stud-Art College	Pedagogical College "Vasile Lupu" from Orhei	Construction College from Hincesti	Industrial - Pedagogical College of Cahul	College of Light Industry of Balti	Polytechnic College of Balti	The Railway Technical College of Balti	"Mihai Eminescu" Pedagogical College from Soroca	Pedagogical College "Gheorghhe Asachi" of Lipcani	Pedagogical College of Comrat		
Architecture	+																								
Cadastré and organization of the territory	+															+									
Construction and operation of buildings and edifices	+															+									
Construction and exploitation of roads	+																								
Interior design	+																								
Property valuations	+															+									
Heat supply systems and gas, ventilation	+															+									
Technology of materials and articles of construction	+																								
Processing technology of wood	+																								
Modelling and technology of clothing, Leather and substitutes		+																							
Modelling, design and technology of Knitwear		+																	+						
Modelling, design and technology of garments from fabrics		+												+					+				+		
Managing Web applications			+							+								+			+				
Computers			+			+																			
Accounting			+							+	+	+						+							
Programming and analysis of program products			+							+								+							
Computer networks			+				+																		



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	Chisinau												Centre		South	North			Gagauzia		
Administrative and secretarial services			+																+	+	+
Public catering technology				+																	
Technical diagnosis of car transport					+																
Electrical and electronic equipment for cars						+															
Technical operation of machinery and Construction equipment, road maintenance							+														
The technical operation of the car transport								+													
Car traffic									+											+	
Social assistance										+										+	+
Choreography																				+	
Instrumental interpretation																				+	+
Pre-school pedagogy																				+	
Sport and Physical Training										+											
Canto																					+
Tourism																					+
Radio electronic household appliances																					+
Automation of technological processes																					+
Electro mechanics																					+
Mechatronics																					+
Metrology and compliance certification																					+
Machine building technology																					+
Postal communications																					+
Power Engineering																					+
Telecommunication technologies and networks																					+
electronics																					+
Machines, refrigeration systems and systems of air conditioning																					+
Teleradio communications																					+
Administration of data bases																					+
Technical operation of locomotives and wagons																					+
Automated systems in railway transport																					+









## Final draft report: Mapping of economic, innovative and scientific potential in the Republic of Moldova

Domenii/ General field of study	Specialitati/ Specialty / The study program at cycle I - Bachelor	Cod	Chisinau																		North	South		Ga- gau- zia													
			USM	UTM	ASE M	Uni med icine	UPS Crea ngă	UST	USE FS	Uni agra ra	IRIM	ULI M	UCC M	ATIC	USE M	Uni ASM	Aca d AMT AP	Aca d. Polic e	Aca d. milit ar	USP EE	IMI- NOV A	Pers pect iva -INT	Univ ersit atea Slav onă	ISPC A	STA TI- ART	US Bălți	US Cahul	US Tara clia	US Com rat								
exacte	Chimie/Chemistry	442.1	x					x							x																						
	Cihimie biofarmaceutică/ Biopharmaceutical chemistry	442.2	x																																		
	Matematică/Mathematics	443.1	x					x							x																						
	Matematică aplicată/Applied mathematics	443.2	x																																		
	Informatică/Computer science	444.1	x		x		x	x			x			x													x	x									
	Management informațional/ Informational management	444.2	x	x	x															x																	
	Informatică aplicată/Applied informatics	444.3	x	x	x						x									x																	
52 Inginerie și activități ingineresti/ Engineering and engineering trades	Tehnologia construcțiilor de mașini/ Mechanical engineering technology	521.1		x																																	
	Construcții de echip. și mașini agr./ Construction of agricultural machinery and equipment	521.2		x																																	
	Mașini și sisteme de producție/ Machines and production systems	521.3		x																																	
	Ingineria mecanică/ Mechanical engineering	521.4		x																																	
	Ingineria și manag. zăcăm., minerit/ Engineering and management of deposits, mining	521.5		x																																	
	Utilaje și tehn. de ambalare a produselor/ Machinery and technology for packaging products	521.6		x																																	
	Design industrial/Industrial design	521.7		x																																	
	Inginerie și management (pe ramuri)/ Engineering and management by fields	521.8		x										x													x	x					x				
	Inginerie inovațională și transfer tehn./ Innovation ingeneering and technological transfer	521.9		x																																	
	Mașini și aparate în industria ușoară/ Machines in light industry	522.1		x																																	
Mașini și aparate în industria alimentară/ Machines in food processing	522.2		x																																		
Mașini și instalații frig., sisteme de climat./ Refrigerating machinery and equipment, air-conditioning systems	522.3		x																																		



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			USM	UTM	ASE M	Uni med icine	UPS Crea ngă	UST	USE FS	Uni agra ra	IRIM	ULI M	UCC M	ATIC	USE M	Uni ASM	Aca d AMT AP	Aca d. Polic e	Aca d. milit ar	USP EE	IMI- NOV A	Pers pect iva -INT	Univ ersit atea Slav onă	ISPC A	STA TI- ART	US Bălți	US Cahul	US Tara clia	US Com rat									
54 Tehnologii de fabricare și prelucrare/ Manufac- turing and processing	Tehn.și managementul alim. Publice/ Technology and management of public nourishment	541.1		x	x							x																										
	Tehnologia produselor alimentare/ Food production technology	541.2		x								x																							x			
	Tehn. vin și a produs.obț. prin fermentare/ Technology of wine and fermented products	541.3		x																																		
	Ingineria produselor textile și din piele/ Engineering of textile and leather products	542.1		x																																		
	Design vestimentar industrial/ Industrial fashion design	542.2		x																							x											
	Tehnologia prelucrării lemnului/Woodworking engineering	543.1		x																																		
	Design și tehnologii poligrafice/ Printing design and technology	543.4		x																																		
55 Tehnologie chimică și bio- tehnologică	Tehnologie chimică/ Chemical technology	551.1	x																																			
	Tehnologia produselor cosmetice și med./ Cosmetic and medical goods technology	551.2	x									x																										
	Tehnologia farmaceutică/ Pharmaceutical Technology	551.3										x																										
	Biotehnologii industriale/ Industrial Biotechnologies	552.2		x																																		
58 Arhitect- ură și con- strucții/ Architec- ture and con- struction	Arhitectura/Architecture	581.1		x																																		
	Urbanism și amenajarea teritoriului/ Urban planning and landscaping	581.2		x																																		
	Design interior/Interior design	581.4		x																																		
	Construcții și inginerie civilă/Industrial and civil construction	582.1		x																																		
	Ingineria mat. și art. de construcție/ Engineering of construction materials	582.2		x																																		
	Căi ferate, drumuri, poduri/Railways, roads, bridges	582.4		x																																		
	Inginerie antiincendii și protecție civilă/ Anti-fire engineering and civil protection	582.5		x																																		
Ingineria și protecția apelor/ Engineering and water protection	582.6		x																																			





