National Development Strategy Croatia 2030 Policy Note:

Agriculture, Fisheries, and Food Processing in Croatia’s Food & Bio-Economy

July 2019
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Agriculture, Fisheries, and Food Processing in Croatia’s Food & Bio-Economy

1 Overview of the global trends and societal challenges

1.1. Shifting consumer demand and accelerating climate change will further shape the agri-food sector in Croatia in the next decade. During the last two decades, privatization of state-owned agricultural land, cooperatives, and manufacturing enterprises as well as the integration of input, product, credit, and services markets into the EU and global economy have been the dominant forces driving change in Croatia’s agri-food sector, which encompasses the agriculture, fisheries, and food processing sectors for the purpose of this report. While these forces will continue to shape the sector in the next decade, they will be further amplified by the increasing input supply and financial risks posed by accelerating climate change as well as shifting consumer demand in high value markets at home and abroad. In this context, the sector will also need to respond to current and future commitments undertaken by governments, businesses, and investors in the context of the Sustainable Development Goals (SDGs) and Paris Climate Accord. In May 2017, the EU set up a multi-stakeholder platform on the implementation of the SDGs in the EU, which are to be reflected in all future legislation. These combined market, environmental, and political forces point to a future of continued transformational change for the agri-food sector in Croatia, which will affect stakeholders across this sector and beyond.

1.2. Consumers in high value markets in the EU and beyond are shifting their expenditures towards safe, healthy, sustainable, and convenient products. Although price and taste remain the most important factors determining food choices in high value markets in the European Union (EU), the purchases of consumers with higher disposable incomes are increasingly driven by other factors and quality attributes such as food safety, expected health benefits, sustainability, and product origin. In the EU, this shift is largely the result of increased consumer awareness and information as well as higher incomes, which have led to growing consumer interest in food production systems, processing practices, supply chain traceability, and product origin. Meanwhile, the growing shares of urban consumers in the EU continue to seek convenience in food and beverage products to accommodate busy lifestyles. Moreover, they demand that these products are healthy and «functional». In other words, they demand fresh convenience foods that are natural, minimally processed, and provide customized health benefits beyond basic nutrition. In general, these ongoing consumer demand shifts towards higher value products in the

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1 7.431 Kuna/EUR and 1.138 USD/EUR exchange rates were applied for the purposes of this Policy Note.
2 Commission Decision on setting up the multi-stakeholder platform on the implementation of the Sustainable Development Goals in the EU C (2017) 2941 final
5 Ibid., p37.
EU, where most of the EU’s domestic production is consumed, put increasing pressure on the agri-food sector to further shift from a focus on quantity to quality in the forthcoming decades.

1.3. Recent EU market projections further confirm ongoing shifts in consumer demand. Although trends for individual crop and product categories vary, the European Commission projects that by 2030, in comparison to the 2016-2018 averages, (i) EU consumption of sugar will decline by 5%, driven by health initiatives and consumer preferences; (ii) EU cereal demand will increase by 4%, due to a small increase in feed demand and the growing importance of industrial uses; (iii) EU milk consumption will continue to decline (from 52 kg per capita in 2018 to 49 kg per capita by 2030), whereas EU consumption of value added dairy products will continue to grow (with cheese consumption expected to increase by 1.3 kg per capita); (iv) overall meat consumption will decline slightly in the EU-15 (by 1 kg per capita), whereas, except for pig meat, it will continue its upward trend in the EU-13 (by nearly 1 kg per capita); and, lastly, (v) EU consumption of specialized crops such as fruit and vegetables, olive oil, and wine will largely stabilize, and export growth will remain steady. In general, growth in alternative production systems, such as local, organic or other types of certified production systems, is expected to continue to be higher than that of conventional ones.

1.4. Agri-food producers and processors must increasingly differentiate and personalize their product offerings in response to shifting consumer demand and stricter regulations. As consumer demand diversifies in high value markets within the EU, agri-food product offerings must become more differentiated and personalized in order to meet individual consumer preferences. In a consumer demand-driven market environment, focusing production on undifferentiated commodities will become an increasingly non-competitive strategy. In addition, product offerings must change more frequently and adopt a stronger focus on niche and targeted products. Although this customization trend tends to benefit large food and beverage manufacturers with multiple product supply chains, it also creates space for smaller, ‘single play’ food and beverage manufacturers, buyers, and retailers to enter the market, especially when leveraging e-commerce platforms. Regardless of their size and business model, increased flexibility, integration, and coordination between producers, manufacturers, buyers, and retailers is required to accommodate individual consumer needs. The need for close coordination of R&D, advisory services, production, processing, quality management, and marketing activities across the agri-food value chain is further reinforced by the steady introduction of stringent public standards and regulations.

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7 Ibid.
9 Ibid.
governing the agri-food sector in the EU. In response to consumer/citizen demands, the EU has complemented its General Food Law (2002) with regulations focused on food hygiene (HACCP)\textsuperscript{10}, food information\textsuperscript{11}, and traceability\textsuperscript{12}. The EU has also expanded environmental regulations in regards to waste management\textsuperscript{13}, packaging\textsuperscript{14}, and renewable energy\textsuperscript{15}.

1.5. The modern retail sector has been consolidating to better coordinate supply chains, comply with strict legal and regulatory requirements, and meet diverse consumer demands. Over the past decade, Croatia has experienced a ‘retail revolution’ as food retailing shifts from small shops and grocery stores to supermarkets. Today, the food retail sector is dominated by regional/national retail groups, which have been growing steadily through “greenfield” investments as well as mergers and acquisitions. Much of this consolidation process is driven by competition from discount retailers. As part of the consolidation of the sector at large, which may partly reverse when incomes levels in Croatia rise further, retailers have been pursuing increased vertical and horizontal integration of their supply chains. In particular, retailers have been integrating wholesale buyers, aggregators, or large individual producers who are able to meet their specific volume, quality, and delivery requirements, in their supply chain. In addition, they have been investing in manufacturers with their own processing facilities and primary production. Increasingly, retailers manage their sourcing requirements and supply chain relationships through private standards and labels, which, in 2014 accounted on average for 30\% of the grocery retail market in 15 European countries.\textsuperscript{16} Private standards and labels allow retailers to set and enforce strict food safety and quality standards, which usually go beyond the legal requirements, while retaining price-sensitive consumers. Although the impact of private labels on the agri-food processing industry, in particular Micro-, Small-, and Medium-Sized (MSMEs) remains unclear, pressures to further upgrade and consolidate supply chains are generally increasing.

\textsuperscript{10} Regulation (EC) 852/2004 establishes general rules for hygiene of food stuffs.
\textsuperscript{11} Regulation (EC) 1169/2011 introduces a minimum font size and rules on nutrition labelling. It also includes mandatory labelling of the country of origin or place of provenance for certain pre-packed fresh meat.
\textsuperscript{12} Regulation (EC) No 178/2002 establishes basic traceability requirements. It requires food business operators to be able to identify from whom and to whom a product has been supplied (“one step back-one step forward traceability”), but they do not have to identify the immediate consumers when they are final consumers. In addition, they are required to have systems and procedures in place that allow for this information to be made available to the competent authorities, upon request. Although the Regulation does not compel food/feed business operators to establish so-called internal traceability systems, a recent SME-focused survey by the European Commission indicated that round 75\% of the respondents have an internal traceability system.
\textsuperscript{13} The revised Waste Framework Directive, adopted by the European Commission in 2008 and applied from 2010, aims to increase waste prevention and recycling and introduces a priority order of what constitutes the best overall approach in environmental waste legislation and policy. For example, waste prevention ranks higher than recycling, which in turn ranks higher than other types of recovery (e.g. energy recovery) and least preferred is disposal.
\textsuperscript{14} The Packaging and Packaging Waste Directive was established in 1994 to harmonise the various member state packaging legislation and by doing so facilitate functioning of the internal market by reducing barriers to trade. Alongside this goal, the legislation has the objective of preventing and reducing the environmental impact caused by packaging and packaging waste.
1.6. Climate change impacts and risk will have a profound impact on the agricultural sector.
The general consensus is that changes in temperature and precipitation, combined with the increasing occurrence of extreme weather events such as floods and droughts, will have significant impacts on the agricultural sector globally. Climate change impacts and risks depend on the magnitude and rate of global warming, geographic location, levels of development and vulnerability, as well as on the choices and implementation of adaptation and mitigation options. The specific projected climate change impacts and risks for the agri-food sector include biodiversity loss, lower yields, soil degradation, more pests and diseases, and forest fires, all of which may cause significant economic losses. Extreme weather events in Croatia such as droughts and hail have resulted in average losses of EUR 176 million per year from 2000-2007, amounting to 0.6% of national GDP, or 9.3% of the GVA generated by the agriculture, forestry and fisheries sector. In the future, crop models predict that maize production in Croatia, for example, will be negatively affected by climate change – resulting in losses of between EUR 6-16 million in 2050 and EUR 31-43 million in 2100. Other crops may also face problems due to a lack of access to irrigation water (see Section 3.4) and increased occurrence of droughts, especially in the mountain regions as well as the Adriatic and its hinterland during the Summer season. However, there may be advantages as well. For example, increased temperatures, when coupled with access to irrigation water, could result in increased yields for winter crops as they would be cultivated under milder winter conditions. At the same time, lower yields and economic losses may increase agricultural and food prices globally, which generate market opportunities for innovative and entrepreneurial producers. Finally, the agriculture sector in the EU can play an important role in mitigating climate risks given that agricultural activities in the EU-28 accounted for 10% of total EU greenhouse gas emissions for 2016. The vast majority of the EU-28 greenhouse gas emissions from agriculture come from three sources: agricultural soils (accounting for about half of agricultural emissions), enteric fermentation (about one third), and manure management (about one sixth).

1.7. Climate change impacts are expected to appear through a variety of vectors in the fisheries sector.
For capture fisheries and (to a lesser extent) marine aquaculture, climate change impacts primarily manifest themselves in rises in sea-levels, increases in sea temperature, acidification, changes in ocean current patterns, and extreme weather events. Marine fish populations in the Adriatic are already showing significant changes in behavior/migration patterns, some of which may be explained by climate change. It is expected that climate change will also change the growing season and rearing time for farmed fish such as tuna. In the context of tuna production systems, these changes may be further affected by changes in the status of wild stocks. In some cases, climate change impacts may require adaptation, but in other cases, it may increase the potential for aquaculture. In addition to the migration of existing species of commercial fish and the reduction in wild stocks, the risk of increases in invasive species is also higher. Crucially, producers’ and governments’ capacity to manage climate risks will determine how well production systems can adapt to climate change, with some of the smaller producers/fishers facing greater risks. Fisheries’ operations could also be modified and adapted to further mitigate their contribution to climate change.

18 EUROSTAT (2018)
20 Ibid.
21 Ibid.
22 Ibid.
2 Overview of developments in Croatia

2.1. Croatia’s primary and food processing sectors have generally demonstrated a negative growth performance in the past decades. Primary agriculture and fisheries constitute important economic sectors in Croatia, especially for rural and coastal communities. The gross value added (GVA) of the primary sector (including forestry) accounted for 3.9% of Croatia’s total GVA in 2017, which is significantly higher than the 1.6% of GVA the sector represents in the EU-28. However, in the past decade, the primary agriculture sector has recorded negative growth in terms of both gross output and value added (see Figure 1 and Figure 2 below). Gross value added declined by 4.4 percent each year on average between 2008 and 2017, while gross agricultural output declined by 3.7 percent in the same time frame. Meanwhile, the agriculture sector in the rest of the EU displayed generally positive growth with respect to the same indicators (see Figure 1 and Figure 2 below).23 Similarly, the overall value added generated by Croatia’s food, beverage, and tobacco manufacturing industry accounted for 3.3% of GDP in 2015 compared to EU-13 and EU-28 averages of 2.3% and 1.8% respectively.24 However, value added generated by Croatia’s food, beverage, and tobacco manufacturing industry declined on average 1.3 percent each year between 2011 and 2016, whereas in the same time frame, it increased on average 0.4 percent per year in the EU-28.25

Figure 1: Output of Agricultural Industry 2008-17

![Output of the agricultural industry - basic and producer prices, Croatia](image1)

![Output of the agricultural industry - basic and producer prices, EU-28](image2)

Source: Eurostat (2018)

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23 It must be noted that as of 2013 a methodological change occurred for Croatian statistics with respect to the addition of subsidies to the value of production. As a result of this change, the decoupled part of public support to farm income was redirected thus lowering the base for comparison with preceding periods. Similar a methodological change occurred for most other EU Member States several years earlier, which may to some extent explain the significant difference in performance during last five years. The same observation applies when analysing productivity measured as GVA per annual working unit (AWU).

24 FAOSTAT (2018)

25 Eurostat (2019)
2.2. Croatia’s capture fisheries sub-sector has performed negatively in terms of production values. Estimates of the share of fisheries in Croatia’s Gross Domestic Product (GDP) range between 0.2% and 0.7%. However, once the value of upstream and downstream activities is included, the contribution to national GDP is estimated to exceed 1%. Today, 79% of production derived is from capture fishing and the remainder results from aquaculture. The total catches of marine fish in Croatia has been slowly decreasing in recent years, from close to 80,000 Tons in 2014 to (a projected) 70,000 Tons in 2018, while the landed value has declined from an estimated EUR 60 million in 2014 to (a projected) EUR 54 million in 2018. Sardines and anchovies currently account for more than 80% of total catches volumes. Importantly, the value of landings is negatively impacted by the share of sardines and anchovies that are used as feed by the tuna ranching operations given that the prices per kilo of feed are much lower than for direct human consumption.

2.3. Croatia’s marine aquaculture sub-sector, on the other hand, has shown a notable growth trend in recent years. Total aquaculture production in 2016 amounted to about 17,300 Tons with a value of about EUR 109 million, approximately 5% more than the total value achieved in 2015. Marine aquaculture, which includes tuna ranching, farming of finfish, pelagic fish and shellfish, dominates Croatian aquaculture both in terms of annual production and in terms of total value. Total production in marine aquaculture in 2016 increased by 10% compared to 2015, amounting to over 13,000 Tons, with a total value of about EUR 101 million. In 2017, European seabass (40.6%), gilthead seabream (34.9%), Atlantic bluefin tuna (15.6%), Mediterranean mussel (6.6%), meagre (1.8%), and European

27 Ibid.
28 Croatia Ministry of Agriculture (2018)
29 Ibid.
30 Finfish farming involves a closed farming cycle (with the exception of Atlantic bluefin tuna), where the first phases take place in a hatchery, and then in floating cages at sea. Atlantic bluefin tuna represents a different type of activity, as it is on growing of wild caught specimens (8–10 kg in size) which are then grown to market size of 30 kg and larger for sale mainly to the Japanese market.
31 Croatia Ministry of Agriculture (2018)
flat oyster (0.4%) accounted for the entire production volume of Croatia’s marine aquaculture. The largest number of farms for white fish and tuna fish are in the Zadar region. Atlantic bluefin tuna production is limited by national quotas established under the International Commission for the Conservation of Atlantic Tunas (ICCAT) and its growth is limited by the slow-paced recovery rate of their stocks; on the other hand, the production of European seabass, gilthead seabream, meagre, and shellfish has recorded steady increases in production volumes in recent years (see Table 1 below).

Table 1: Mariculture Production, By Species (2008-2017)

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</thead>
<tbody>
<tr>
<td>European Seabass</td>
<td>2,500</td>
<td>2,800</td>
<td>2,800</td>
<td>2,775</td>
<td>2,453</td>
<td>2,826</td>
<td>3,215</td>
<td>4,075</td>
<td>5,310</td>
<td>5,616</td>
</tr>
<tr>
<td>Gilthead Seabream</td>
<td>2,000</td>
<td>2,200</td>
<td>2,400</td>
<td>1,719</td>
<td>2,173</td>
<td>2,978</td>
<td>3,655</td>
<td>4,488</td>
<td>4,101</td>
<td>4,830</td>
</tr>
<tr>
<td>Atlantic Bluefin Tuna</td>
<td>3,711</td>
<td>4,200</td>
<td>3,592</td>
<td>3,223</td>
<td>1,907</td>
<td>2,616</td>
<td>2,224</td>
<td>2,603</td>
<td>2,934</td>
<td>2,162</td>
</tr>
<tr>
<td>Meagre</td>
<td>2</td>
<td>39</td>
<td>24</td>
<td>44</td>
<td>60</td>
<td>67</td>
<td>125</td>
<td>253</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbot</td>
<td></td>
<td>1</td>
<td>7</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Common dentex</td>
<td>0.037</td>
<td>6</td>
<td>40</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Porgy</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sharpsnout Seabream</td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sea Trout</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>8,211</td>
<td>9,200</td>
<td>8,794</td>
<td>7,756</td>
<td>6,557</td>
<td>8,474</td>
<td>9,247</td>
<td>11,244</td>
<td>12,471</td>
<td>12,861</td>
</tr>
</tbody>
</table>

* Croatian Chamber of Commerce
Source: Croatia Ministry of Agriculture

2.4. The positive performance of Croatia’s marine aquaculture sub-sector is not replicated for key fresh aquaculture species. Production in fresh (inland) aquaculture decreased by 15% in 2016 to 4,034 Tons compared to 4,832 Tones in 2015 (see Table 2 below). In 2017, the most important species in fresh aquaculture in terms of production volumes were common carp (62.3%), rainbow trout (12%), silver carp (14.6%), and grass carp (5%). Both carp and trout production has experienced significant declines in recent years. Production of common carp, which is traditionally farmed in the region of Slavonia, was 50% lower in 2017 than in 2009. Trout farm production, similarly, was 679 tons in 2015, 467 tons in 2016, and 396 tons in 2017, decreasing by 283 tons from 2015.

Table 2: Fresh Water Aquaculture Production, By Species (2008-2017)

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</tr>
</thead>
<tbody>
<tr>
<td>Trout</td>
<td>2,752</td>
<td>2,071</td>
<td>2,492</td>
<td>2,489</td>
<td>1000*</td>
<td>351</td>
<td>378</td>
<td>675</td>
<td>467</td>
<td>395</td>
</tr>
</tbody>
</table>

* Croatian Chamber of Commerce
Source: Croatia Ministry of Agriculture

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32 Ibid
33 Central Bureau of Statistics of the Republic of Croatia
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| Common Carp | 3,201 | 4,088 | 1,816 | 2,891 | 2,484 | 2,100 | 2,891 | 2,484 | 2,100 | 2,039 |
| Grass Carp | 206 | 307 | 231 | 158 | 202 | 209 | 288 | 132 | 134 | 169 |
| Silver Carp | 149 | 157 | 73 | 85 | 88 | 127 | 194 | 174 | 135 | 73 |
| Big Head Carp | 547 | 599 | 309 | 522 | 296 | 303 | 519 | 295 | 472 | 477 |
| Tench | 8 | 4 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wels Catfish | 52 | 67 | 29 | 24 | 36 | 35 | 38 | 48 | 40 | 31 |
| Zander | 10 | 7 | 7 | 8 | 7 | 11 | 14 | 10 | 7 | 9 |
| Pike | 11 | 14 | 8 | 11 | 12 | 6 | 16 | 9 | 9 | 12 |
| Other Species | 191 | 174 | 82 | 84 | 81 | 92 | 78 | 81 | 71 | 66 |
| TOTAL | 7,127 | 7,488 | 5,048 | 6,283 | 4,209 | 3,235 | 3,807 | 4,832 | 4,034 | 3,272 |

*Croatian Chamber of Commerce
Source: Croatia Ministry of Agriculture

2.5. Croatia’s agri-food sector is characterized by large trade deficits, in particular with other EU countries. Since Croatia’s EU accession in 2013, the trade and marketing position of the agri-food sector has been evolving rapidly. Croatia's trade flows in agri-food products have increasingly been gravitating towards other EU countries; in 2017, 56% of agri-food exports were destined for EU countries (compared to 42% in 2008), and 86% of agri-food imports originated from EU countries (compared to 68% in 2008).\(^\text{34}\) Key agri-food trading partners in the EU included Germany, Italy, Slovenia, Hungary, Poland, and Austria.\(^\text{35}\) Trade flows in agri-food products with non-EU countries, on the other hand, remain heavily biased towards partners in the Western Balkan region.\(^\text{36}\) While export values of agri-food products have increased in aggregate, Croatia’s agri-food trade balance recorded a deficit of EUR 975.2 million in 2017.\(^\text{37}\) With the exception of a number of basic commodities\(^\text{38}\), which reached a trade

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\(^\text{35}\) UN Comtrade (2018) data indicate that in 2017 Slovenia (15.5%), Italy (14.7%), Germany (8.6%), Hungary (5.7%), and Austria (4.4%) constituted Croatia’s primary agri-food export markets in the EU (by value), whereas Germany (15.3%), Italy (10.6%), Hungary (10.4%), Slovenia (8.6%), and Poland (7.6%) represented Croatia’s main sources of agri-food imports in the EU.

\(^\text{36}\) UN Comtrade (2018) data indicate that in 2017 key non-EU export markets for Croatia’s agri-food products (by value) included Bosnia and Herzegovina (14.4%), Serbia (9.6%), FYR Macedonia (2.5%), Japan (1.6%), and Russia (1.4%), whereas key sources of non-EU agri-food imports included Serbia (3.6%), Bosnia and Herzegovina (1.8%), Brazil (1.3%), FYR Macedonia (1.2%), and Cuba (0.8%).


\(^\text{38}\) UN Comtrade (2018) data indicate that in 2017 trade surpluses were only recorded for “oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit, industrial or medicinal plants; straw and fodder” (EUR 109.8 million); “cereals” (EUR 95.7 million); “preparations of meat, fish or crustaceans, molluscs or other aquatic invertebrates” (EUR 95.7 million); and “tobacco and manufactured tobacco substitutes” (EUR 7.7 million).
surplus of EUR 6.7 million, Croatia experienced trade deficits across many agri-food product categories\(^{39}\) in 2017, in particular with respect to (non-commodity) primary products (EUR 524 million), processed products (EUR 200 million), and food preparations (EUR 188 million).\(^{40}\) The agri-food trade deficit was especially large with EU countries (EUR 1.38 billion), while a positive trade balance was registered with non-EU countries (EUR 406 million).\(^{41}\)

2.6. An overall positive trade balance is observed for the fisheries sector. Croatia’s fisheries sector is characterized by the import of higher quantities of fish with a lower market value and by the export of high-value products. Croatia thus recorded a trade surplus of EUR 46.3 million for fisheries and aquaculture products in 2017 compared to EUR 54.1 million in 2016. Japan is the most important destination for Croatian tuna, while within the EU, Italy and Spain are the main export destinations for fresh fish and salted products respectively. Although fresh (inland) aquaculture production is mostly sold on the national market, about 25% is exported to the EU market. Meanwhile, Croatia’s shellfish production is placed solely on the domestic market due to its inability to meet export market requirements and as a result of the limited output quantities preventing the achievement of economies of scale.

2.7. A lot of public resources are devoted to the agri-food sector. Over the current (2014-2020) programming cycle, under the EU’s European Maritime and Fisheries Fund (EMFF), Croatia’s overall financial envelope (including EU and national funds) amounts to EUR 348.7 million of which EUR 134 million is allocated to fisheries, EUR 73.6 million to aquaculture, EUR 43.1 million to Common Fishery Policy (CFP) data collection and control, EUR 22.2 million to Community-led Local Development (CLLD) Strategies, EUR 54 million to marketing and processing of fish products, and EUR 1.3 million to the protection of the marine environment.\(^{42}\) Meanwhile, Croatia’s overall financial envelope under the current EU Common Agricultural Policy (CAP) is nearly EUR 3.4 billion.\(^{43}\) Unlike most EU Member States, where direct payments (Pillar I) represent on average 75-80% of CAP expenditures, 57% of Croatia’s current CAP expenditures are channeled towards rural development (Pillar II), 40.5% to Direct Payments, and 2.1% to Market Measures.\(^{44}\) When national funds (i.e. co-financing of rural development, complementary national direct payments, state aids, and general services) are added to these EU CAP inflows, total Croatian public support to agriculture is currently around 1.3 percent of GDP (average for period 2014-2017), which is more than twice as high compared to the EU-28.\(^{45}\) Whereas combined

\(^{39}\) UN Comtrade (2018) data indicate that in 2017 the agri-food product categories recording the largest trade deficits included “meat” (EUR 298.1 million); “dairy produce, eggs, honey, and edible meat products” (EUR 173.9 million); “prepared animal fodder” (EUR 140.9 million); “vegetables and certain roots and tubers” (EUR 84.6 million); “preparations of vegetables, fruit, nuts or other parts of plants” (EUR 87.2 million); and “preparations of cereals, flour, starch or milk, including pastrycooks’ products” (EUR 74.3 million).


\(^{41}\) Ibid.


\(^{45}\) Public support to agriculture includes transfers to farmers (and other beneficiaries of agricultural policies such as companies, municipalities, schools, etc.) and general or public services in agriculture. Average share of public support to agriculture
Agriculture spending in the EU is continuously decreasing, from 0.8 percent in 2008 to (a projected) 0.36 percent in 2020, this trend is not yet evident in Croatia. Considering that direct payments in Croatia are still being phased over a 10-year transitional period, the share of combined spending in agriculture will likely remain high until 2022.

2.8. Croatia’s Rural Development Program (RDP 2014-2020) currently covers a broad range of intervention measures. The RDP (2014-2020) currently funds a total of 18 (out of 20) measures in support of all 6 EU rural development priorities and all 3 cross-cutting objectives for innovation, environment, and climate change mitigation and adaptation. The four largest rural development measures in budgetary terms under the RDP 2014-2020 are investments in physical assets (28.7%), payments in areas facing natural or other specific constraints (13.5%), basic services and village renewal (11.2%), and farm and business development (11%).

2.9. Capital investment gaps persist in Croatia’s agri-food sector, despite high public expenditure levels. The capital intensity of Croatia’s agri-food sector remains low compared to other EU countries. For example, the gaps in gross fixed capital formation per annual agricultural work unit and per hectare of utilized agricultural land remain large between Croatia and the EU-15, while gross capital formation levels have been declining in Croatia since 2008 (see Figure 3 below).

EU Member States draw up their rural development programs based on the needs of their territories and addressing at least four of the following six common EU priorities: (1) fostering knowledge transfer and innovation in agriculture, forestry and rural areas; (2) enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management; (3) promoting food chain organization, animal welfare and risk management in agriculture; (4) restoring, preserving and enhancing ecosystems related to agriculture and forestry; (5) promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sector; (6) promoting social inclusion, poverty reduction and economic development in rural area.
2.10. While the food processing sector’s technological levels are relatively strong/high, Croatia’s overall research, development, and innovation performance significantly lags behind other EU countries. Croatia is currently considered a “Modest Innovator” in Europe. Overall R&D expenditures in Croatia are low, accounting for 0.81 percent of GDP (with the business sector accounting for 0.41 percent), compared to 2 percent in the EU and 2.4 percent in the OECD countries. Croatia also lags behind its main regional and global competitors in agricultural R&D. In 2016, Croatia spent EUR 2 per inhabitant on R&D in agriculture, compared to an average of EUR 6 in the EU-28, EUR 7.6 in the U.S., EUR 15.5 in South Korea, and EUR 50 in Norway (see Figure 4 below).

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47 European Innovation Scoreboard 2017
2.11. The agri-food sector continues to account for a relatively high share of employment in Croatia. Croatia’s agriculture sector accounts for a high share of employment. In 2017, Croatia’s agriculture sector employed an estimated 7.5% of the workforce compared to 6.7% in the EU-13 and 4.25% in the EU-28. Meanwhile, Croatia’s fisheries sector acts as a significant source of income throughout the year for the country’s coastal communities, particularly within the islands. Overall, 7,559 Croatian vessels were registered in the EU fleet register in 2017. In 2016-2017 a number of vessels (in purse seine and demersal trawler fishery) exited the fleet with public aid. Any new capacity increase in the fleet (without public aid) is subject to prior capacity reduction (without public aid) of at least equal amount. It is estimated that approximately 14,000 people (fishermen, employees in companies involved in capture fisheries, farming and processing) are directly employed in the sector, and 11,000 people are

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48 World Development Indicators (2018)
indirectly involved (e.g. seasonal workers, especially in the segment of employees on fishing vessels). In 2017, the total number of aquaculture production centers, including both marine (158 farms) and freshwater (46 farms), was 204. Most of these farms are microscale enterprises, particularly family-owned farms. Overall, the food and beverage manufacturing industry in Croatia, which was comprised of 3,200 enterprises in 2015, generated 30% of total manufacturing turnover by value, employing 24% of the total manufacturing sector's workforce. Between 2008 and 2013, although value added segments of the agri-food sector (i.e. food and beverage, manufacturing) accounted for an increasing share of total paid sector employment, the total number of people in paid employment in the sector declined from an 62,142 to 55,748.

2.12. Poverty in Croatia has a strong rural dimension and remains linked to agriculture. A relatively large share of Croatia's population lives in rural areas; in 2017, 43% of the Croatian population lived in rural areas compared to 19.2% in the EU-28. However, rural areas in Croatia are characterized by a lower labor force participation rate than in other EU countries. In 2014, labor force participation in rural areas in Croatia was 51% compared to 56.7% in the EU-28 and 55% in the EU-13. In addition, poverty in Croatia tends to concentrate in rural areas. Recent poverty maps developed by the World Bank show that the highest geographical concentration of factors influencing the share of people at risk of poverty can be found in rural areas as well as small towns and settlements in the east and the southeast of the country, mainly along the borderline with Bosnia and Herzegovina (BiH) and Serbia (which are also the areas that were most affected by the Homeland War in the 1990s) (see Map 1 below).

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52 Ibid.
54 FAOSTAT (2018)
55 The headcount poverty rate for the Central and Eastern area is more than double the level of the other two areas. Poverty ranges from 24.9 to 34.3 percent in the Central and Eastern statistical region. In the Northwest statistical region, poverty ranges between 5.9 (Grad Zagreb) to 23.7 (Varazdinska) percent. In the Adriatic the range is less wide from 9.1 for Primorsko-goranska to 16.9 for Splitsko-dalmatinska. Furthermore, the Adriatic region has the most counties with poverty rates under 15 percent.
2.13. Areas where agriculture accounts for a comparatively large share of land use tend to be closely associated with high poverty rates. In this context, the income, employment, and poverty conditions in the Eastern Slavonia region stand out in particular. Whereas in Croatia’s richest county (Grad Zagreb), GDP per capita was more than EUR 15,000 in 2014, in the five counties within the Slavonia, Baranja & Srijem regions, GDP per capita was EUR 5,000 to 7,000 in each of the counties. In these same five counties, unemployment rates are between 19% and 29%, compared to a national average of 15%. As a result, Slavonia, Baranja & Srijem host almost one-third of Croatia’s unemployed population, but less than one-fifth of the total population. While the headcount poverty rate for Croatia was 16.3% in 2011, it was between 24.9% (Osijek) and 33.9% (Brod-Požavina) in the five Slavonian counties [using a poverty threshold of 60 percent of the median household consumption] (see Map 1 above). According to data from their Index of Multiple Deprivation, households in Slavonia, Baranja & Srijem exhibit deprivation on multiple dimensions (economic development, physical infrastructure, social services, health and education), and the situation has worsened between 2011 and 2015. Importantly, poverty in these regions appears to be rooted not only in unemployment, but also in income levels amongst the employed population (See Map 2 below, where the five counties are marked with a thick border).

Map 1: Poverty Headcount

Source: ‘Croatia Small-Area Estimation of Consumption-Based Poverty (Poverty Maps)’, World Bank 2017

56 The most recent data from Eurostat is for 2014.
2.14. Rural areas have been experiencing negative demographic pressures. Data for the last inter-census period (2001–2011) shows that the depopulation rate of rural settlements was nearly twice as high as the depopulation rate of Croatia in general. In addition, in no less than 45% of administrative units (administrative cities and municipalities) the population in rural settlements has been affected by significant ageing rates. In 2013, 30.3% of agricultural holdings were held by people older than 65 years and only 4.7% by people younger than 35 years compared to EU-28 averages of 31.1% and 6%, respectively. Clearly, these demographic changes constitute a limiting factor in the development of rural areas and contribute to a deepening of inequality between rural and urban areas.

2.15. The poor growth performance of Croatia’s agri-food sector in recent years has contributed to lower agricultural greenhouse gas (GHG) emissions and intensity levels. In the period between 2005-2015, Croatia decreased its overall GHG emissions by 19% and is now expected to reach its 2020 target with at least a 20% margin compared to 2005. By reducing GHG emissions by at least 25% compared to 1990, Croatia would easily comply with the common EU goal of reducing GHG emissions by 20% in the same time frame. In the context of the agri-food sector, overall agricultural GHG emission levels decreased by 9.2% in the period between 2005-2015, compared to a reduction of 15.7% in the EU-28 and a slight increase of 1% in the EU-13. In 2016, enteric fermentation (37.1%), synthetic fertilizers (20.7%), and manure management (17.8%) accounted for the bulk of agricultural GHG emissions in Croatia. Although the carbon intensity of Croatia’s economy is about 20% higher than the EU average, the carbon intensity of agricultural production in Croatia is significantly lower than EU averages (see Figure 5 below).

59 Ibid.
2.16. Croatia's agri-food sector continues to face a number of conservation challenges. Croatia is favored with abundant crop land and fresh water resources in the Slavonia region. Additionally, Croatia hosts high levels of biodiversity, encompassing 3 (Mediterranean, Continental, and Alpine) out of 9 recognized biogeographical regions in the EU, including vast plains in the east, dense forests, which cover more than 35% of the central territory, and more than 1,000 islands in the Adriatic. Croatia has also the second largest Natura 2000 network in relation to the country area in the EU with as much as 36.5% of Croatian land area covered by the Natura 2000 network. In 2013, all carp ponds were included in the Natura 2000 network for conservation of specific habitats and important bird species. This has led to frequent conflicts between conservation and fish farming objectives due to material damages to carp pond production from piscivore wildlife, especially birds. Realistic management plans, elaborating detailed conservation measures for target species and habitat types, the means for implementation and possible monitoring programs, are urgently required. Meanwhile, the status of fish stocks in the open sea of the Adriatic is still relatively uncertain, especially in the area around the island of Jabuka (a natural spawning area and nursery habitat of commercial fish stocks) and in the Ecological and Fisheries Protection Zone (ZERP). Since October 2013, the exploitation of sardines and anchovies in the nearby fishing area has been managed by the Plan for Small Pelagic Stocks.

2.17. There also remains scope to further improve the natural resource management performance of the agricultural sector. While Croatian agriculture is characterized by low pesticide use

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60 In 2018 (NN 58/2018) the Croatian government issued the newest “Ordinance on the conditions, criteria and method of award of state aid for damages from different kinds of birds and other animals on carp ponds in 2018”. The subject of the state aid is the granting of non-refundable funds for damages and/or lost profits on carp ponds. The amount of support depends on the the production area, but also on the production per area unit. The production of all fish species and breeding categories of 500 kg/ha must be achieved for the minimal amount of grant. In order to stimulate production, the maximum amount of HRK 5,772.55 /ha is granted on condition of achieving production of 1000 and more kg/ha of all species and breeding categories.


62 All vessels actively fishing for anchovy and sardines in the so-called GSA17 fishing area are subject to the provisions of the Plan for Small Pelagic Stocks. In terms of effort management, the vessels fishing actively for small pelagics have a limit of activity of 20 days per month with a total maximum of 180 days per year, with an additional 144 days for vessels specifically targeting anchovies.
compared to other EU countries, fertilizer use remains slightly higher (see Table 3 below) despite the important reductions in (nitrogen) fertilizer use achieved since 2008. Today, Croatia’s soil health is facing a number of threats; in particular, gross nitrogen and phosphorus balances have been steadily declining since 2010, while stabilizing in other EU countries. In addition, Croatia has experienced higher soil erosion by water (especially along the Adriatic coast) and lower average carbon content in the top soil compared to EU-13 and EU-28 levels. Furthermore, despite the availability of abundant freshwater resources, agricultural producers have limited access to irrigation water (see Section 3.4.), and although water quantity is not a restricting factor, it is a point of concern in vulnerable areas in Croatia, which represent 9% of the total territory of Croatia. One of the most critical water quality parameters in vulnerable areas is the nutrient content of nitrogen and phosphorous. In the period 2012-2015, as much as 30% of fresh water resources in vulnerable areas in Croatia was classified as eutrophic and 64% as hypertrophic. Between 2009–2012, the number of river body streams in vulnerable areas with unsatisfactory conditions rose by nearly 70% and 20% for nitrogen and phosphorous respectively. Nearly all (97%) nitrogen discharged to the Croatian aquatic environment originates from agriculture. Over time, if left unaddressed, the deterioration of water quality conditions in vulnerable areas could pose a growing threat to water quality conditions in non-vulnerable areas in Croatia as well.

Table 3: Croatia performs poorly in key drivers of agricultural factor productivity.

<table>
<thead>
<tr>
<th>Variable</th>
<th>EU28</th>
<th>Croatia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Averages from 2011 to 2015</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer Consumption (Kg per ha of arable land)</td>
<td>165.56</td>
<td>169**</td>
</tr>
<tr>
<td>R&amp;D Expenditure as % of GDP</td>
<td>2.00</td>
<td>0.79</td>
</tr>
<tr>
<td>Net Capital Stock per worker (constant 2010 US$)</td>
<td>111,733</td>
<td>33,051</td>
</tr>
<tr>
<td><em><em>Panel B</em> Effect on agricultural labor productivity if a country would close a quarter of the gap in:</em>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer Consumption (Kg per ha of arable land)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>R&amp;D Expenditure as % of GDP</td>
<td>11.9%</td>
<td></td>
</tr>
<tr>
<td>Net Capital Stock per worker (constant 2010 US$)</td>
<td>25.1%</td>
<td></td>
</tr>
</tbody>
</table>

* Estimates are obtained utilizing coefficients from column 2 of and figures from Panel A, which were used to calculate the relative change (%) required for each covariate to close a quarter of the gap compared to EU-28 levels.

** Average from 2012 to 2016.

Source: World Bank Staff using World Development Indicator data.
3 Assessment of the main developmental challenges and opportunities for Croatia

Main challenges:

Low Productivity

3.1. Croatia’s agri-food sector must overcome major labor productivity gaps. Labor productivity in Croatia’s agricultural sector declined by 1.9% per year on average between 2008 and 2017 when measured by gross agriculture output per annual work unit (AWU) and by 2.6% per year on average when measured by gross value added per annual work unit (AWU) (see Figure 6 below). Meanwhile, labor productivity gradually increased when measured against the same performance indicators in both the EU-15 (by 2.8% and 3.6% per year on average in terms of GAO/AWU and GVA/AWU respectively) and EU-13 (by 4.8% and 6.0% per year on average in terms of GAO/AWU and GVA/AWU respectively). Today, Croatia’s labor productivity levels achieve less than 20% of the levels achieved in the EU-15.

Figure 6: Labor Productivity Trends

Source: Eurostat (2018)
3.2. Similarly, land productivity in Croatia significantly lags behind the rest of the EU. Today, average yields of the major crops and livestock products in Croatia do not match EU-15 levels and this yield gap has not changed significantly over the past decade (see yield gap analysis included in the Annex). Notable exceptions are primary vegetables (e.g. cucumbers, tomatoes), maize, and wheat, which have been closing their yield gaps with the EU-15 (with primary vegetable yields now exceeding the EU-15 average). However, land productivity in Croatia, when measured by gross agriculture output and gross value added per utilized agricultural area (UAA), declined on average, between 2008 and 2017, by 5.2% and 6.2% per year respectively (see Figure 7 below). Meanwhile, land productivity slightly improved when measured against the same performance indicators in both the EU-15 (by 1.9% and 2.8% per year on average in terms of GAO/UAA and GVA/UAA respectively) and EU-13 (by 1.3% and 2.4% per year on average in terms of GAO/UAA and GVA/UAA respectively). Today, Croatia’s land productivity levels remain higher than the EU-13 levels, but the EU-13’s land productivity gap with Croatia has been narrowing rapidly over the past decade. Meanwhile, Croatia’s land productivity gap with the EU-15 has been widening to nearly 50%.

**Figure 7: Land Productivity Trends**
3.3. Low labor and land productivity in Croatia have been mainly driven by low capital investments and R&D expenditures. A regression analysis conducted by the World Bank shows that there is a positive and statistically significant relationship between agricultural labor productivity in Southeastern Europe and spending on agricultural capital accumulation, R&D, and fertilizer use. For Croatia, the analysis shows that the national agri-food system is characterized by low R&D expenditures and a large capital gap compared to EU-28 averages (see Table 3 above). Concomitantly, land productivity in Croatia is constrained by the prominence of low value commodities in Croatia's production structure; in 2010, about two thirds (65%) of arable land was devoted to the production of low value cereals (of which a majority was dedicated to maize production).

3.4. Insufficient access to irrigation water constitutes a major impediment to improving land productivity in Croatia. In addition to land administration and consolidation issues and small farm sizes (see Sections 3.6 and 3.10), land productivity in Croatia is further compounded by the limited reach, reliability, and sustainability of agricultural irrigation systems. Despite the adoption of a National Irrigation Program (NAPNAV) in 2005, less than 10% of irrigable land (in 2012) and less than 1% of agricultural land (in 2013) were actually irrigated in Croatia. A number of policy and institutional factors constrain the development of agricultural irrigation systems in Croatia, including a bias towards low value commodity production (which limits the financial and economic feasibility of developing a large irrigation system), insufficient organization of water users to manage and operate irrigation systems, slow permitting processes at the county level, and diverse competing water resource management priorities at the level of the National Water Agency (Hrvatske Vode).

3.5. A range of factors also constrain the productivity of the fisheries sector. Key factors include (i) an outdated (vessels are, on average, 35 years old) and relatively small fishing fleet (comprising 8% of the total fishing fleets in the Mediterranean and Black Seas) that was not updated before the country joined the EU and became bound by the CFP; (ii) poor diversification of species and products (with the
bulk of products focused on just two species, anchovies and sardines); (iii) limited technological development; (iv) limited marketing strategies; and (v) a lack of product branding and licensing. Weak processing and cooling/storage capacities and limited production of products with a higher added value, together with market uncertainty and high production costs are additional challenges experienced by the sector. Meanwhile, some high-value freshwater fish species that are now grown in polyculture with carp in nonsignificant quantities (e.g. pike perch, largemouth black bass, European catfish, perch) could be grown in indoor recirculating production systems in a controlled environment, which would shorten the production cycle and improve product safety and quality.

Weak Enabling Environment for Agri-Food Businesses

3.6. Various institutional factors affect the development of agricultural land markets in Croatia. On average, Croatia is estimated to have among the lowest average price levels for arable land in the EU, with only Romania and Estonia recording lower levels in 2016. In general, however, effective land governance and mobilization of agricultural land for investments in Croatia is currently constrained by institutional fragmentation, sector-driven land policies and spatial planning, multiple legal regimes governing land status and ownership restrictions, weak enforcement of contractual obligations, ambiguous land classification rules, and incomplete and outdated land management systems. Furthermore, although the majority of agricultural land is privately owned, a significant share (around 30%) remains publicly owned. State-owned agricultural land is typically assigned to long-term leases and rarely sold. However, the allocation of state-owned agricultural land suffers from inefficient and lengthy administrative procedures, mainly due to inconsistencies between land cadaster and land registration information. In addition, restrictive selection criteria are often applied, including requirements regarding land protection, farm practices, and even the type of agricultural activity. At the same time, however, ex-post controls to verify whether the restrictive selection criteria are actually adhered to, once state-owned agricultural land has been allocated, remain weak. A new Law on Agricultural Land was adopted by the government (and has been in force since March 9th, 2018) to address some of these institutional constraints. Most importantly, the Law abolished the Agency for Agricultural Land and transferred the authority for allocating state-owned land to the local level.

3.7. Low labor costs are offset by low labor productivity. Labor costs in Croatia are lower than the EU-28 average, as well as those in most EU-15 countries (see Figure 8 below). However, labor costs in Croatia are higher than in most EU-13 countries and low labor productivity (see above) currently offsets low labor costs. As a result, this cost advantage has not translated into comparative advantage, particularly for agricultural commodities. In addition, there is a growing concern regarding shortages of labor in Croatia’s agricultural sector. Access to the EU labor market and the ongoing structural transformation of the agri-food system have resulted in significant migration from rural areas in Croatia, which has reduced labor availability and may eventually lead to increasing labor costs. The availability of seasonal labor has also been affected by alternative employment opportunities available to seasonal workers, including seasonal jobs along the Adriatic coast (during peak tourism season) and in EU countries where wages are higher.

67 Ibid.
3.8. While large agri-food producers and processors have relatively good access to capital at subsidized rates in Croatia, small- and medium-sized operations often remain excluded. During the period 2011-2016, agricultural lending has stagnated in Croatia. According to the Croatian National Bank, the share of agricultural loans in the overall banking system at the end of 2016 was around 6% (reaching EUR 683 million) where approximately 1/3 of total loans were of a short-term nature and 2/3 of a long-term nature. In general, limited investment opportunities for domestic savings, easy access to external funding (EU, European Investment Bank (EIB), and European Investment Fund (EIF)), and extensive public support for agricultural credit development through different public institutions (in particular the state-owned Croatian Bank for Reconstruction and Development (HBOR) and the Croatian Agency for SMEs, Innovations, and Investments (HAMAG-BICRO)) have contributed to high levels of liquidity in Croatia’s banking system and relatively low commercial interest rates (3%-5%) for agricultural loans. There are some micro/small loan programs with lower interest rates (0.5%-1%) that focus on smaller farmers, but resources available for these programs remain limited.72

70 The HBOR directly grants agricultural loans (covering primary production, processing and fisheries) or it lends funds to banks who in turn offer loans to clients. Loans are for both short term (working capital) financing and longer term, although HBOR has more orientation towards longer term investments. Interest rates are 3% for agricultural loans to the final beneficiary/client. When HBOR lends to commercial banks it charges 1% and commercial banks take full risk when they on lend. HBOR uses guarantees from HAMAG-BICRO. Guarantees for agricultural loans cover 50% of the outstanding principal with a one-time fee of 0.8%. Guarantees for start-ups cover 80% on a loan by loan basis.
71 The Croatian Agency for SMEs and Investments (HAMAG–BICRO) offers loans, guarantees, and direct support to SMEs.
72 A micro/small loan program by HAMAG-BICRO (up to EUR 25.000 is micro and between EUR 25.000-50.000 is small) has Kn 24 million (or EUR 3.2 million) for disbursement at low interest rates (0.5%-1%)
3.9. A number of demand- and supply-side factors inhibit access to capital for micro-, small- and medium-sized agri-food producers and processors in Croatia. On the demand side, small producers and MSMEs tend to have poor financial literacy, weak business planning and management capacities, as well as insufficient linkages to modern agri-food value chains and a lack of knowledge about their financing or business management requirements, all of which limits their engagement opportunities with credit markets. On the supply side, small producers and MSMEs in the agri-food sector have difficulties accessing financing mainly due their lack of equity capital and because guarantee programs demand adequate collateral, which is often difficult to provide due to unresolved land title and building permit issues. Collateral constraints are further amplified by the fact that Croatia currently lacks laws and regulations governing movable collateral and the pledging of future receipts. Combined with their small-scale nature, low productivity, poor record keeping, weak business planning and management, and insufficient value chain linkages, small producers and MSMEs are perceived as high-risk, low return investment opportunities by commercial lending institutions. As a result, agricultural loans and guarantees tend to concentrate on larger producers and agribusinesses, especially field crops such as cereals and oil seeds (about EUR 450 million) and livestock such as poultry and pig farming (about EUR 100 million). Out of the total financing investments for agriculture, field crops account for 66% of total financing, pigs/poultry for another 15%, and all the other sectors account for just under 20% of the total financing. On average, livestock farm loans reach EUR 45,000, of which EUR 10,000 is for working capital and the rest is for investments. For field crop, farms loans average about EUR 20,000, with 2/3 of this amount allocated to short term working capital and the rest to long term capital. In other sectors, including horticulture, wine, milk, other grazing livestock, and other permanent crops, loans remain well below EUR 5,000 on average per farm.

3.10. Small and medium-sized agri-food producers and processor have difficulties seizing new opportunities despite unrestricted access to high value domestic and EU markets. The Croatian agri-food sector is still characterized by fragmented production with lots of small producers and weak producer organization. Within commercial fishery, 92% of the fleet of vessels less than 12 meters in length are used for small-scale coastal fishing. Similarly, 52% of agricultural holdings in Croatia manage less than 2 hectares and 70% of the farms manage less than 5 hectares, while, only 0.23% of registered producers in Croatia in 2016 were organized into cooperatives. On the other hand, the agri-food processing industry is very concentrated, as 62% of total revenues are generated by 1.26% of enterprises. Fragmentation in primary production, combined with limited competition in agri-food processing, constrains the development and expansion of well-functioning agri-food value chains in Croatia. Agricultural producers and processors benefit from unrestricted access to high value domestic and EU markets. However, increased investment and coordination between (smaller) producers and processors are needed to tackle increasing market competition. This includes joint measures related to improving productivity, efficiency, product quality, and meeting regulatory compliance levels (e.g. food safety, traceability, occupational health and safety, etc.), especially for small and medium-sized operations. For example, access to regional markets is critical for smaller producers who do not have proper resources to store and transport their produce to consumers and agro-processors. However, access to these markets is relatively constrained for producers in the Dalmatia and, to a lesser extent, Slavonia regions, which increases transaction costs for producers operating with extensive crop lands within these regions (see Map 3 below).

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73Ibid.
75European Investment Bank (2018)
76European Investment Bank (2018)
3.11. Croatia’s weak logistics performance constrains the development of agri-food chains in high value markets. Agri-food value chains encompass activities for primary production, processing, and distribution, as well as a range of support services. It is often these services that help create the most value in the agri-food sector. In this context, a recent analysis conducted by the World Bank under the Competitiveness Reinforcement Initiative determined that the frequency of delivery necessary for a given food product is the differentiating factor for profitability in the agri-food sector. In general, items such as fresh food products that require frequent delivery often have a higher value and allow profit retention at the level of producers as opposed to profiting typically dominant retailers. For products with a short shelf life, quick logistics with just-in-time linkages along the agri-food value chain are key to successfully compete in high value agri-food markets. However, Croatia currently performs poorly on a range of logistics-related indicators. In 2013, the share of products lost to breakage or spoilage during shipping to domestic markets was higher than the global average and was more than twice that of (non-OECD) High Income Countries (see Figure 9 below). The World Bank’s Logistics Performance Index (LPI) also provides insights into the performance of the agri-food sector; it recorded that Croatia’s 2016 index score (3.16) was well below that of other European countries (see Figure 11 below).

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3.12. Just-in-time logistics critically depend on the emergence of Third-Party logistics (3PL) providers. As a result and/or an indicator of Croatia’s logistic underperformance, only 30–40% of Croatian companies outsource logistics functions compared to the EU average of 70%. However, competitiveness is impossible without Third Party logistics (3PL) providers who are able to provide chilled multi-compartment lorry truck or airfreight solutions and other coordination services to agri-food chains. Sophisticated 3PL providers can also coordinate purchase orders (and cancellation of purchase orders).
orders) with a set of food producers, thus serving as the intermediary between the group/cluster and the retail sector. Having an advanced logistics industry will also be necessary to provide a diversity of solutions for cold chain challenges related to the transportation of agri-food products. For example, often, shipments to buyers in destinations markets require producers to hire logistics providers for ‘Less than Truck Load’ (LTL) shipments. LTL shipments that combine several producers into one truck help make shipments economically viable for smaller producers. However, such LTL business models only work if there is (i) a substantial cadre of firms exporting to fill the volumes, and (ii) a competent 3PL provider that can manage that function. Where such LTL shipments exist, there is also a need for a logistic hub (run by 3PL operators) that can palletize and re-package disparate products by the destination.

**Fragmented Agricultural Knowledge & Innovation System (AKIS)**

3.13. Croatia’s AKIS encompasses a relatively diverse range of public and private actors. Agriculture Knowledge and Innovation Systems (AKIS) facilitate the exchange of knowledge and support services between diverse actors in rural and coastal areas. In optimal form, the system includes a variety of actors such as public and private advisors, educators, researchers, civil society experts, and various agri-food chain actors that provide producers with relevant training, technical advice, information, and learning networks around innovations in technology, production practices and management systems, and regulatory compliance requirements. Today, a relatively diverse set of public and private actors make up Croatia’s AKIS. In general, publicly funded entities dominate Croatia’s AKIS with, until recently, the Croatian Agriculture and Forestry Advisory Service (CAFAS) – a specialized public agency responsible for advisory activities in agriculture, rural development, and fisheries – occupying one of the most influential positions. Other key actors include educational and research institutes, technology centers, and laboratories, as well as food industry and input providers, who are increasingly investing in research and innovation and often provide highly specialized advice to their cooperants or customers. On the other hand, civil society actors (such as NGOs and farmers association) and private advisors are the least developed components of Croatia’s AKIS.

3.14. While relatively diverse in range, capabilities in Croatia’s AKIS are fragmented and its actors poorly connected. Functional cooperation between public and private AKIS actors in terms of joint research, education, and advisory activities to improve agri-food production is very limited or non-existent. Basic and applied research activities are undertaken to some extent, but they are localized and there is no system for sharing or transferring acquired knowledge and innovations to producers or other stakeholders in the system. For example, in the framework of the existing Council for Agriculture Research (VIP), which brings together representatives of agriculture agencies, faculties and research entities around applied research projects, there is no system in place for disseminating VIP project results...
to the farm advisors in the form of technical packages. Similarly, while performance data and information regarding agriculture production and fisheries is collected by different entities at both the national and producer level, it is not available or easily accessible for AKIS actors. Meanwhile, activities in the fisheries sector there is currently no (aquaculture and fishery) technology and innovation center that supports experimental research, demonstration, and vocational training.

3.15. The impact of recent AKIS reforms decisions remains uncertain. At the end of 2018, the government of Croatia decided to close the CAFAS as a public agency and to merge it with the Ministry of Agriculture. In addition, reform plans are being developed for the existing technology and innovation centers for livestock (Croatian Agriculture Agency) and crop (Croatian Center for Agriculture, Food, and Villages) calling on improvements whereby staff, assets and activities would be partially transferred to the MoA and partially merged into a new Croatian Agency for Agriculture and Food. Furthermore, discussions have been launched to replace the current system for applied research projects (VIP) with so-called European Innovation Partnership (EIP) projects that promote an Interactive Innovation Model and are supported under the current CAP program. Operational Groups (OGs) are the principal constituent element of EIPs as they enable cooperation between different AKIS actors with interrelated interests, knowledge and experience (such as farmers, advisors, researchers, enterprises or non-governmental organizations) in undertaking a specific, practical innovation project. Finally, the MoA has launched the process for certifying private advisors, which would be governed by the newly established Chamber of Agronomy. While these reform decisions could help redefine public and private sector roles in exchanging knowledge and support services between AKIS actors, their combined impact in terms of developing a well-functioning AKIS in Croatia remain unclear at this stage.

EU Policy Reforms

3.16. The funding levels and strategic directions of the EU’s common agricultural policy are changing as part of the next budget programming period. On June 1st, 2018 the European Commission published its proposals for modernizing and simplifying the CAP.82 The proposals envision a future CAP focused on nine common objectives that emphasize the policy’s role in leading a transition towards a more sustainable agriculture, accommodating digital innovations, and contributing to the economic and socio-cultural dynamism of rural areas.83 To achieve these objectives, the European Commission’s proposal for the multiannual financial framework (MFF) 2021-2027 incorporates EUR 365 billion for

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82 The proposals, which build on the European Commission’s Communication on the Future of Food and Farming presented in November 2017, include draft regulations regarding CAP Strategic Plans (a proposed new way of working covering direct payments to farmers, rural development support and sectoral support programs), the Single Common Market Organization (CMO), and the financing, managing and monitoring of the CAP.

83 The future CAP will focus on nine general objectives with “modernising the sector by fostering and sharing of knowledge, innovation and digitalization in agriculture and rural areas, and encouraging their uptake” pursued as a cross-cutting objective: (i) Support viable farm income and resilience across the Union to enhance food security; (ii) Enhance market orientation and increase competitiveness, including greater focus on research, technology and digitalization; (iii) Improve farmers’ position in the value chain; (iv) Contribute to climate change mitigation and adaptation, as well as sustainable energy; (v) Foster sustainable development and efficient management of natural resources such as water, soil and air; (vi) Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes; (vii) Attract and sustain young farmers and facilitate business development in rural areas; (viii) Promote employment, growth, social inclusion and local development in rural areas, including bio-economy and sustainable forestry; (ix) Improve the response of EU agriculture to societal demands on food and health, including safe and nutritious food produced in a sustainable way, as well as animal welfare.
the CAP (in current prices). The proposal represents a reduction of around 5% for the CAP budget in current prices and a reduction of around 12% in constant 2018 prices without inflation. The proposal includes EUR 265.2 billion for direct payments, EUR 20 billion for market support measures (EAGF), and EUR 78.8 billion for rural development (EAFRD). An additional EUR 10 billion will be available through the EU’s Horizon Europe research program to support research and innovation in food, agriculture, rural development and the bio-economy.

3.17. Changes in the strategic directions of the Common Fisheries Policy (CFP) and Integrated Maritime Policy (IMP) are also being prepared under a new European Maritime and Fisheries Fund (EMFF). The new EMFF will continue to support the European fisheries sector towards more sustainable fishing practices, with a particular focus on supporting small-scale fishermen. It will also help unleash the growth potential of a sustainable blue economy for a more prosperous future for coastal communities. For the first time, it will also contribute to strengthening international ocean governance for safer, cleaner, more secure, and sustainably managed seas and oceans. Finally, the European Commission seeks to reinforce the environmental impact of the EMFF with a specific focus on protecting marine ecosystems and an expected contribution of 30% of its budget to climate change mitigation and adaptation, in line with the commitments agreed under the Paris Climate Agreement.84

3.18. Future support programs financed under the CAP and CFP/IMP must be re-oriented towards addressing context-specific challenges and delivering impacts. Future CAP Strategic Plans and EMFF Operational Programs developed by each Member State will have to define a strategy and explain how national actions will contribute to reaching common EU policy objectives. The Strategic Plans and Operational Programs will also set targets for reaching the policy objectives, with an annual monitoring of progress to enable the achievement these targets through standardized performance indicators. Furthermore, advice on all requirements and conditions at the producer level that stem from each country’s CAP Strategic Plan will have to be provided to farmers through a system of farm advisory services (FAS), which will be fully embedded in their Agricultural Knowledge and Innovation System (AKIS). According to the latest CAP legislative proposals, Member States would be required to outline as an integral part of their CAP Strategic Plan how the design, functioning and financing of their AKIS contributes to the cross-cutting objective of fostering and sharing knowledge, innovation and digitalization in the agriculture sector and rural areas. Finally, under the CAP, Member States will be required to dedicate at least 30% of their rural development budget to environment and climate measures, following the new green architecture of the CAP, which is driven by an enhanced system of “conditionality” that links income support for farmers to the application of environment- and climate-friendly farming practices.

Opportunities for development:

Strategic Market Segmentation

3.19. There are significant growth opportunities for the agri-food sector in both domestic and EU market segments. Domestic growth opportunities are driven by higher household expenditure levels.

low fish consumption (compared to other EU countries), and a growing tourism sector. Growth opportunities in EU markets, on the other hand, are driven by consumer demand shifting towards high value agri-food products (see Section 1.2). Considering these macro-level growth trends, agri-food producers and processors in Croatia will have to closely align their capacities and offerings with consumer needs and demands in strategic segments, especially in regards to high value fresh fruits, vegetable, and livestock products where Croatia is currently competitive (e.g. peppers, raspberry, sour cherry, hazelnut, pigs, pork meat, and sheep meat).  

3.20. Overall, global food markets can be segmented both by the consumer market (demand side) and the product category (supply side). Specifically, global food markets can be segmented in three macro-typologies of consumer markets; (i) the Daily Use Segment of consumers who simply consume food in order to meet their basic caloric needs; (ii) the Convenience Segment of consumers who have limited time to prepare food or knowledge of how to do so; and (iii) the Indulgence Segment of consumers who are often consuming food items to engage in an “experience”. The indulgence segment is quite profitable and includes organic food, specialty products, and origin labels. However, the barriers to entry for this segment are high and the spillover effects are more limited. Alternatively, high levels of profitability are often found in the fresh convenience segment, one that also holds poverty reduction potential through linkages to smaller producers in lagging regions. At the same time, global food markets can be segmented into two product types; (i) Fresh or perishable products that must be delivered in a timely and frequent basis; and (ii) Stockable products that can be delivered at infrequent intervals because they have longer shelf lives. Crucially, the longer the shelf life of an item, the more commoditized and tradeable it becomes. This commoditization allows producers around the world to deliver products prior to spoilage, thus allowing the entire world to potentially participate. These segments require high product volumes and huge economies of scale to capture margin. On the other hand, items which necessitate more frequent delivery (perishable or fresh items) compete only with other producers that have access to sophisticated logistics providers, which creates higher margins for those engaged in production. Box 1 below provides a summary of the different segment characteristics.

87 Fresh products involve a range of agricultural produce that can be sold in raw (e.g. Adriatic squid, oysters) or prepared (e.g. fresh pasta packaged and sold in supermarkets) forms.
89 While some of these margins are accounted for in increased logistic costs, some of the increased margins are also given to producers.
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Box 1: Summary of Segment Characteristics

<table>
<thead>
<tr>
<th>Frequency of Delivery</th>
<th>Daily Use</th>
<th>Convenience</th>
<th>Indulgence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
</tr>
<tr>
<td>In-Frequent</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
</tr>
</tbody>
</table>

**Daily-use Markets**: *Daily Use* describes a segment of users that typically consume food in order to meet their basic caloric needs. While *basic* consumers in this segment are not overly interested in quality and are more driven by cost, there is also a cadre of *discerning* customers that are more focused on food trends and on the quality of food in their daily use. Those consumers have the income and ability to choose between different products with purchasing criteria that may include nutritional content, color, texture, taste, fashion, and grade.

**A1: Fresh Daily Use**

- **Product**: Fresh products for daily use typically describe a range of non-differentiable food products, such as basic meats (pork), cereals (corn), fruits (strawberries), and vegetables (tomatoes). Products in this group generally come packaged in some raw form and perish within some limited timeframe.

- **Typical Companies**: Where markets are highly integrated into global trade, products are likely to be traded in bulk and sold through supermarkets. Animal products in this segment – such as chicken or pork – are often commoditized and sold through large international firms such as Tyson's or Vion. Where markets are not integrated through logistic networks, such supply is more localized and more likely to be sold through local markets.

**B1: Stockable Daily Use**

- **Product**: Products in this segment are non-perishable and require only infrequent delivery to consumer outlets since their shelf life is quite long. Typically, products in this category can include a range of dry goods such as cereals, canned and bottled goods (e.g. sunflower oil), dehydrated foods (raisins) and certain types of deep-frozen foods (frozen fish).

- **Typical Companies**: Given the pressures of globalization, companies operating at various stages of the value chain in this segment tend to be quite large. In the upstream examples of companies include Louis Dreyfus, Archer Daniels Midland Company, while downstream companies often resemble Del Monte, Nestlé, Intersnack, etc.

**Convenience Markets**: *Convenience Segment* consumers often have limited time to prepare good quality food or they lack the knowledge of how to do so. Consumers in this segment tend to be quite demanding in terms of quality, taste and nutritional content and are willing to pay a premium price for convenience and ease of use.

**A2: Fresh Convenience**

- **Product**: In this segment, final products usually consist of a combination and mix of different fresh products from different suppliers, put together in a comprehensive meal. Therefore, typical products in this segment include things like fresh packaged pasta, pre-marinated fresh meat, pre-cut and mixed fruit, etc.

- **Typical Companies**: Companies in this segment tend to be small or medium size enterprises (e.g. Qizini or Padifoods) since product differentiation is key to survival. They also tend to invest in anticipating different trends in food consumption and often maintain intensive cooperation with logistics companies and retailers.

**B2: Stockable Convenience**
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- **Product**: Convenience-based items that have longer shelf-lives (and less frequent delivery) include individual packaged and pasteurized yogurts, microwaveable "TV dinners ", etc.

- **Typical Companies**: Companies in this segment also tend to be quite large given the economies of scale. This segment is also largely dominated by brands (e.g. DiGiorno frozen pizza) owned by large global multinationals, such as Nestlé.

**Indulgence Markets**: The Indulgence Segment caters mostly to high income buyers that are seeking a special "experience" in the consumption of food. These indulgent consumers are often directed to individuals who are not only interested in the quality of a product, but also the story behind that product and the experience of how it is consumed.

**A3: Fresh Indulgence**

- **Product**: Products in this segment tend to be quite niche and require intensive curation in primary production since quality and product differentiation are key. Typical products in this segment include things like raw oysters, truffles, macaroons, etc.

- **Typical Companies**: Companies in this segment are often small or medium sized enterprises. However, they often must invest significant amounts in specialized production capital and in specialized training for their labor force.

**B3: Stockable Indulgence**

- **Product**: Products in this category are often items that have long and complex production cycles that require specialized knowledge and which are exceptionally difficult to replicate. Typical products in this category often include a number of specialty items like fine/premium wines (as opposed to basic wines), high end tea, gourmet olive oil, etc. Unique and individualized branding are quite important for products in this segment, which often create high barriers to entry.

- **Typical Companies**: Companies in this segment tend to be medium to large sized enterprises with limited output. The sales channel for this segment are usually specialty goods stores, luxury restaurants/bars, the tourism sector, some high-end supermarkets. The producer themselves sometimes also serve as the sales channel directly to the consumer. Infrequent delivery in this segment makes the competition global and only the firms with the right mix of quality, branding, sales and marketing can count on long-term success.

Source: World Bank

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3.21. Consumption of organic food products continues to grow rapidly in the EU. In the EU, the retail market for organic food increased from EUR 10 billion to EUR 27.1 billion between 2004 and 2015, representing average annual growth above 15% in contrast to the average annual growth rate in grocery retail markets of around 2% to 3% in the period 2006-2012. Today, the EU is the second largest market for organic products in the world after the United States. The largest EU markets for organic products in 2015 were Germany (EUR 8.6 billion), France (EUR 5.5 billion) and the UK (EUR 2.6 billion).

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90 “The global food industry leaders, such as Nestlé and Unilever, have recently adopted a similar orientation to the low-income consumers of developing countries, as these have increasingly adopted modern retail shopping habits. The thesis of this research on the trans-nationalization of retailing is that the same system of quality and logistical standards is now redefining the conditions of access to the domestic markets of developing countries. If, as we have seen, the small farmer has difficulty in integrating into non-traditional export chains, he now also faces the same problems in accessing domestic, urban markets. Retailers are tending to set up their own distribution centers based on selected suppliers. These new circuits, in turn, have a knock-on effect, leading to the modernization of traditional wholesale and outdoor markets, closing the door on those who are unable to adapt. The speed and extent of these changes in developing countries have been challenged” (da Silva, Baker, et al. 2009).
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3.22. Specialty products and origin labels can further differentiate national product offerings in high value markets. In light of the customization trend in consumer demand and the accompanying focus on more niche and targeted products, specialty products and origin labels such as Geographical Indications (GIs) have strong growth potential and provide an additional avenue to differentiate products in high value markets at home and in the EU. A recent EU study showed that 10 out of the 13 GI-products analyzed obtained a price premium compared to the corresponding standard good, but the price difference was less clear for producers who supply raw (versus processed) agricultural products.93

3.23. The EU regulations governing GIs demand collective action by producers for the registration and implementation of GIs. GIs allow organized local producers to collectively define and manage production and processing quality standards, defend their products’ reputation, and communicate their value to consumers. They also help agri-food manufacturers exploit the diversity and manage the fragmentation that characterizes the agri-food sector in Croatia. International experience shows that success critically depends on strong collective action and self-organization by producers, clear geographical and social boundaries, shared knowledge and awareness of GI processes, supportive national legislation, close coordination between all supply chain stakeholders (i.e. producers, manufacturers, government institutions, and donors), implementation of credible certification and control systems, use of protected trademarks, and information and promotion campaigns to consumers. Croatia has extensive experience as regards GIs. Most recently, Mali Ston Bay oysters were awarded “Protected Designation of Origin” (PDO) at the national level in 2018 and mussel farmers have started the registration process for mussels from Novigrad Sea. One of the most successful aquaculture producers has, in the past, tried to initiate a “Made in Croatia” label but found that all producers were benefitting, which diluted the value of the brand. So far, the socio-economic impact of GIs has been limited in Croatia, mainly due to weak producer organizations, marketing capabilities, and internal monitoring and control systems.

Digital Agriculture

3.24. Digital Agriculture (DA) solutions could drastically improve productivity, efficiency, and environmental sustainability across the entire agri-food sector. DA is an umbrella term that encompasses a variety of cutting-edge technologies ranging from mobile phone applications to highly automated farm machinery equipped with a vast array of sensors coupled with satellite and drone imaging. DA is proving to be a powerful force for the transformation of agri-food systems, enabling the inter-connection of data objects that are context-sensitive and can be identified, sensed and controlled remotely. At the farm level, for example, precision agriculture decision-support tools based on site-specific satellite imagery can help optimize fertilizer applications, weeding, spraying, and harvesting, leading to lower production costs and better environmental impacts. A broad range of stakeholders and processes across the agri-food system are impacted by this transformation process,

92 For example, the number of registered importers of organic produce in the EU grew from less than 500 to more than 3000 in the period 2009-2012.
including farmers, food processors, logistic services, waste management, and consumers. The profound changes in access to data, information, and relationships enabled by DA could simultaneously enhance agricultural factor productivity, increase food chain efficiency, reduce environmental impacts, and strengthen resilience to climate change across the agri-food system. Notwithstanding these benefits of DA, however, it remains unclear how rapidly DA applications will diffuse and how they will affect jobs and income distribution in the rural space.

3.25. Digital marketplaces could help agri-food producers and processors forge direct links with buyers and consumers. While digitalization has been a growth driver in the distribution of food and beverages, the agri-food industry is generally lagging somewhat behind in leveraging e-commerce platforms. Digital marketplaces need to be emphasized in future reforms; agri-food and beverage manufacturers could use online marketplaces as effective tools to sell on a business-to-business or business-to-consumer basis. E-commerce and social network platforms enable manufacturers to reach and communicate to businesses and consumers directly, build brand loyalty, and gain feedback about existing and new products faster and more cost-effectively.\textsuperscript{94} Digital marketplaces also create new opportunities for the market entrance of smaller, single focus agri-food and beverage manufacturers. Finally, they offer the possibility of production-on-demand, which may help the agri-food industry to micro-manufacture on the basis of buyer and consumer demands.

3.26. Croatia is well-positioned to take advantage of ongoing developments in digital agriculture technologies. Croatia is investing over EUR 100 million to deploy the Next Generation broadband across the country, focusing particularly in rural areas where services were previously not available. These investments will significantly increase future connectivity and lower the costs to access and transmit data. In addition, Croatia has access to key resources and markets in the EU. This mitigates potential scale issues related to Croatia’s small internal market and opens up opportunities to export DA products and services to other markets in the EU and beyond. Croatia is also highly ranked in terms of consumers’ readiness to use internet services. In 2017, only 4\% of the population in Croatia reported that they had not ordered goods or services over the internet because they lacked the necessary skills to do so, compared to an average of 6\% in the EU-15 area, 14\% in Spain, and 18\% in Portugal.

3.27. Croatia has access to significant funding opportunities under the EU’s Common Agriculture Policy (CAP) and the EU’s Cohesion Policy to both strengthen its innovation system and support DA. As noted earlier, the European Commission’s proposal for the 2021-2027 programming cycle of the CAP puts significant emphasis on fostering knowledge, innovation and digitalization in agriculture and rural areas to enhance the agricultural sector’s market orientation and competitiveness. Similarly, a key driver for developing Research and Innovation Strategies for Smart Specialization (RIS3) under the EU’s Cohesion Policy are the maximization of synergies between the EU’s Structural Funds and the EU’s Research and Innovation Program (Horizon 2020/Horizon Europe) and promotion of a strategic and integrated approach to harness the potential for smart growth and the

knowledge economy. In this context, Croatia’s agri-food sector is one of the most promising sectors for RIS3 along with Croatia’s cross-cutting ICT sectors. Finally, the future development of digital agriculture in Croatia is facilitated by the recently founded National Council for Digital Economy and the prominent role assigned, within national strategies, to digital technologies to reform the fields of education, science, technology, innovation and industrial development.

**Diversification of Rural and Coastal Economies**

3.28. Leveraging the agri-food sector’s multiple functions and cross-sector linkages could be a powerful driver for diversified rural and coastal economies. The agri-food sector has significant potential to unlock broad-based growth and decent jobs in rural and coastal areas. Food is not only an industry, but also a social, cultural and health commodity, which has the power to connect people of various ages, cultures, and social backgrounds with local communities and landscapes. The agri-food sector is also one of the most cross-cutting sectors that links with, among others, the areas of biodiversity conservation, biotechnology and pharmaceuticals, bioenergy, packaging, ICT, research and education, transport and logistics, tourism, health and wellbeing, natural resource management, sustainability, cultural and creative industries. Thanks to the primary sector’s backward and forward linkages to other sectors, primary sector growth affects economic activity across the agri-food value chain and beyond. The multiplier effects of changes in agricultural output and food processing appear to be particularly strong in Croatia (see Table 4 below). However, there has been a sizable decline in the food processing multiplier since 2000, attributable to the decrease of food processing purchases from domestic primary agriculture, which dropped from 28.2 percent of total inputs in 2000 to 17 percent in 2014. Meanwhile, in Croatia (in line with global trends), the employment multiplier of food processing (2.61) is relatively high, but that of primary agriculture is low (1.43).

Table 4: Multiplier estimates: Agriculture and Food Processing, Croatia

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>TYPE I Output Multipliers - Backward</strong></td>
<td></td>
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<tr>
<td>Agriculture</td>
<td>1.657</td>
<td>13</td>
<td>1.647</td>
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<tr>
<td>Food Processing</td>
<td>1.983</td>
<td>1</td>
<td>1.785</td>
</tr>
<tr>
<td><strong>TYPE II Output Multipliers - Backward</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>5.320</td>
<td>5</td>
<td>5.189</td>
</tr>
<tr>
<td>Food Processing</td>
<td>5.481</td>
<td>3</td>
<td>4.927</td>
</tr>
</tbody>
</table>

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95 Smart specialization encourages innovation and experimentation through an entrepreneurial discovery process, by allowing entrepreneurial actors to demonstrate the most promising areas for future regional development through trial and error and experimentation.

96 The National Council for Digital Economy aims to establish an active partnership of all relevant stakeholders in the development of the digital economy by defining the objectives and priorities for the creation of a single digital market.


99 In 2014, Type I output multiplier (1.647) implies that production of US$ 1 million of primary agricultural output generates an additional economic stimulus of US$ 0.647 million in other sectors. The multiplier effect of food processing is even higher (1.785) in Croatia. However, the food processing multiplier has declined since 2000 (from 1.983 to 1.785).
3.29. The linkages between the agri-food and tourism sectors are particularly relevant in the context of Croatia given that the tourism sector contributes significantly to the national economy. In addition to supplying fresh and healthy food, agriculture and fisheries can add value to a vibrant tourism sector. In general, the OECD has reported that food plays an important role in the development of tourism regions and industries given that it often comprises 30% or more of tourist expenditures and this money is regularly spent directly on local businesses. As a result, tourism’s local economic impact can be important not only for businesses that directly provide food for tourists (such as hotels, restaurants and attractions), but also throughout the agri-food value chain, especially if the food provided is supplied locally. Furthermore, a recent report released by the World Tourism Organization stresses the importance of food as immaterial cultural heritage, which can enhance the reputation and improve the differentiation of destinations that have a rich food culture. Specialty foods are thus becoming an essential component in motivating destination choice and are selectively replacing geographical location as part of the destination marketing mix for many visitors. By linking food tourism, which is perceived as a high-value market, to other products such as cultural and natural heritage sites, Croatia could provide a comprehensive tourism package, including advertisements for disadvantaged rural and coastal areas, capitalizing on the potential linkages to traditional fishing activities which benefit from a strong “folkloric” image.

3.30. The agri-food and other natural resource-based sectors could also help promote sustainable and circular bio-economies in rural and coastal areas. The EU defines bio-economy as the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy. The reliance on biological resources makes the agriculture, aquaculture, fishery, and forestry sectors central to the bio-economy. By introducing circular systems linked to these sectors, bio-economies can help add value and

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### Output Multipliers - Forward

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>1.675</th>
<th>22</th>
<th>1.507</th>
<th>23</th>
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<tbody>
<tr>
<td>Food Processing</td>
<td>1.170</td>
<td>49</td>
<td></td>
<td>1.128</td>
<td>45</td>
<td>-3.55%</td>
</tr>
</tbody>
</table>

### Direct & Indirect Value-Added Coefficients

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<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>0.829</th>
<th>12</th>
<th>0.806</th>
<th>19</th>
<th>-2.76%</th>
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<tbody>
<tr>
<td>Food Processing</td>
<td>0.792</td>
<td>18</td>
<td></td>
<td>0.715</td>
<td>32</td>
<td>-9.70%</td>
</tr>
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</table>

### Direct & Indirect Employment Coefficients

<table>
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<tr>
<th></th>
<th>Agriculture</th>
<th>139</th>
<th>2</th>
<th>52</th>
<th>2</th>
<th>-62.48%</th>
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</thead>
<tbody>
<tr>
<td>Food Processing</td>
<td>82</td>
<td>15</td>
<td></td>
<td>24</td>
<td>28</td>
<td>-70.43%</td>
</tr>
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</table>

### Value Added Multipliers

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<tr>
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<th>Agriculture</th>
<th>1.738</th>
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<th>1.729</th>
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</thead>
<tbody>
<tr>
<td>Food Processing</td>
<td>2.491</td>
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<td>2.230</td>
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<td>-10.48%</td>
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### Employment Multipliers

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<tr>
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<th>1.346</th>
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<th>1.432</th>
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<th>6.38%</th>
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</thead>
<tbody>
<tr>
<td>Food Processing</td>
<td>3.413</td>
<td>2</td>
<td></td>
<td>2.612</td>
<td>3</td>
<td>-23.47%</td>
</tr>
</tbody>
</table>

Source: World Bank staff calculations

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101 Ibid., p7.
improve efficiencies within existing value chains, create income diversification opportunities, minimize waste and GHG emissions, reduce dependencies on external inputs (in particular fossil fuels), and facilitate cross-sectoral synergies and innovations in rural and coastal “blue” economies. By clustering different bio-based production systems and industries into functional territorial units, sustainable and circular bio-economies can promote agglomeration economies that help regenerate rural areas, while reconciling demands for sustainable agriculture, fisheries, and forests, food security, with the sustainable use of renewable biological resources for industrial purposes.

3.31. Sustainable and circular bio-economies offer numerous diversification opportunities to rural and coastal areas in Croatia. Given its quality agricultural land, forest, and fresh water and marine resources, Croatia has significant potential to transition existing value chains in rural and coastal areas into sustainable and circular bio-economies. Moreover, recent technological developments are creating increasing opportunities to use waste and residues from agriculture, fishery, aquaculture, and forestry value chains to raise productivity, lower costs, reduce risks, produce value added products, and develop new markets. For example, in the context of Integrated Multi-Trophic Aquaculture (IMTA), the byproducts (including waste) from an aquatic species are used to fertilize a plant or feed another aquatic species.  

3.32. Although a National Bio-Economy Strategy is absent in Croatia, the country is already engaged in bio-economy activities. In September 2018, the European Commission announced an updated EU Bio-Economy Strategy aimed at improving and scaling up renewable resources to address climate change and sustainable development challenges at both the local and global level, while promoting jobs, growth, and investment across the EU. To these ends, the European Commission is expected to launch a series of measures in 2019 centered on (i) scaling up and strengthening bio-based sectors; (ii) rapidly deploying bio-economies across Europe; and (iii) protecting ecosystems and understanding the ecological limitations of the bio-economy. Croatia’s current bio-economic activities are largely focused on biomass production from crops, followed by production of primary woody biomass and grassland systems. Biomass uses, on the other hand, are concentrated mostly in the food and feed sub-sectors, followed by bio-materials (forestry products) and bio-energy. The wood industry in Croatia mainly consists of primary wood processing, wood furniture, parquet, flooring, and wood-based panel production. There are no pulp mills or integrated paper mills in the country. In general, bio-economy activities remain largely uncoordinated and disconnected in Croatia, which limits the potential benefits that a holistic, integrated approach may offer. For example, the bio-energy sector is an important user of both agricultural and forestry residues. However, biomass energy production has largely been driven by “energy producers” as opposed to integrated agricultural-forestry-energy systems that actively involve farmers and private forest owners who would benefit from this alternative economic activity.

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102 Aquaponics, fractionated aquaculture, integrated agriculture-aquaculture systems, integrated peri-urban-aquaculture systems, and integrated fisheries-aquaculture systems are all variations of the IMTA concept.

103 Key measures proposed by the European Commission include the establishment of a EUR 100 million Circular Bio-Economy Thematic Investment Platform to bring bio-based innovations closer to the market and de-risk private investments in sustainable solutions, and facilitate the development of new sustainable bio-refineries across the EU.

104 Key measures proposed by the European Commission include (i) the development of a strategic deployment agenda for sustainable food and farming systems, forestry, and bio-based products; (ii) the establishment of an EU Bio-Economy Policy Support Facility for EU Member States under Horizon 2020 to develop national and regional bio-economy agendas; (iii) the launch of pilot actions for the development of bio-economies in rural, coastal and urban areas (e.g. waste management or carbon farming).

105 Key measures proposed by the European Commission include (i) the implementation of an EU-wide monitoring system to track progress towards a sustainable and circular bio-economy; (ii) the enhancement of the knowledge base specific to bio-economy areas by gathering data and ensuring better data access through the Knowledge Centre for the Bio-Economy; and (iii) the provision of guidance and promotion of good practices on how to operate in the bio-economy within safe ecological limits.
The biodegradable plastics market in Croatia is another promising opportunity that can trigger multiple benefits if future bio-economy development activities are coordinated appropriately.

**Improved Agri-Food System Resilience**

### 3.33. Practices promoted under organic and climate-smart production systems can deliver important environmental benefits, while strengthening climate resilience

Organic and climate-smart production, which systematically integrates climate change concerns in the planning and development of sustainable agricultural, fisheries, and aquaculture production systems, offer a variety of environmental benefits and can be an important part of a suite of strategies to improve the resilience of the agri-food system in Croatia. In particular, agricultural practices such as crop rotations, conservation tillage, cover cropping, composting, and integrated pest and weed management have widely demonstrated positive impacts on environment and climate resiliency in the form of improved soil quality and ecosystem services, as well as ground and surface water. Additionally, an eco-system approach to fisheries and aquaculture increases aquatic and marine systems’ potential to absorb and recover from change, protects fish stocks, improves the efficient use of natural resources, supports intersectoral collaboration, and promotes integrated monitoring and information systems that incorporate scientific and local knowledge. In general, awareness of the environmental sustainability aspects of marine fishing has been growing in Croatia thanks to close impact monitoring and research collaborations between scientific institutions and local fishing communities. Croatia has reached a unique level of collaboration between government institutions, fisheries scientists and fishing cooperatives, whereby fishermen are taking an active role in identifying the elements of the fleet targeted for capacity reduction. The expansion of organic and climate smart production systems and the integration of successful sustainability management practices into conventional production systems are important next steps for strengthening the overall environmental performance and resilience of Croatia’s agri-food system.

### 3.34. Integrated landscape and seascape management can further strengthen resilience across the agri-food system and beyond

Integrated landscape management approaches are garnering new interest as scientists, policymakers, and local stakeholders recognize the need to increase the multifunctionality of rural and coastal landscapes for food production, livelihood improvement, and ecosystem conservation. Such approaches have been attempted in many parts of Europe, Latin America, the Caribbean, and Africa in the framework of bio-economy initiatives in order to help manage ecological, social, and economic interactions among different parts of the landscape, realize positive synergies among relevant interests and actors, and/or to mitigate negative trade-offs.

### 3.35. Integrated landscape management approaches are implemented by multi-stakeholder groups that operate on the basis of participatory, community-based processes for dialogue, planning, negotiating and monitoring management decisions

These multi-stakeholder groups jointly define landscape management objectives in a manner that encompasses the full range of goods and services needed from the landscape. Field, farm, fishing, and forest management practices are thus designed to contribute to multiple objectives, including human well-being, food and fiber production, climate change mitigation, and the conservation of local biodiversity and ecosystem services. Through improved coordination of natural resource uses and industrial activities in the landscape, they reduce the risk of cross-sector impacts and the contradictory effects of single-focused policies. In addition, they allow special areas/natural resources, including the ecosystem goods and services they provide (e.g. flood prevention, carbon sequestration, nutrient retention, etc.), to be identified for management within the

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context of total landscapes rather than addressed as isolated entities. As a result, integrated landscape management approaches could be a powerful lever for advancing both the EU’s bio-economy and climate change, environmental, and territorial development agendas. Though not as developed, the integrated seascape approach is similar, with a view to better integrating diverse, and sometimes conflicting natural resource uses, in marine and coastal ecosystems. This approach recognizes that not all oceanic economic sectors are compatible and aims to give decision-makers the tools they need to manage trade-offs between these uses. In this context, an accurate valuation of all benefits must be provided, including non-monetary values provided by some critical coastal ecosystems.

3.36. **Risk management or risk transfer instruments such as index-based insurance can help manage residual climate risks.** Index-based insurance differs from traditional indemnity insurance, where payouts are explicitly based on the measured loss for a specific client. Instead, in index insurance, farmers can purchase coverage based on an index that is correlated with those losses, such as the amount of rain during a certain time span (weather-based indices) or average yield losses over a larger region (area yield indices). Payouts are then triggered when this index falls above or below a pre-specified threshold. This means that index insurance is not designed to protect farmers against every peril, but is instead designed for situations where there is a larger scale or regional risk (in the case of area yield insurance), or a well-defined climate risk (in the case of weather-based index insurance) that significantly influences a farmer’s livelihood.

3.37. **Traditional indemnity insurance products in Croatia are based on individual farm losses and focus on specific, named, natural perils.** Typically, compensation kicks in once losses on individual farms exceed 20% of the sum insured and beyond that threshold the insurance companies compensate for the full amount of losses. However, insurance is on individual farms and relies on individual farm loss assessments. Moreover, droughts are not covered by insurance as they are considered very risky, especially since most farmers do not have irrigation. Importantly, agricultural risk management is directly supported through two measures under the current Rural Development Program (2014-2020). Despite the generous subsidization of agricultural insurance premiums, which range between 2-7% of insured value for crop production (though there are EU limits on premium subsidies per beneficiary), only 7-8% of registered farmers in Croatia are currently insured. However, those insured represent approximately 50% of production in Croatia, which highlight how agricultural insurance is primarily used by large farmers in Croatia. When it comes to addressing catastrophic or disaster risks, the government provides free compensation to those affected following the declaration of a specific disaster area coming from local authorities. However, budget allocations for compensating catastrophic losses are often not sufficient. For example, in 2018, losses due to catastrophic natural events reached Kn 1 billion, while the budget only had provisioned Kn 20 million.

**Access to Investment Financing**

3.38. **New technologies have the potential to improve producers’ access to investment finance.** Across the globe, the growth of mobile financial services has mirrored the growth of cellphone use, enabling users to send and receive funds, open and manage saving accounts, and obtain loans using a

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107 Firs of all, Measure 17 of Croatia’s current Rural Development Program provides a 70% premium subsidy for agricultural insurance. This measure started in 2016 and has EUR 43-44 million allocated for premium subsidies during the rural development program period. 85% of the budget for subsidies comes from the EU funds while 15% comes from the national budget. Secondly, Measure 5 deals with catastrophic events and natural disasters. Declarations of natural disasters are made at the local, county level, and funding is used to compensate people that suffered losses in areas affected by these catastrophic events. There are Kn 20 million allocated annually from the national budget for natural disaster compensations, while EUR 30 million is provided through EU funds for the entire program period.
network of local agents. More recently, following the arrival of smartphones, (big) data analytics is increasingly supporting credit risk assessments and guides insurance, financing, and advisory services offered by financial institutions. Several international startups (thus far serving primarily urban markets) now offer financial services to previously un-bankable customers using smartphone data (e.g. call data records, mobile money data, social media data). This data is processed by algorithms, generating a predictive score of a person’s likelihood to repay a loan. Meanwhile, agro-ecological zoning and crop suitability mapping enables lenders to understand how risky a farmer’s production is, based on weather and land conditions in the areas where they are located. Using geo-referenced information, lenders are thus able to target loans to those farmers that are growing crops that can thrive under local agro-ecological conditions.

3.39. EU funds could be leveraged to attract increased private investments in Croatia’s agri-food sector. Most EU funds for the agri-food sector are channeled to producers and processors through dedicated funding mechanisms implemented in the context of the EU Common Agricultural Policy, Common Fisheries Policy, and Integrated Maritime Policy. Dedicated funds include (i) the European Agricultural Fund for Rural Development (EAFRD), which covers a broad range of rural development measures; (ii) the European Agricultural Guarantee Fund (EAGF), which encompasses income support to farmers (in the form of direct payments) as well as market measures to mitigate price instability in agri-food markets; and (iii) the European Maritime and Fisheries Fund (EMFF). Investments in agriculture tend to be highly correlated with grants offered through the EAFRD. However, EU funds channeled through other Structural and Investment Funds, including the European Regional Development Fund (ERDF), European Social Fund (ESF), and Cohesion Fund (CF), can be leveraged to support the development of the agri-food sector and rural and coastal areas as well. By closely aligning its policy, regulatory, and incentive frameworks with EU programming requirements, while prioritizing country-specific needs and priorities, Croatia could leverage these EU resources to boost private investments in agri-food sector productivity, improve the business environment in rural areas, stimulate innovation, and address environmental and climate concerns.

108 European Investment Bank (2018)
4 Prioritized policy recommendations

4.1 General Policy Recommendations

4.1.1. Future policies should aim to accelerate the structural transformation of Croatia’s agri-food sector. Considering the high shares of GDP and employment that still depend on the primary sector, the low levels of productivity, the existing rural/coastal-urban income divide, and the well-known link between poverty and agriculture, the structural transformation of Croatia’s agri-food sector can be classified as ‘incomplete’. This in turn limits its potential contribution to improved growth, employment and income levels in rural and coastal areas. Future policy priorities should therefore be geared towards addressing key factors constraining the acceleration of Croatia’s agri-food sector’s structural transformation, in particular low productivity levels. In a global context of accelerating climate change, actions to mitigate and adapt to climate change impacts and risks will have to be fully integrated within these efforts. The country should try to leverage the development opportunities offered by strategic market segments, digital technologies, private capital, resilient agri-food systems, and diverse rural and coastal economies. Digital technologies hold particularly high leverage potential as they significantly reduce costs of sharing information and conducting transactions in fragmented agri-food value chains and knowledge and innovation systems, open the possibility of accessing capital asset at lower costs (and/or only marginal costs through so-called sharing economies), and enable input use efficiencies that improve both the business and environmental performance of agri-food producers and processors.

4.1.2. Future policies should focus on strengthening the strategic position of Croatia’s agri-food sector in international food markets. Depending on its comparative advantages and access to markets, agri-food sector strategies must broadly speaking decide (i) to pursue either a cost leadership or differentiation strategy; and (ii) to target either a broad or focused set of strategic segments in global food markets. Considering its factor endowment, competitive advantages, trade environment, and changing market demand, future policies should enable the Croatian agri-food sector to compete in international food markets on the basis of a focused, differentiation strategy. To this end, future policy priorities should help shift the existing structure of Croatia’s agri-food sector from one geared towards basic (daily use) consumer and product (stockable) segments, towards more advanced consumer (convenience/indulgence), product (fresh), and market (bio-economy) segments. In order to strengthen the strategic position of the Croatian agri-food sector in this manner, future policy priorities should help reorient existing public expenditures and support services towards the promotion of productivity improvements among small, commercially-oriented producers and MSMEs, in particular through increased investments in capital improvements; (digital) technology adoption; and product quality and diversification. In addition, future policy priorities should strengthen the competitiveness of agri-food producers and businesses by reducing the costs of doing business in rural areas. Finally, they should improve resilience and innovation levels in the agri-food sector by mainstreaming climate and environmental concerns; integrating agri-food chains in diversified and knowledge-based rural and coastal economies; and building well-connected agricultural knowledge and innovation systems.
4.1.3. The prioritized policy recommendations seek to introduce and scale up innovations that address the main challenges and opportunities facing Croatia to accelerate the structural transformation of its agri-food sector. A so-called “Innovation Ambition”\textsuperscript{109} lens was applied to identify and organize the prioritized policy recommendations in line with the different time horizons established for the NDS.\textsuperscript{110} The use of an Innovation Ambition lens ensures that a strategy is well-balanced by enabling “core”, “adjacent”, and “transformational” innovations in a given system during the time period covered by the strategy.

4.1.4. The prioritized policy recommendations represent different levels of innovation ambition. Concretely, the “short-term” policy priorities identified in Section 4.2 enable “core” innovations in Croatia’s agri-food system. These (important, but less ground-breaking) innovations, which can be introduced and scaled up in a relatively short timeframe, are focused on optimizing existing products/services produced by stakeholders for existing markets. The “medium-term” policy priorities identified in Section 4.3., on the other hand, enable “adjacent” innovations in the agri-food system. These (important and ambitious) innovations, whose introduction and scaling up can take place over a medium-time horizon, help stakeholders to expand their existing products/services to markets and customers that are new to them, but have already been developed. Finally, the “long-term” policy priorities identified in Section 4.4. enable “transformational” innovations in the agri-food system. These (important and very ambitious) innovations, whose introduction and scaling up requires efforts to be sustained over a long-time horizon, help stakeholders to develop new products/services to serve markets and customer needs that are still under development. As a result, the “short-, medium-, and long-term” policy priorities outlined below do not run sequentially, but instead along a continuum. The implementation roadmap presented in Section 6 further illustrates this approach.

4.2 Short-term Policy Recommendations (1 - 3 yrs)

4.2.1 Implement results-based sector program management systems

4.2.1.1. Problem - The efficiency, effectiveness and equity of agricultural and fisheries spending in Croatia appears low. Although a lot of public resources are devoted to the agri-food sector, its growth performance in recent years has been poor (see Section 2). In the context of the fisheries sector, for example, Croatia’s public administration, like those in other EU member states, has faced difficulties in adequately aligning the investment support and compensation measures for temporary and/or permanent cessation included in its EMFF Operational Program, with regional fish resource management plans and available data regarding fish stocks and socio-economic impacts on local fishing communities. Total allowable catch decisions should ideally be made in real time. However, there is usually a time lag between the collection and analysis of catch data when stock assessments are updated. In agriculture, while public agricultural spending has been directed towards income support under Pillar I (as dictated by the current CAP), Pillar II expenditures have not enabled on-farm capital accumulation, management

\textsuperscript{109} Nagji and Tuff (2012)
efficiency, technology adoption, or the provision of public goods in a manner that improves sector competitiveness, innovation, sustainability, or social inclusion. For example, a recent World Bank analysis found that in 2016, subsidized farms in Croatia appeared to have comparatively lower technical efficiency scores than non-subsidized farms for most types of subsidies examined (decoupled subsidies; rural development support – excluding investment). In addition, although the total factor productivity (TFP) of Croatian producers overall increased by 4.5% per year between 2014 and 2016, these economic efficiency improvements have not been broadly shared. In fact, TFP only improved for 50 percent of farms, whereas around 40 percent of farms in Croatia recorded a decline in TFP between 2014 and 2016. Moreover, TFP growth in Croatia has mainly been due to an increase in technical efficiency (3.2 percent per year) and, to a lesser extent, an increase in scale efficiency (2.6 percent per year). Furthermore, much-needed technical change, which reflects technological progress, seems to have actually regressed in Croatia (-1.1 percent per year). Finally, the World Bank analysis found that large farms (with an economic size larger than EUR 150,000) recorded significant gains in their share of both total subsidies and direct payments between 2014 and 2016, whereas medium sized farms recorded very considerable losses in both types of support. On the other hand, per capita support on Pillar I appears to be distributed more equitably across counties than that on Pillar II.

4.2.1.2. Approach - Strengthen sector capacity for evidence-based strategic planning, implementation and monitoring. In order to improve the efficiency, effectiveness, and equity of public expenditures on agriculture and fisheries, future sector programs must be re-designed in a manner that strengthens the (i) focus on the sector’s most pressing development challenges; (ii) targeting and coherence of proposed intervention measures; and (iii) operational efficiency of program management systems. To these ends, sector capacity to develop, implement, and monitor evidence-based strategic plans and support programs must be strengthened. This includes the development of a CAP Strategic Plan for the post-2020 period, in alignment with the EU’s new CAP programming requirements, as well as the preparation of an Operational Program for Maritime Affairs and Fisheries for the same period, in accordance with the new programming requirements of the Common Fisheries Policy (CFP) and Integrated Maritime Policy (IMP) of the EU.

<table>
<thead>
<tr>
<th>STRATEGIC PLANNING</th>
<th>QUESTIONS</th>
<th>METHODS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If this policy is implemented who will be the winners and losers?</td>
<td>Ex Ante Distributional Analysis</td>
<td>This method particularly useful for new or redesigned programs with lacking or limited investigation of target populations and other stakeholders. In spite of its upfront costs, investment in this method can be very cost effective in the long run, allowing for the adjustment and refinement of programs before implementation, as programs are likely to be better targeted as a result. Distributional analysis can also provide invaluable information about the political consequences of new programs.</td>
<td></td>
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<tr>
<td>From a welfare perspective, given limited public resources</td>
<td>Cost-Benefit Analysis</td>
<td>This method is most often used for investment programs where benefits and costs can be easily expressed in monetary value, such as for infrastructure or agricultural projects. However there have been many innovations in cost-benefit analysis to address this issue. Cost-benefit analysis relies heavily on assumptions</td>
<td></td>
</tr>
</tbody>
</table>

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112 Ibid.
<table>
<thead>
<tr>
<th>Question</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>should we invest in this program?</td>
<td>Stakeholder Consultations</td>
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<tr>
<td></td>
<td>Stakeholder consultation should be part of any priority-setting process. Consultations can</td>
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<tr>
<td></td>
<td>consist of in-depth interviews and/or open-ended discussion with stakeholders and experts,</td>
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<td>where they contribute their experiences, opinions, and viewpoints; community and stakeholder</td>
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<td>fora in which a wide variety of inputs can be solicited; and brainstorming exercises or</td>
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<td>meetings. A variety of more formal, structured approaches can also be used. Examples include:</td>
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<td>group interviews, either in structured or semi-structured formats; focus groups, where</td>
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<td></td>
<td>participants are selected on the basis of some explicit criteria and some sort of group</td>
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<td></td>
<td>interaction generates insights that would otherwise not be available; and various types of</td>
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<td>consensus-building approaches, typically with small groups. Simple preference ranking, voting,</td>
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<td></td>
<td>and scoring (including multi-criteria scoring) methods can be employed in small group</td>
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<td></td>
<td>settings, with aggregated preferences or rankings revealing group priorities.</td>
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<td>What results do we wish to achieve and how do we plan to achieve them?</td>
<td>Theory of Change/ Causality Frameworks</td>
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<td></td>
<td>This method is suitable for all programs; the development of a good theory of change/cause</td>
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<td></td>
<td>lity framework is a vital foundation for good program design and M&amp;E. The process underlying</td>
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<td></td>
<td>the development of the causality framework is important and often involves multiple stakeholders</td>
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<td>in discussions and training of program staff if they are not familiar with the method.</td>
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<td></td>
<td>Therefore, developing good causality frameworks can be time and labor intensive.</td>
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<td>Who can provide lessons to improve the program throughout the program</td>
<td>Benchmarking</td>
</tr>
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<td>cycle?</td>
<td>This method is suitable for programs that rely on performance indicators to guide management</td>
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<td></td>
<td>decisions. It is often used by higher-level policymakers to identify well and poorly performing</td>
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<td>programs that are suitable for comparison. Benchmarking supports the adoption of realistic and</td>
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<td>challenging targets in programs. It can be difficult to find appropriate benchmarks because</td>
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<td>of data constraints or lack of cooperation from affected programs.</td>
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<tr>
<td>Are proposed interventions vulnerable to climate change impacts?</td>
<td>Climate &amp; Disaster Risk Screening</td>
</tr>
<tr>
<td></td>
<td>This method helps identify potential short and long-term climate risks in proposed projects and</td>
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<td></td>
<td>strategies. Climate and disaster risk screening tools are exactly what they sound like: they</td>
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<td></td>
<td>provide due diligence at the early stages of project/strategy design to ensure that climate</td>
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<td>and disaster risks are flagged. Screening is a first, but essential, step to make sure that</td>
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<td>these risks are assessed and managed as part of climate and disaster-resilient development.</td>
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<tr>
<td>What would be the socio-environmental consequences of the policy, plan</td>
<td>Strategic Environmental Assessment (SEA)</td>
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<tr>
<td>or program?</td>
<td>This method promotes the integration of environmental and social considerations across different</td>
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<td>levels of strategic decision-making: plan, program, and policy, particularly in sector</td>
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<td>decision-making and reform. SEA is a family of approaches that lie on a continuum. At one end,</td>
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<td>the focus is on impact analysis, at the other end, on institutional assessment. It helps inform</td>
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<td>dialogue with stakeholders, raise awareness of environmental problems affecting poor people,</td>
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<td></td>
<td>and improve understanding of the linkages between environment and growth sectors. They have</td>
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<td></td>
<td>also contributed to understanding how the burdens of environmental degradation are distributed</td>
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<td></td>
<td>within societies.</td>
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<tr>
<td>Implementation, Monitoring and Evaluation</td>
<td>Process Evaluations</td>
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<tr>
<td>Have operational mechanisms supported the achievement of program</td>
<td>This method is important to inform decision making at both the implementation and follow-up</td>
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<tr>
<td>objectives?</td>
<td>stages of the policy cycle. Without accepted standards of quality and its necessary contextual</td>
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<td>nature (operations vary in each locale) implementing this method can involve high costs due to</td>
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<td>the need to develop an appropriate design and ensure quality. Process evaluations tend to be</td>
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<td>very affordable once quality is ensured and can provide excellent value-for-money information.</td>
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4.2.1.3. Required action – Increasing institutional capacity for evidence-based strategic planning, implementation, and monitoring encompasses (i) analytics: a review of current public spending patterns in agriculture and fisheries as well as an in-depth diagnostic of key country strengths, weaknesses, threats, and opportunities related to specific EU sector objectives (e.g. agri-environment, climate change, AKIS, food safety and SPS, bio-economy etc.) must be conducted; (ii) planning and budgeting: strategies, results monitoring frameworks, and action plans for a smarter targeting of public agriculture and fishery expenditures and services must be formulated based on strategic priorities established in consultation with sector stakeholders and in alignment with new EU CAP and CFP/IMP programming requirements; (iii) implementation and monitoring: program implementation progress must be monitored and evaluated in line with CAP and CFP/IMP reporting requirements.

4.2.1.4. Risk management – Agri-food sector programming may be insufficiently aligned with other sector programming efforts undertaken by the Government of Croatia. This risk is amplified by relatively weak sector program planning and implementation capacities within the Ministry of Agriculture. On the other hand, the strong commitment at the level of the Ministry of Agriculture to defining new strategic directions to improve sector performance in line with EU CAP and CFP/IMP programming processes and requirements as well as its active participation in the development of the National Development Strategy (NDS) – which is coordinated centrally by the MRDEUF – mitigate the risk for significant misalignments.

4.2.2 Improve access to finance for small producers and MSMEs

4.2.2.1. Problem - Small producers and MSMEs lack access to finance that meets both their working capital and investment capital needs. Improving the productivity, sustainability, and innovation performance of Croatia’s agri-food sector requires significant additional capital investments in agri-food value chains. However, small producers and MSMEs in Croatia cannot commit their own capital for investments as they need it to cover short-term needs, while commercial banks perceive these operations as higher risk-low return investment opportunities. The EIB has estimated total unmet credit demand per
year (financing gap) for agricultural producers to be higher than EUR 464.78 million, while for processors the estimated gap is higher than EUR 768.28 million.\footnote{Ministry of Agriculture (2018)}

4.2.2.2. Approach - \textit{Market-based approaches that are scalable and can reach a large number of beneficiaries in agri-food value chains are needed to close the financing gap.} Under market-based approaches, government support must be directed towards public goods and investments in financial and physical infrastructure with industry-wide, systemic benefits. First of all, utilization of \textit{“smart” subsidies} that minimize market distortions and eliminate regressive measures (see also Section 4.2.1.1.) can help encourage private sector investment in modern production systems and agri-food value chains, leading to sustainable development and financing.\footnote{Subsidies should be used to support the institution and not the borrowers. Moreover, subsidies should not undermine competition by favoring specific institutions but should support natural spillover effects to non-subsidized institutions. Subsidies function best when time-bound, limited, decreasing over time, and focused on infrastructure and product development.} Second, \textit{customized credit guarantees and risk sharing facilities} can be an effective mechanism in stimulating loans, particularly when accompanied by complementary technical assistance to banks.\footnote{It is recommended that guarantees in general require an appropriate portion of default risk to remain with the retail financial institution (i.e., coverage maximums, shared losses) to avoid moral hazard and adverse selection, and that the guarantees be gradually phased out in order to promote financial sustainability} Third, development of \textit{insurance markets} represents an opportunity for public-private partnerships to foster access to finance and improve productivity.\footnote{Governments can actively support growth of agricultural insurance through investments in weather stations and data collection, such as weather and area yield data, necessary for commercial products to be developed, which may also require suitably designed premium support. The government can also promote more traditional yield-based crop insurance through appropriate incentives and support systems. Fiscal support is necessary for reinsurance markets and funding for catastrophic risks} Finally, governments can strengthen the \textit{financial infrastructure} underpinning well-functioning agri-food finance markets by a number of measures: supporting the extension of credit reference bureaus (as well as other forms of client identification and credit reporting); improving collateral registries for movable collateral and developing alternative forms of collateral; improving creditor rights to register security interests on sales contracts (to support increased lending via value chain and contract farming structures); and fostering a mix of diverse financial institutions serving clients, with the standards, oversight, and support appropriate to each type of institution, and facilitating wholesale and partnering relationships between players to support innovation and expanded reach.

\begin{footnotesize}
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\item \footnote{Ministry of Agriculture (2018)}
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4.2.2.3. Required action – Promoting market-based approaches to improving access to finance for small producers and MSMEs encompasses (i) **analytics**: options for scaling up specific and customizable risk management instruments targeting small producers and agribusiness MSMEs must be reviewed, and data management needs and solutions related to key financial risk indicators (e.g. land ownership status, moveable collateral, agricultural and fisheries production, agro-climatic conditions, supply chains, market prices etc.) must be assessed at the level of key participants in agri-finance markets to inform effective agricultural and fisheries finance policies and to bridge the gap in understanding that divides market participants from the supply and demand sides; (ii) **planning and budgeting**: selected risk management options for agriculture and fisheries, that improve access to finance for more producers and MSMEs, and crowd-in private financial intermediaries must be incorporated under the EU CAP Strategic Plan and EMFF Operational Program; (iii) **implementation and monitoring**: Investment support must be accompanied by the development of improved data management platforms and tailored capacity building of banks/financial institutions (e.g. training, product development, risk management, value chain finance arrangements) as well as producers and producer organizations (e.g. basic farm economics, financial literacy, organization, governance, business management, and financial skills). The financing needs of various agri-food operation categories (smallholders, commercial farmers, and agribusinesses) must be continuously assessed in order to evaluate whether strategies and financial instruments are properly implemented and effective in achieving stated goals.

4.2.2.4. Risk management – *Poorly targeted public support could undermine the sustainable development of agri-food finance markets.* Incentives to encourage increased lending to the agri-food sector are welcome, but policymakers should avoid historically ineffective and sometimes damaging measures such as interest rate caps, debt forgiveness, and directed or mandatory lending targets, which impede the functioning of financial markets. The market-based approaches outlined above help mitigate the risk of crowding out private finance in this manner.
4.3 Medium-term Policy Recommendations (4 - 7 yrs)

4.3.1 Facilitate well-functioning agri-food value chains

4.3.1.1 Problem – Fragmented value chains inhibit small and medium-sized producers’ ability to add value and seize new market opportunities. Low productivity, compounded by insufficient quality management and weak market linkages, affects the ability of producers – in particular, small and medium size producers – to compete with imports and to take advantage of new export opportunities created by the EU market. Smaller producers, which dominate the production structure in Croatia, participate mainly in short value chains that typically end at local green or wholesale markets. Meanwhile, lack of access to sufficiently large and reliable volumes of quality inputs at competitive prices further constrains the competitiveness of agri-food processors.

4.3.1.2. Approach - Commercial partnerships can forge close agri-food value chain coordination and align input supplies with markets demands. Well-functioning value chains help the agri-food sector to better create, deliver, and capture market value and opportunities by closely coordinating actions between upstream and downstream agri-food value chain stakeholders. Manufacturers’ ability to deliver standardized food and beverage products to consumers often depends on large scale changes in producers’ input use (e.g. seed/root stock production), production practices, processing capacity, as well as marketing technologies and practices. Implementing such improvements requires long-term and comprehensive investments, technical assistance, and coordination of public and private value chain stakeholders. Commercial partnerships, such as the “productive alliances” introduced by the World Bank in Latin America, Africa, and East Asia since the 2000s and the “Operational Groups” introduced by the EU as part of the partnership measure of Pillar II of the CAP, have been demonstrated to be effective platforms for coordinating these types of actions across the value chain. Productive alliances usually involve a group of commercially-oriented small producers, one or more large buyers, and the public sector. They coordinate their activities on the basis of a “business plan”, which outlines the investment, technical assistance, and business development needs of the producers to upgrade and strengthen their linkage with the buyer(s). Business plans are implemented through subprojects financed by public grants on the basis of transparent and technical selection criteria, matched by the beneficiary producers and, in some cases, also by the buyer(s). Evidence from surveys and evaluations has shown these commercial partnerships have led to increases in production volumes, productivity, and access to improved inputs and productive equipment, as well as producers’ integration into new markets. Producers also have benefited from better product quality and diversification, resulting in increased sales volumes and prices. While some partnership programs led to improvements in employment and the generation of new jobs, the evidence is based on relatively small samples and varies strongly across value chains.


119 Ibid.

120 Ibid.
Best Practice Example: Collaborative Short Food Chains in the EU

Collaborative Short Food Chains (SFCs) have the potential to improve farm incomes, promote sustainable farming systems, and contribute to local economic development. SFCs can also be seen as a means to restructure food chains in order to support sustainable and healthy farming methods, generate resilient farm-based livelihoods (in rural, peri-urban and urban areas) and re-localize control of food economies. Whilst SFCs are often part of local food systems (in which food is produced, traded and eaten within a defined geographical area, respecting seasonality and procuring territorial added value), they are not restricted to locally based exchanges. They can also be spatially extended to enable products from different agro-climatic zones to be sourced as directly as possible. There are many different forms of SFCs in the EU, but they share the common characteristic of having reduced numbers of intermediaries between the farmer or food producer, and the consumer. The concept of SFC is dynamic and evolving as societal actors engage in a range of innovations and experimental food chain structures. Typologies of collaborative SFCs are under-developed, but a number of elements can be identified which reflect the diversity of collaborative SFCs:

- Organizational form (e.g. informal association, social enterprise, co-operative, etc.)
- Type of producer-consumer interaction (e.g. direct link, subscription, etc.)
- Type of collaborators (e.g. only producers, producers and consumers, producers and processors, etc.)
- Initiators of the collaboration (e.g. producers, local authorities, consumers, retailers, processors, etc.)
- Motivations of the collaborators (e.g. local economic development, maintenance of a local processing facility, environmental protection, social equity, or a combination of these and others)
- Number of actors involved
- Age of collaboration (e.g. 1-5 years; 5-10 years etc.)
- Type and range of products involved (e.g. raw or processed; mono or multi-products etc.)
- Production methods involved (e.g. organic, conventional etc.)
- Types of markets (e.g. local, national, international)
- Types of sales channels used (e.g. local selling, Internet sales, etc.)
- Activities and services provided (e.g. production, product development, branding, sale, delivery etc.)


4.3.1.3. Required action – Facilitating productive partnerships encompasses (i) analytics: value chain development needs in strategic sub-sectors must be assessed and a conceptual framework must be developed that lays out innovative governance arrangements and funding mechanisms for designing, implementing, and monitoring agri-food chain partnerships; (ii) planning and budgeting: eligibility and selection criteria must be defined to guide the targeting of products, producers, buyers, and geographies under agri-food chain partnerships, and a pipeline of pilot projects must be developed; (iii) implementation and monitoring: the implementation progress of selected pilot projects must be closely monitored and evaluated to ensure lessons learned are effectively captured; (iv) scaling up: support measures with innovative delivery mechanisms for agri-food chain partnerships must be rolled out under the post-2020 CAP Strategic Plan and EMFF Operational Program, and any complementary policy reforms to ensure the long-term success of productive partnerships must be implemented.

4.3.1.4. Risk management – Commercial partnerships in fragmented agri-food value chains critically depend on strong producer organization. Modern producer organizations are organized around a clear purpose, a well-defined market position, and professional and market-oriented service delivery to members, as well as democratic controls by members over management and decision-making. Modern producer organizations strengthen smaller producers’ position in agri-food value chains by facilitating joint procurement and supply of inputs, enabling access to finance and cost-sharing of investments, sharing best practices, conducting market research, and increasing small producers’ bargaining power in relation to manufacturers, retailers, and traders. In addition, they raise productivity levels by upholding production quality standards, consolidating production outputs, conducting primary processing, and the joint marketing of final products. However, producer organization in Croatia is extremely weak. In
2016, only 0.23% of registered producers in Croatia were organized into cooperatives. Moreover, cooperatives, as currently defined, operate under some inherent limitations; therefore, other organizational options such as informal associations of producers and limited liability companies, may offer more appropriate organizational frameworks. Governments can mitigate the risks associated with weak producer organization by strengthening producer organizations in line with international best practices. This includes the development of clear commercial objectives, mandatory supply agreements, proper capitalization structures, and sound business and governance principles. In this regard, technical and business management assistance provided under productive partnerships to help establish and develop producer organizations could be particularly effective.

4.3.2 Develop an integrated agriculture knowledge and innovation system (AKIS)

4.3.2.1. Problem – The adoption of new technologies by agri-food producers and processors is limited. Agri-food producers and processors in Croatia typically do not use the best available breeds, technologies, and digital tools to improve their production, access information, or connect to markets.

4.3.2.2. Approach - Agricultural Knowledge and Innovation Systems (AKIS) that are diverse, connected, and adapted to local needs can significantly improve the innovation performance of the agri-food sector. The main features of well-functioning AKIS in the EU include (i) active cooperation and exchange between involved entities, (ii) constant adaptation to the needs of producers and rural communities, and (iii) delivery of concrete, measurable results to improve production, resilience and sustainability of the agri-food system. In the majority of EU countries, the public AKIS actors provide general information on national and EU schemes as well as trainings and technical advice, in particular related to regulatory compliance rules and conditions. While research and educational AKIS entities are usually considered a source of knowledge, they often also provide advisory services. Lastly, food companies, input providers and private advisors form an important part the AKIS. Their advisory services are offered together with their respective products or under certain forms of productive partnerships. World Bank analyses estimate that closing half of the R&D investment gap relative to EU-28 levels would increase agricultural labor productivity by 11.9 percent in Croatia. However, in order to maximize the impact of public funds for research and innovation, government expenditures must be underpinned by strong policy governance systems. This includes the development of dedicated innovation strategies, national policy co-ordination bodies (with representatives from relevant ministries, academic institutions, and the private sector), independent implementing agencies and funding instruments, and policy monitoring and evaluation systems. Furthermore, collaborations between governments, research institutions, and industry are playing an increasingly important role in developing innovation and transferring technologies that are beneficial to the industry, society, and the environment. EU countries have developed and implemented several mechanisms to overcome stakeholder coordination challenges in

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their innovation systems. These include innovation vouchers\textsuperscript{122}, business-led collaborative grants pro-
grams\textsuperscript{123}, technology transfer offices\textsuperscript{124}, joint innovation and technological networks (such as the Euro-
porean Innovation Partnerships supported under the current CAP), and regional consortia-led projects. Importantly, targeted technical and investment support for agri-food MSMEs and start-ups is required to facilitate market-driven innovation. In general, innovation in the agri-food sector goes well beyond traditional R&D focused on the creation of new, or improvement of existing, products. It also includes the integration of ecological and circular approaches and technologies in primary production systems, implementation of new processing or formulation techniques (e.g. new types of conservation, additives, flavors), new industrial processes using agri-food waste, by-products, and co-products, logistics and food chain management arrangements (e.g. farm-to-fork approach), packaging (e.g. physical packaging, provision of consumer information), marketing methods, rebranding, as well as organizational and managerial changes.

\textsuperscript{122} Innovation vouchers are small lines of credit that enable MSMEs to purchase services from public knowledge providers. They are designed as incentives for small firms to introduce innovations (new products, processes or services) in their business operations. Innovation vouchers are also important as they afford MSMEs opportunities for greater exposure to public knowledge providers such as universities and research organizations. They thus help MSMEs overcome obstacles like their perceptions of public institutions as irrelevant to business or their reluctance to take on the costs of identifying relevant providers.

\textsuperscript{123} Cooperative grants programs give businesses opportunities to launch joint research initiatives with researchers. Typically, they require the joint participation of research organizations and businesses and often require some level of co-financing. Such partnerships can be short- or long-term and are often centered on a firm-specific problem.

\textsuperscript{124} Technology Transfer Offices (TTOs) assist public research organizations in managing their intellectual assets and changing them into benefits for the wider economy and society at large. TTOs also help facilitate the transfer of knowledge into the private sector either through spin-offs or licensing agreements. They also facilitate contractual research and assist in the protection and management of intellectual property, all of which generate revenues for higher education. TTOs have recently taken on another function – the funding of proof-of-concept type activities through their own seed funds.
Best Practice Example: The Central Role of Teagasc in Ireland's AKIS

Ireland's AKIS is globally known as an example of a functional and efficient system. It is based on a partially publicly funded entity – Teagasc. Teagasc undertakes research, training and advisory activities and operates in partnership with rural development agencies and all agriculture and food industry sectors. Teagasc employs approximately 1,200 staff at 51 locations throughout Ireland. The staff includes 216 research scientists, 51 specialist advisors, 116 research technicians and technologists, and 171 support staff. There are also over 250 general advisors based in the 51 county and local offices. A number of factors have contributed to Teagasc's success:

- **Excellent knowledge flow** – Teagasc organizes functional knowledge flow between AKIS actors such as faculties, institutes, industry and Teagasc advisors.
- **Advisors participate in research and education** – Teagasc is the biggest national research and education center in Ireland, which enables the direct flow of knowledge and new information to advisors. Most advisors directly participate in research.
- **Strong interaction with the industry** – Teagasc cooperates with industry through the Joint Industry Program. Relevance and quality of research, training, and advisory programs is achieved through jointly agreed program objectives and a feedback system involving industry staff and farmer representatives.
- **Strong involvement of farmers** - The Irish Co-operative Organization Society (ICOS) promotes knowledge development and exchange through ICOS Skillet education programs. ICOS is also represented on the board of Teagasc.
- **Diversified and sustainable funding** - Teagasc is the national body providing research, advisory and training services to the agriculture industry, food industry and rural communities. The organization has an annual operating budget of approx. €160 million. Around 75% of Teagasc's yearly budget comes from national and EU funding, while the remainder comes from projects and services. Some 40% of the budget is oriented to research, with the remainder split half and half between advisory and education services.
- **Strong international activities** – Teagasc offers its expertise on numerous development projects worldwide. This helps strengthen both the program design and funding sources of the organization.
- **A strong leading actor** – Depending on a country's social, political, and cultural environment, the presence of a leading actor in organizing the AKIS can be a critical success factor. The central part of Ireland's AKIS is a single organization; Teagasc.

**Source:** World Bank

### 4.3.2.3. Required action

- (i) **Analytics** - a functional review of Croatia’s existing AKIS must be conducted, taking into account recent AKIS reform decisions as well as the strategic directions and program implementation requirements adopted under the EU CAP and CFP/IMP for the period 2021-2027;
- (ii) **Planning and budgeting** - a National AKIS Plan and a pipeline of innovation partnership projects must be developed as an integral part of the CAP Strategic Plan and EMFF Operational Program to effectively leverage and maximize synergies between national AKIS capabilities, national research, education, science, and technology programs led by other line-Ministries, and available EU funds under the CAP’s ‘European Innovation Partnership for Agricultural Productivity and Sustainability’ (EIP-AGRI), the CFP/IMP’s EMFF, the Cohesion Policy’s ‘Research and Innovation Strategies for Smart Specialization (RIS3)’, as well as the EU’s Research and Innovation Program (Horizon 2020/Horizon Europe);
- (iii) **Implementation and monitoring** - public, semi-commercial, and private agricultural advisory capacity and information and knowledge management systems must be strengthened in line with the National AKIS Plan, especially within emerging EU-wide priority areas (e.g. agri-environment, climate change, digital technologies, agri-business management, food safety and SPS etc.)

### 4.3.2.4. Risk management

**Developing an integrated AKIS requires public and private sector roles (in supporting market-driven innovation) to be redefined.** The Croatian AKIS is still strongly oriented towards basic research in the public sector and government support is not focused on transitioning to new technologies, applying new knowledge, or value adding production. Meanwhile, tax in-
centives or other measures offer limited support for research, development, and innovation by companies/faculties/institutes. Critically, the impacts of the recent government decision to re-incorporate the CAFAS into the MoA on the development of an integrated AKIS remain unclear at this stage and will have to be evaluated further. On the other hand, the influence of private advisors remains limited to the users of the products their companies deliver or producers in productive partnership arrangements. Importantly, there is currently no mechanism for coordinating, targeting or guiding the activities of the main AKIS actors to ensure they act in synergy towards specific agri-food, bio-economy, and/or national innovation goals. The development of national, agri-food sector, and bio-economy-specific innovation strategies, implementation mechanisms, and monitoring and evaluation systems would mitigate the risks associated with the transition process towards an integrated AKIS.

4.3.3 Integrate modern agri-food value chains in diversified and knowledge-based rural and coastal economies

4.3.3.1. Problem – The predominance of low value-added activities in lagging regions in Croatia inhibits the diversification of local economies. Successful agri-food sector transformation depends on the creation of employment opportunities upstream of agri-food value chains and beyond. As national economies and agri-food sectors modernize, fewer people will work in primary agriculture and fisheries, and relatively more will work in downstream segments of the value chain and related support services. In rural and coastal areas (where primary agriculture, fishery, and aquaculture are the dominant economic activities) a key challenge is therefore to transform the agri-food sector, so as to capture more of the employment generated by value chains producing high value added versus that of basic commodity-oriented value chains. Even if such transformation creates new and more rewarding agri-food system jobs, the agri-food sector alone will not absorb all labor in rural and coastal areas. Complementary local-level development initiatives focused on creating diversified and knowledge-based rural and coastal economies beyond the agri-food sector and encompassing all bio-based sectors are needed, so as to ensure the successful provision of decent jobs in rural and coastal areas in the future.

4.3.3.2. Approach -Participatory development approaches involving public, private, and civil society stakeholders can be a powerful mechanism for diversifying local economies, especially in less favored areas. Given the wide-ranging characteristics of rural and coastal areas, there is no “one-size-fits-all” approach to integrating modern agri-food value chains in rural and coastal economies. In fact, a mix of approaches and tools currently exist to support place-based, cross-sectoral, and participatory development strategies. At the local level, the “Community-Led Local Development” (CLLD) approach has been a key component of the EU’s rural development and common fisheries policies for more than 20 years. It constitutes a bottom-up method for involving local public, private, and civil society partners in rural and coastal communities to shape local development through so-called “Local Action Groups” (LAG) and “Fisheries Local Action Groups” (FLAGs) respectively. At the regional level, “smart specialization” is a new policy approach to regional development and regional innovation planning. This approach is grounded in a so-called Entrepreneurial Discovery Process (EDP), which builds on region-

125 Since 2014, it is possible for a single Local Development Strategy (LDS) to be supported by several EU Funds (known as multi-funded CLLD) in order to (i) enable LAGs to comprehensively integrate local needs and solutions; (ii) enable Leader-type support to be better coordinated with local development support from other EU funds; and (iii) reinforce the links between rural, urban and fisheries areas.
specific assets, strengths, potentials, capacities, critical mass, and expertise. A specific characteristic of the approach is the focus on diversification of regional economies alongside specialization. The central idea is that a limited number of activities are selected through the EDP to stimulate regional growth, job creation, and collaboration among research and knowledge institutions, as well as businesses and investors. Regional entrepreneurs active in research, development, and business drive the identification of new business opportunities, tapping into their core competences, and combining them with others’ skills and knowledge inputs, with a view to create new combinations that foster unique areas of activities. Agri-food related priorities are one of the most prominent priority areas selected by EU countries and regions as part of their smart specialization strategies, along with Key Enabling Technologies (KETs), health, energy and the digital agenda. The sub-areas most frequently selected included new agri-food technologies (23%) followed by agri-food and tourism (20%) and food with higher added value (13%). Local (CLLD) and regional (smart specialization) approaches to territorial development can help promote sustainable and circular bio-economies in rural and coastal areas by bringing together relevant public and private sector actors across a certain territory. This holds particularly true given that the majority of bio-economic activities are likely to cluster close to biomass production landscapes due to lower resource mobilization and transportation costs. A review of four successful EU regional strategies that incorporated bio-economy actions showed that in all cases: (i) the preparation process was led by regional bodies with the participation of multiple stakeholders; (ii) the strategies were centered around the particular assets and strengths offered by the region; and (iii) the strategies were closely linked to Horizon 2020 and ESIFs so as to ensure access to EU funds to be used for their implementation.

127 Ibid.
128 Ibid.
129 Ibid.
130 Eye@RIS3 database is an open access database managed by the S3 Platform. The database contains information on S3 priorities selected by EU countries and regions. As of 1st December 2015, 25 countries and 178 regions encoded their priorities. The database is available at S3 Platform webpage: http://s3platform.jrc.ec.europa.eu/map
131 The most frequent key words used by EU countries and regions to describe “agro-food new technologies” specialization are biotechnology, (food) technology, KETs and ICT. The most frequent key words used to describe “agro-food and tourism are (sustainable) tourism, eco-tourism, experience-based industry, and health and wellness tourism. The most frequent key words used to describe “food with higher added value” are health, healthy (organic) food, nutrition, and life sciences.
Best Practice Example: Studying and Promoting Biogas Production in the Territory of the LAG ‘Pays des Condruses” in Belgium

The area covered by the Local Action Group Pays des Condruses has a highly developed cattle breeding sector, and the existence of these farms offers great potentials for biogas production. It was estimated that if all the animal waste of the area was used for the production of biogas it would cover the annual electricity consumption of all 7 towns in the LAG area. The LAG supported a series of studies during the 2007-2013 CAP programming period that were conducted on various issues related to biogas production. These included mapping the distribution of farms in the area and their capacity to produce biogas, identifying the areas of higher consumption of energy for heating, examining the possibility and options for setting up cooperatives that would handle the digesters and methods for compensating their members (e.g. via dividends), how to implement dry digestion, etc. The studies were accompanied by seminars and internet publications for informing farmers and citizens, study trips and the production of guidelines on how to apply the dry digestion technique. Apart from the studies and information produced, projects to set up biogas plants were launched on 4 out of the 19 points of high energy consumption identified in the area. The LAG’s role in the project was crucial in that they acted as mediator and catalyst, as well as facilitating contacts between businesses, farmers, architects, engineers and the local administration.


4.3.3.3. Required action – Realizing the potential of modern agri-food and circular bio-economy value chains in building knowledge-based and diversified rural and coastal economies entails; (i) Analytics: current bio-economy actors, activities, and relevant support programs in Croatia must be mapped out; knowledge tools, including agro-ecological zonification (see Section 4.4.1.2), must be developed to assess the potential of the bio-economy at the sub-national level; and, bio-economy development challenges and opportunities must be evaluated for areas/landscapes with important bio-mass production and diversification potential; (ii) Planning and budgeting: a National Bio-Economy Strategy and Implementation Plan and a pipeline of strategic bio-economy projects must be developed to effectively leverage and maximize synergies between national AKIS capabilities, programs, and available EU funds under the CAP’s and EMFF’s Community-Led Local Development (CLLD) instruments, the Cohesion Policy’s ‘Research and Innovation Strategies for Smart Specialization (RIS3)’, as well as the EU’s Research and Innovation Program (Horizon 2020/Horizon Europe); (iii) Implementation and monitoring: policy and institutional reforms emanating from the National Bio-economy Strategy must be rolled out and the implementation progress must be monitored and evaluated in line with EU reporting requirements.

4.3.3.4. Risk management – Territorial development outcomes critically depend on the way in which government institutions vertically coordinate their interventions and engage with the private sector, civil society, and individuals at each spatial planning level. Inadequate coordination between public, private, and civil society stakeholders at the national, regional, and sub-regional levels increases the risk of duplication of territorial investments and a lack of critical mass for impact. For example, between 2011 and 2017, 62 development strategies were produced in Slavonia, Baranja & Srijem by Counties, Municipalities and Local Action Groups, and hundreds of local economic initiatives have been proposed as part of development planning processes within each county and municipality. Multi-stakeholder governance formats that are more responsive to the functional organization of the territory and rural/coastal-urban complementarities could mitigate this risk by enabling a more functional targeting of territorial investments.
4.4 Long -term Policy Recommendation (8 -10 yrs)

4.4.1 Adapt and mitigate climate change impacts and risks facing the agri-food sector

4.4.1.1. Problem – Accelerating climate change will exacerbate existing productivity and natural resource management constraints. The 2018 IPCC special report on the impacts of global warming reaching 1.5 °C above pre-industrial levels and of the related global greenhouse gas emission pathways indicated that human activities are estimated to have caused approximately a 1.0°C increase. If global warming continues to increase at the current rate, it is likely to reach 1.5°C between 2030 and 2052; under existing “nationally determined contributions” the world is on a track towards a global warming of 3-4°C by 2100. Meanwhile, the report highlights the increased risks of not keeping global warming well below the 2°C target as established by the Paris Climate Agreement adopted in 2015. Ultimately, climate change impacts and risks will depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options. In the context of Croatia's agri-food sector, key climate change vulnerabilities include low productivity levels and a number of natural resource management constraints, including limited access to irrigation water, nutrient pollution of water resources, and the negative performance of important soil health parameters such as declining gross nitrogen and phosphorus balances, lower carbon content, and higher levels of soil erosion by water (see Section 2.17).

4.4.1.2. Approach - Climate change concerns must be mainstreamed in public policies and programs. As a cross-cutting issue, climate change adaptation and mitigation efforts must be coordinated at all levels of government and encompass all sector policies and programs. In regards to the agri-food sector, climate change concerns are being further elevated as strategic priorities in the context of the EU’s common agriculture, fisheries, and integrated maritime policies. As a result, climate change actions will have to be implemented at the level of individual agri-food producers and processors, key production landscapes and territories, as well as within the agri-food sector as whole. Given the rising pressures on natural resources, agri-food producers and processors must continue to improve their environmental performance through more sustainable production methods and technologies, including organic certification, climate smart production systems, crop/species diversification, digital solutions, renewable energy use, and energy efficiency improvements. In addition, participatory development approaches (see Section 4.3.3.2.) could be leveraged to reconcile socio-economic development and environmental concerns in key production landscapes and territories, especially with regards to the development of irrigation systems, nutrient pollution controls, and circular bio-economy value chains. Given that sustainability and circularity are at the heart of the updated EU Bio-Economy Strategy, the sustainable modernization of primary agriculture, forestry, aquaculture, and fishery production systems will be essential to optimize local biomass production. Finally, the agri-food sector as a whole will have to adapt to challenges stemming from climate change through both mitigation and adaptation actions. In this context, the development of an integrated AKIS (see Section 4.3.2.2) will be instrumental to strengthening the agri-food sector’s climate resilience (e.g. by providing salient information and advice on farm management, promoting the adoption of organic and/or climate smart practices, increasing incentives for R&D activities aimed at improving crop/species selection, varieties, climate resilience technologies, etc.)
Best practice example: Using Agro-Ecological Zoning Systems to Mainstream Climate Change Concerns in Sector Strategies, Programs, and Impact Evaluations

The Food and Agriculture Organization of the United Nations (FAO) and the International Institute for Applied Systems Analysis (IIASA) have, over the past 30 years, developed the Agro-Ecological Zones (AEZ) methodology for assessing agricultural resources and potential. The purpose of zoning is to identify areas with similar sets of potentials and constraints for a particular crop or land use. These areas are established according to the climatic and edaphic requirements of the specific crops, represented as a set of parameters based on elements of ecology, climatology, plant productivity, soil characteristics, and hydrology. There are various methodologies for AEZ depending on the specific objectives and available data. Some approaches are focused on producing aggregated information supporting regional or national plans, others are specific and detailed. Data and information about soils, land forms, climate and crops are organized and stored in databases, so as to be incorporated into systems that implement models, pattern recognition, and optimization algorithms. Often, environmental variables can be combined with socioeconomic variables, georeferenced, and organized in geographic information systems (GIS) to be analyzed, classified, and presented in the form of maps and reports. AEZs have a wide range of potential applications, including climate change impact assessments, analysis of yield gaps, land degradation assessments, land use optimization modelling, and explaining adaptation behaviors to climate change. Therefore, it is important to develop and offer simple, effective and case-specific tools that integrate and make available the most up-to-date AEZ knowledge and produce high resolution and spatially explicit projections of current and future crop suitability.

Source: FAO

4.4.1.3. Required Action – Mainstreaming climate change concerns in agri-food sector strategies, programs, and impact evaluations encompasses: (i) Analytics: gaps with respect to climate and environmental data, information, and modeling must be reviewed; new knowledge tools, including agro-ecological zoning, must be developed to support the integration of climate mitigation and adaptation concerns in both sector and spatial/land use planning processes; (ii) Planning and Budgeting: climate adaptation and mitigation conditionalities, eco-schemes, and rural development measures (e.g. innovation partnerships, CLLD, etc.) must be integrated in national and EU-funded support programs for the agri-food sector in a manner that takes into account National Adaptation Action Plans for Agriculture and Fisheries (iii) Implementation and Monitoring: participatory planning and development mechanisms must be leveraged to effectively coordinate and implement climate change adaptation and mitigation actions involving public, private, and civil society actors at the national level and in key production landscapes and territories.

4.4.1.4. Risk Management – Improved access to reliable and sustainable irrigation water systems will be critical to managing climate change impacts and risks and increasing productivity levels in the agricultural sector. Improved yields and the diversification of Croatia’s production structure towards high value crop production will not be achieved in a context of accelerating climate change unless agricultural producers in Croatia have greater access to irrigation water. At the same time, producers are unlikely to organize, use, and assume greater responsibility for the operation and maintenance of irrigation water systems unless they engage in higher value crop production. Given these interdependencies, national agricultural and irrigation development programs must be closely aligned, so as to increase agricultural productivity levels and strengthen climate resilience. A revamping of the existing National Irrigation Program is a policy priority, including (i) the construction, rehabilitation, and modernization of irrigation and drainage infrastructure on existing agricultural land; (ii) adoption of new technologies in irrigated agriculture; and (iii) the introduction of participatory approaches to water management and the strengthening of water resource management institutions.
4.4.2 Develop digital agriculture (DA) markets

4.4.2.1. Problem - Institutional barriers constrain the potential of DA. The successful development of a DA market in Croatia depends on the creation of an integrated environment that builds synergies between agri-businesses and innovators. Specifically, innovators must have direct access to farmers, universities, research centers and innovation hubs to effectively invest in product developments that introduce DA either as their mainstream products or as complementary services to their existing portfolio. From this perspective, well-functioning Agriculture Knowledge Information Systems (AKIS) plays a key support role in promoting DA. However, Croatia’s fragmented AKIS (see Section 3.14) currently contributes to both demand and supply constraints affecting digital agriculture markets. On the supply side, the absence of early stage capital (e.g. venture capital, angel investment, etc.), stakeholder collaboration, and public support for innovators to develop digital agricultural services creates high R&D costs. Meanwhile, a lack of incentives for farmers to modernize and adopt digital agricultural technologies constrains market demand.

4.4.2.2. Approach - The public sector can leverage both push and pull mechanisms to address weaknesses and leverage strengths in the AKIS, to help create and expand DA markets. Push mechanisms to induce development include interventions that reduce development costs, lower barriers to entry, and facilitate the testing/demonstration of digital agricultural solutions by the private sector. For instance, regulations, funding, and infrastructure that support basic and applied agricultural and general R&D, as well as the demonstration of DA products and services, can provide a push to create and strengthen private enterprises (e.g. start-ups) to participate in DA markets.

Well-targeted incentives could already be deployed to kick-start this process in the short-term. The establishment of Digital Innovation Hubs\(^\text{133}\) could act as an innovation-booster for the entire DA ecosystem. On the other hand, pull mechanisms at the disposal of the public sector include government policies that reward the successful development of digital agricultural services by ensuring demand and future revenue streams to the private sector. Input suppliers, farmers, and downstream players in the food market will only engage with DA service and good providers if the services/products can be acquired at cost-effective levels. Due to the relative small-scale of the domestic market in Croatia, government support may therefore be required to adjust prices of DA services/products to levels that would boost demand and jump-start the domestic DA market. This includes incentives (e.g. vouchers or subsidies), regulations, and public services (e.g. providing buyers with the information about the availability and quality of goods) that influence input suppliers, farmers, logistics providers, and downstream chains to demand DA services and goods from private suppliers.

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\(^{133}\) Digital Innovation Hubs (DIH) are newly promoted concept where they play a role of meeting place for various stakeholders in innovation system: R&D institutions, private companies, investors, governmental bodies, etc. In the future R&D funding programs, Digital Innovation Hubs will play a major role and will be closely tied to EU science funding. Currently, there are no DIHs registered in Croatia
**Best practice example: API – AGRO Open Data and Open API platform**

API-AGRO is a data and algorithm exchange platform that helps stakeholders in France’s vegetable and livestock farming sectors to share their digital data in a secure and easy way, and connect with others in the agricultural value chain. The platform was set up by different public and private partners, including ACTA (France’s network of agricultural technical institutes) and the French Chambers of Agriculture. The API-AGRO platform is based on the tool of a French start-up, OpenDataSoft, which has developed a product distributed in SaaS (Software as a Service) format. Composed of multiple Application Programming Interfaces (APIs), the API-AGRO platform enables data sharing between different programs with clearly defined user rights and permissions. The main aim of the platform is to make available, via digital distributions channels (web, mobile phones etc.), a catalogue of agronomic datasets, calculation functions for technical and economic performance indicators, and (decision-support) services produced by reference institutes’ researchers and engineers. In addition, the platform seeks to facilitate their reuse in applications. To this end, APIs provide a hook for partners or third-party developers to access data and services to build applications or to offer new services for different Farm Management Information Systems that may be useful to farmers, like calculating applications and decision-support tools. For example, one digital application that was developed through the API-AGRO platform gives farmers support in the decision-making processes on how to manage their cereal APIs have thus helped boost open innovation in the agricultural knowledge and innovation system (AKIS) by integrating new players (start-ups, for example) and promoting the co-development of new digital agriculture applications.


**4.4.2.3. Required action** Building Digital Agriculture markets includes: – *(i) Analytics:* current digital infrastructures, AKIS functions, and available resources (e.g. CAP, RIS3) to support digital innovation and mobilize private entrepreneurs to focus on developing new digital solutions must be assessed; Possible strategies to support participation of producers, rural communities, and private entrepreneurs in the DA market must be tested; *(ii) Planning and budgeting:* digitization measures must be integrated in national and sector-specific strategies as well as EU-funded support programs; *(iii) Implementation and Monitoring:* capacity building programs focused on digital agriculture solutions must be developed and rolled-out for public, semi-commercial, and private advisory services in line with the National AKIS Plan; Legislation to regulate farm data collection, management, and dissemination between governmental bodies and private parties must be developed so as to foster the development of DA services, which is particularly important in the context of the newly established EU General Data Protection Regulation (GDPR).

**4.4.2.4. Risk management – Data sharing will be crucial for the development of a DA market in Croatia.** Transparency and responsibility are key for gaining trust between public and private stakeholders. Unless potential benefits and risks are made clear and stakeholders can trust that data exchanges are settled in a proper and fair way through contractual agreements, originators may be unwilling to share data. It is therefore crucial to clearly define key principles regarding data rights, access rights and/or data re-usage rights. Only if such principles are established and enforced will it be possible to develop business models that benefit all stakeholders involved in DA.
5 Cross-cutting issues and their implications for policy

5.1. A broad range of cross-cutting policy issues affect the agri-food sector due to its multiple functions and cross-sector linkages. Sections 3 and 4 outlined how the cross-cutting issues of Land Markets, Local/Territorial Development, Environment and Climate Change, Irrigation Water, Research, Development and Innovation, and Digital Technology are shaping the current and future policy agenda in the agri-food sector. In addition to these strategic issues directly facing the agri-food sector in Croatia, there are a number of macro-level issues that more indirectly influence the sector's potential to serve as an engine of improved growth, jobs, and incomes. First of all, future agri-food sector growth and development is affected by Croatia's overall public governance conditions. In particular, the legal and objective enforcement of contract rights for creditors, farmers, and MSMEs is important to strengthen agri-food value chain structures and facilitate financing to all market participants. Secondly, quality education and vocational training programs are critical for closely matching local knowledge and skills with agri-food sector needs. Thirdly, flexible labor markets enable better employment prospects, shorter spells of unemployment, less informality, and higher productivity and ultimately incomes. Fourthly, increased competitiveness and innovation in support services, in particular logistics services, provided to agri-food producers and processors would enable increased diversification toward (fresh) high value products and reduce transaction costs along the agri-food value chain. Fifthly, fiscal policies that reduce the relatively high tax burden on the economy stimulate increased growth, job, and income levels across the agri-food value chain and beyond. Finally, increased use of renewable energy and energy-efficient technologies and the promotion of sustainable and circular bio-economies further reduce the environmental footprint of Croatia's agri-food sector, while generating cost-efficiencies, added value, and market diversification opportunities. Managing these various intersections between the agri-food sector and related policy areas requires an integrated approach to sector planning, budgeting, and monitoring and evaluation, in particular as it relates to effectively leveraging European Structural and Investment Funds (ESIF).
## 6 Proposed implementation roadmap

<table>
<thead>
<tr>
<th>Starting from</th>
<th>Sub-actions</th>
<th>Milestone(s)</th>
<th>Resource(s)</th>
<th>Area</th>
</tr>
</thead>
</table>
| 2019/Q1      | 1. Review of current public spending patterns and performance in agriculture and fisheries  
2. Conduct in-depth SWOT analyses focused on specific EU sector objectives  
3. Set strategic priorities in consultation with sector stakeholders  
4. Prepare national sector strategies and results monitoring frameworks  
5. Prepare action plans for strategy and results monitoring framework implementation  
6. Launch pilot projects testing strategic policy reforms, new investment directions, and improved program delivery mechanisms  
7. Submit CAP Strategic Plan and EMFF Operational Program (2021-2027) for approval by the European Commission  
8. Evaluate efficiency, effectiveness, and equity of public agricultural and fisheries expenditures  
9. Adapt support programs in line with evaluation outcomes | 2019/Q3: National sector strategies, results monitoring frameworks, and (sub-sector) action plans developed  
2020/Q1: Pilot projects testing strategic policy reforms, new investment directions, and delivery mechanisms completed  
2020/Q2: Draft CAP Strategic Plan and EMFF Operational Program (2021-2027) prepared  
2020/Q4: Final CAP Strategic Plan and EMFF Operational Program approved by the European Commission  
2023/Q4: Efficiency, effectiveness, and equity of public agricultural and fisheries expenditures evaluated (mid-term program evaluation) | EAGF  
EAFRD  
EMFF  
State Budget | Results-based Program Management                                                                                                                               |
| 2019/Q1      | 1. Review options for scaling up specific and customizable risk management instruments targeting small agriculture and fisheries producers and MSMEs  
2. Review data management needs and solutions related to key financial risk indicators  
3. Incorporate selected risk management options in national sector strategies, results monitoring frameworks, and action plans | 2019/Q3: Selected risk management options incorporated in national sector strategies, results monitoring frameworks, and action plans  
2019/Q4 – 2021/Q4: Data management and capacity building programs for producers, producer groups, businesses, and financial service providers developed and rolled out  
2020/Q4: Eligibility criteria defined and financial resources for selected risk management | EAFRD  
EMFF  
State Budget  
HBOR  
HAMAG-BICRO | Access to Finance for Small Producers and MSMEs |

Agriculture, fisheries, and food processing in Croatia's food & bio-economy
4. Define eligibility criteria and allocate adequate financial resources for selected risk management options under the CAP Strategic Plan and EMFF Operational Program
5. Develop and roll-out improved data management and capacity building programs for producers, producer groups, businesses, and financial service providers participating in agri-finance markets

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<tbody>
<tr>
<td>1. Assess value chain development needs in strategic sub-sectors</td>
<td>Innovative pilot agri-food chain partnership projects completed</td>
<td>Eligibility criteria defined and financial resources for agri-food chain partnerships allocated under CAP Strategic Plan and EMFF Operational Program (2021-2027)</td>
<td>Agri-food chain partnership projects implemented through new delivery mechanisms with EAFRD, EMFF, and/or ERDF support</td>
<td>National AKIS Plan developed</td>
<td>Capacity building programs for public, semi-commercial, and private advisory services developed and rolled-out in line with National AKIS Plan</td>
<td>Eligibility criteria defined and financial resources for innovation partnerships allocated under the CAP Strategic Plan and EMFF Operational Program (2021-2027)</td>
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<td>2. Develop a conceptual framework for the improved design, implementation, and monitoring of agri-food chain partnerships (‘Productive Alliances’)</td>
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<td>3. Develop a pipeline of innovative pilot agri-food chain partnership projects</td>
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<td>4. Evaluate lessons learned from pilot agri-food chain partnership projects</td>
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<td>5. Define eligibility criteria and allocate adequate financial resources for agri-food chain partnerships under the CAP Strategic Plan and EMFF Operational Program</td>
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<tr>
<th>EAFRD</th>
<th>EMFF</th>
<th>ERDF</th>
<th>State/Regional/Local Budgets</th>
<th>Private Investment</th>
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<tbody>
<tr>
<td>Horizon Europe</td>
<td>Cohesion Policy (RIS3)</td>
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Agriculture, fisheries, and food processing in Croatia’s food & bio-economy
<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
<th>Funding Sources</th>
<th>Diversification of Rural Economies</th>
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<tbody>
<tr>
<td>2019/Q1</td>
<td>1. Map current bio-economy actors, activities, and relevant support programs in Croatia&lt;br&gt;2. Develop knowledge tools, including agro-ecological zonification, to assess the potential of the bio-economy at the sub-national level&lt;br&gt;3. Assess bio-economy development challenges and opportunities for areas/landscapes with important bio-mass production potential&lt;br&gt;4. Develop a National Bio-Economy Strategy and Implementation Plan&lt;br&gt;5. Develop a pipeline of strategic bio-economy projects in consultation with international, regional, and/or local stakeholders&lt;br&gt;6. Define eligibility criteria and allocate adequate financial resources for bio-economy-oriented projects under the CLLD instrument of the CAP Strategic Plan and EMFF Operational Program</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
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<tr>
<td>2020/Q1</td>
<td>Bio-economy development challenges and opportunities for areas/landscapes with important bio-mass production potential assessed</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
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<tr>
<td>2020/Q2</td>
<td>National Bio-Economy Strategy and Implementation Plan developed</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
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<tr>
<td>2020/Q3</td>
<td>Pipeline of strategic bio-economy projects at the international, regional, and/or local level developed</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
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<tr>
<td>2020/Q4</td>
<td>Bio-economy-oriented eligibility criteria defined and financial resources allocated under the CLLD instrument of the CAP Strategic Plan and EMFF Operational Program (2021-2027)</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
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<tr>
<td>2021/Q1-2027/Q4:</td>
<td>Bio-economy-oriented transnational, regional, and/or local (CLLD) projects implemented with EAFRD, EMFF, Horizon Europe, and/or Cohesion Policy (RIS3) support</td>
<td>EAFRD&lt;br&gt;EMFF&lt;br&gt;Horizon Europe&lt;br&gt;ERDF&lt;br&gt;Cohesion Policy (RIS3)</td>
<td>Diversification of Rural Economies</td>
</tr>
<tr>
<td>2019/Q1</td>
<td>1. Review climate and environmental data, information, and modeling gaps&lt;br&gt;2. Develop new knowledge tools, including agro-ecological zoning, to support the mainstreaming of climate change mitigation and adaptation concerns&lt;br&gt;3. Integrate climate adaptation and mitigation conditionalities, eco-schemes, and rural development measures in national and international levels</td>
<td>EAGF&lt;br&gt;EAFRD&lt;br&gt;EMFF&lt;br&gt;State/Regional/Local Budgets&lt;br&gt;Private Investment</td>
<td>Climate Change Adaptation and Mitigation</td>
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<tr>
<td>2020/Q1</td>
<td>New knowledge tools for climate-sensitive sector and spatial/land use planning processes developed, including national agro-ecological zonification</td>
<td>EAGF&lt;br&gt;EAFRD&lt;br&gt;EMFF&lt;br&gt;State/Regional/Local Budgets&lt;br&gt;Private Investment</td>
<td>Climate Change Adaptation and Mitigation</td>
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<tr>
<td>2019/Q1</td>
<td>EU-funded sector support programs</td>
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<td>4. Leverage participatory planning and development mechanisms at the national and sub-national level</td>
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<td>under CAP Strategic Plan and EMFF Operational Program (2021-2027)</td>
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<td></td>
<td>2021/Q1-2027/Q4: Climate-sensitive condition-abilities, eco-schemes and rural development projects implemented with EAGF, EAFRD, and/or EMFF support</td>
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<td></td>
<td>2026/Q1-2028/Q1: Innovative climate change adaption and mitigation intervention measures developed in line with emerging program learnings, the EU’s next Multi-Annual Financial Framework (2028-2034), and 2050 long-term vision for a climate-neutral economy</td>
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<tr>
<td>2020/Q1</td>
<td>1. Review current digital infrastructure, AKIS functions, and available resources</td>
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<td></td>
<td>2. Test possible strategies to support participation of producers, rural communities, and private entre-preneurs in the DA market</td>
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<td>3. Integrate digitization measures in both national and sector-specific strategies and EU-funded support programs</td>
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<td>4. Develop and roll-out capacity building programs focused on digital agriculture solutions for public, semi-commercial, and private advisory services in line with National AKIS Plan</td>
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<td>5. Regulate farm data collection, management, and dissemination between governmental bodies and private parties</td>
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<tr>
<td></td>
<td>2020/Q1: Pilot projects testing delivery mechanisms for digital agriculture solutions to producers and rural communities completed</td>
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<td></td>
<td>2020/Q2: Digitization support strategy incorporated in National AKIS Plan</td>
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<td></td>
<td>2020/Q2-2022/Q2: Capacity building programs focused on digital agriculture solutions developed and rolled-out for public, semi-commercial, and private advisory services in line with National AKIS Plan</td>
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<td></td>
<td>2020/Q4: Eligibility criteria defined and financial resources for digitization measures allocated under CAP Strategic Plan and EMFF Operational Program (2021-2027)</td>
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<tr>
<td></td>
<td>Regulations governing farm data collection, management, and dissemination between governmental bodies and private parties adopted</td>
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<td></td>
<td>2021/Q1-2027/Q4: Digitization projects implemented with EAFRD, EMFF, Horizon Europe, ERDF, Cohesion Policy (RIS3), State/Regional/Local Budgets, Private Investment</td>
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<tr>
<td>EMFF, Horizon Europe, ERDF, and/or Cohesion Policy (RIS3) support</td>
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**2026/Q1-2028/Q1:** Innovative digitization measures developed in line with emerging program learnings and the EU’s next Multi-Annual Financial Framework (2028-2034)
7 Proposals for strategic (“Flagship”) projects

7.1 Re-orienting Incentives and Public Services towards the Strategic Transformation of Agriculture and Rural Space

a) Description of flagship project: Under the proposed flagship project, the targeting of both EU and national incentive programs, including public support services related to the AKIS and food safety system, would be improved in a manner that helps re-orient public expenditures and services towards reaching common EU economic, environmental, and social objectives, while addressing country-specific development priorities. Using available evidence generated by in-depth sector diagnostic work, the specific sector policy reforms would be designed and implemented as an integral part of the future CAP Strategic Plan and EMFF Operational Program, which must be prepared by the MoA for the next EU budget programming period (2021-2027). Implementation progress of the sector policy reforms would be monitored by the Government and verified by the European Commission on the basis of EU common and program-specific results indicators and targets, in the context of the annual and multi-annual program monitoring and reviewing exercises. The overarching goal of the sector policy reforms would be to accelerate the structural transformation of Croatia’s agri-food sector by gearing public expenditures and services towards the promotion of productivity improvements, increased diversification of rural economies, and the mainstreaming of climate and environmental concerns in the agri-food sector.

b) Project’s relevance to national strategic framework: The proposed project would contribute primarily to the following development directions included in the national strategic framework: (i) Competitive, Entrepreneurial, and Innovative Croatia; (ii) Green Croatia; (iii) Connected Croatia; (iv) Economically Stable and Efficient Croatia; and (v) Regional Croatia.

c) Economic potential and exploitation: The current efficiency, effectiveness, and equity of high public agriculture and fisheries expenditure levels in Croatia appear low. As a result, the implementation of evidence-based and results-oriented incentive programs and public service delivery for the agriculture and fisheries sector has significant potential to further strengthen competitiveness, entrepreneurship, and innovation across Croatia’s agri-food sector. The structural transformation of agri-food systems is driven by both on-farm capital intensification and enhanced (digital) data, information, and knowledge on farming practices (e.g. food safety, fertilizer, pesticides, tilling, etc.). These on-farm improvements help unleash significant increases in agricultural output due to higher labor and land productivity and improved compliance with public and private standards. The expansion of agricultural output leads to an increase in the supply of raw materials at lower costs to agri-processors downstream of the agri-food chain. This increased supply enables the scale-up of operations, promotes vertical and horizontal integration, and reduces overall costs, all of which strengthen the competitiveness of the agri-food system as a whole. In addition, capital investment-led improvements in labor productivity tend to displace rural workers who subsequently migrate to peri-urban areas or cities to find employment in non-agricultural sectors. Meanwhile, increased labor productivity and mobility in rural spaces improve livelihoods in rural areas by enabling higher incomes per capita as well as lower poverty density and poverty rates.

d) Sustainability: Project funding and results would be sustained under the next EU CAP and CFP/IMP for the period 2021-2027. Even if the agricultural sector transformation process outlined above (7.1.c) creates new and better agri-food sector jobs, it must be noted that the sector alone will
not provide rewarding opportunities for all in rural areas. Complementary local development initiatives focused on creating diversified and knowledge-based rural economies beyond the agri-food sector and encompassing all bio-based sectors are critical to ensure success in the future. Moreover, although Croatia has quality land and abundant freshwater resources, declining soil health and limited access to irrigation water currently expose the agriculture sector to important environmental risks, which are likely to be amplified due to the growing climate change impacts and risks in the future. Improved and sustainable natural resource management, including the development of sustainable and circular bio-economy models, are therefore critical to reduce the agricultural sector’s vulnerabilities, while increasing input use efficiency and creating new diversification opportunities.

e) **Duration:** 7 years (2021-2027)

f) **Estimated amount of funding required:** The total amount of funding will depend on the final EU CAP and EMFF budget allocations for Croatia under the post-2020 Multi-Annual Financial Framework, which is currently under negotiation. Assuming total EU and national funds allocated to Croatia under the CAP (EUR 4.8 billion) and EMFF (EUR 348.7 million) remain the same as under the current budget period (2014-2020), the total estimated amount of funding required in the period 2021-2027 would be EUR 5.1 billion.

g) **Preconditions:** An in-depth sector diagnostic must be completed to guide the CAP and EMFF strategic planning processes. This includes a comparative review and analysis of (i) the efficiency, effectiveness, and equity of public spending in Croatia under the CAP and CFP/IMP; (ii) sector performance; (iii) current regulatory and policy frameworks for agriculture, rural development, and fisheries, in particular those related to agri-finance and risk management, agricultural land, food safety and SPS, AKIS, agroecological and climate assessments, and sustainable and circular bio-economies; as well as (iv) the functional organization of (public) sector institutions.

h) **Project leader:** Ministry of Agriculture

i) **Beneficiaries:** Up to 170,515 agricultural holdings (number registered at the end of 2016), including family agricultural holdings (96.86%), companies (1.50%), crafts (1.29%), and cooperatives (0.23%). Up to approximately 14,000 people (fishermen, employees in companies involved in capture fisheries, farming and processing) who are directly employed in the fisheries sector.

### 7.2 Investing in Product Quality for Strategic Segments

a) **Description of flagship project:** Under the proposed flagship project, increased investments in improved product quality and agri-food chain linkages would be supported in a number of high value production systems and strategic value chains, including fresh fruit and vegetables, livestock, and olive oil. Specific investments would include the development of cold chains, national centers of excellence, (digital) marketing infrastructure and platforms, and short agri-food chains. Under the future CAP Strategic Plan and EMFF Operational Program, new mechanisms for coordinating the design, implementation, and financing of investments in quality improvements would be introduced and rolled-out in the framework of intervention measures promoting agri-food chain partnerships between producers and buyers, which take into account international best practices (e.g. “Productive Alliances”).

b) **Project’s relevance to national strategic framework:** The proposed project would contribute primarily to the following development directions included in the national strategic framework: i)
c) **Economic potential and exploitation:** Recent studies completed by the World Bank have determined that highly perishable (or ‘fresh’) items tend to be more profitable than stockable commodities.\(^\text{134}\) Generally speaking, ‘fresh’ crops items allow farmers to capture more value when they are able to identify the demand/scarcity and then deliver the products to the market (before it perishes). However, for the most part, Croatia’s producers have not been able to seize these opportunities. In addition, in the advanced markets of Europe, an emerging set of ‘convenience consumers’ are driving demand for a new set of *fresh convenience* food products. The manufacturing of fresh agricultural items into *fresh convenience* products creates space for further diversifying agricultural products and allows food manufacturing firms to capture additional value. A handful of Croatian firms are already engaged in the fresh convenience segment in the local market and are making profits in excess of 11%, well above the industry average. Meanwhile, the European Commission’s most recent outlook for agricultural markets and incomes (2018-2030) points to increasing demand for olive oil in non-producing EU countries and, especially, export markets. Thanks to growing production and processing capacity, EU olive oil exports are expected to further expand by 3.3% per year by 2030 compared with the 2016-2018 average. The European Commission’s outlook also projects that while overall meat consumption will decline slightly in the EU-15 (by 1 kg per capita) during the same period, it will continue its upward trend in the EU-13 (by nearly 1 kg per capita), except for pig meat.

d) **Sustainability:** Project funding and results would be sustained under the next EU CAP and CFP/IMP for the period 2021-2027. In addition, project sustainability would be further ensured through the introduction of improved delivery mechanisms for agri-food chain partnerships, which may include investments in market & consumer research, product innovation (e.g. improved packaging and labelling, new methods of fresh preservation), digital solutions, and certification against private standards.

e) **Duration:** 7 years (2021-2027)

f) **Estimated amount of funding required:** A project investment pipeline amounting to EUR 168.3 million has been identified and is expected to expand under the next EU CAP and CFP/IMP for the period 2021-2027.

g) **Preconditions - points for consideration before the project can begin:** N/A

h) **Project leader:** Ministry of Agriculture

i) **Beneficiaries:** Family agricultural holdings, agri-business companies, cooperatives, fishermen, employees in companies involved in capture fisheries/farming/processing, and public institutions (e.g. local/regional governments, research institutions, advisory services) participating in agri-food chain partnerships.

7.3 Promoting Sustainable and Circular Bio-Economies in Rural Areas

a) **Description of flagship project:** Under the proposed flagship project, national and regional investments would be supported that aim to promote a sustainable and circular bio-economy in rural areas in Croatia. At the regional level, the BIOEAST Initiative offers Croatia a shared strategic research and innovation framework for organizing joint programming towards sustainable bio-economies in the Central and Eastern European countries.\(^{135}\) In June 2018, the Ministry of Agriculture of Croatia signed a joint BIOEAST vision 2030 declaration, which identifies investment needs and opportunities in three strategic areas: (i) sustainably increase biomass production; (ii) develop methods for circular ("zero waste") processing of available biomass with a specific focus on (localized) agro-food systems and other bio-based sectors such as forestry; and (iii) further diversify local economies in rural areas.

b) **Project’s relevance to national strategic framework:** The proposed flagship project would contribute primarily to the following development directions included in the national strategic framework: (i) **Competitive, Entrepreneurial, and Innovative Croatia**; (ii) **Regional** Croatia; and (iii) **Green** Croatia.

c) **Economic potential and exploitation:** The key industries in Croatia with important bio-economy growth and development potential identified include agriculture, food processing, aquaculture, and forestry. The University of Zagreb’s Faculty of Energy, has estimated that on average around 10 million tons of agricultural waste, co-products, and by-products (AWCB) are generated every year in Croatia by animal, fruit, cereal and vegetables value chains with the largest volumes generated in the livestock sector in the production of manure.\(^{136}\) An initial World Bank assessment regarding the potential availability of sustainable lignocellulosic materials from agricultural residues shows that between 2 and 3 million dried tons of materials could be available annually (with the largest portion of biomass residues deriving from maize stover residues, followed by straws from cereal production).\(^{136}\) As new technologies develop, market opportunities for bio-economy value chains

\(^{135}\) The BIOEAST Initiative, which brings together the Ministries of Agriculture from Croatia, the Czech Republic, Hungary, Poland, Slovakia, Bulgaria, Romania, Slovenia, Estonia, Latvia, and Lithuania, represents a long-term process that was formally launched in September 2017 with a view to (i) initiate cooperation and the development of knowledge-based bio-economy policies; (ii) identify common challenges and validate common research topics; (iii) initiate strategies that promote a cross-sectoral approach for the development of a national circular and bio-economy strategy; (iv) establish data-driven support for implementation of policies through the creation of an interoperable, fully integrated observing and forecasting system; (v) train a new generation of dedicated multi-stakeholder actors; (vi) promote regional, national, EU and international funding opportunities to develop innovative technologies, methodologies and approaches that boost the sustainable and circular economic growth of the European bio-economy sectors and the conservation and upgrading of the regional environment, resources and cultural heritage; and, finally, (vii) draw attention to specific challenges and research potential of the macro-region, through involving society and promoting public awareness.

\(^{136}\) Information and data generated in the framework of the Agrocycle Project of the University of Zagreb, Faculty of Energy, can be accessed here: [http://www.agrocycle.eu/](http://www.agrocycle.eu/). Further analysis is needed to assess the quantity and quality of AWCB that is available, not currently been recycled or used, to have a more accurate information for future uses. As this analysis is based on secondary information sources, it will be important to also ground the assessment, at least for the most relevant value chains in the country, to evaluate the validity of these assumptions and/or to define local coefficient and parameters to monitor the production and use of these resources in the future. It will also be important to determine the spatial distribution of these resources to identify volumes available and potential market outlets that will make them viable feedstock for other industries. To this end, the Faculty of Energy has carried out additional work to ground the assessment and to define the spatial distribution of AWCB in the territory which will be an important input to this work.

\(^{137}\) Note that the sustainable Availability indicates the biomass that is available after discounting the ecological and soil needs for leaving residue in the field and current uses of biomass i.e. livestock bedding, energy production etc.

\(^{138}\) EU funded project entitled: Delivery of Sustainable supply of non-food biomass to support a “resources-efficient” Bio-economy in Europe
are growing. Globally, innovation to explore waste management options in agriculture and aquaculture systems, including symbiotic (plant/fish) production systems, are emerging. Technological developments are also increasing economic opportunities for the forestry sector, including bioenergy, wood construction, packaging products, chemicals, textiles, etc. In Croatia, manufacturing of biodegradable plastics is an area where there are already both R&D (e.g. Bio-mi Ltd) and actual manufacturing activities (e.g. biodegradable films and bags from EcoCortec). Today, there is growing interest in distributed energy generation that uses wood-based biomass or agricultural biomass/biogas to meet residential and industrial energy needs, with the active participation of primary producers. Wood pellet production and biomass-based heat or combined heat and power production have become investment areas in a number of countries and there is no reason to assume that Croatia would be any different. The annual cut is 7,325,000 m$^3$ in state forests, and 1,087,000 m$^3$ in private forests. While the state owns and manages over 75% of the forest area in Croatia and the public forest management company (Hrvatske Šume), which has been FSC certified since 2002, is the biggest roundwood supplier for the local wood industry, private owners still own a significant share, and their forest management decisions are likely to exert an important influence on the availability of small diameter wood for biomass for energy in the future. Appropriate policy instruments targeting private forest owners who are ready to produce woody biomass could play an important role in the future woody biomass. Private forest owners currently do not receive much government assistance or incentives. Moreover, private forests are fragmented, and the size of individual holdings is small. How these global and national developments will impact the agri-food sector and local economies in Croatia remains to be defined. In general, additional analysis to better understand the potential opportunities from management of waste, by-products, and co-products generated along agriculture, aquaculture, and forestry value chains is needed.

d) **Sustainability:** Program funding and results would be sustained under the EU policies governing the Horizon Europe Framework Program and the ESIF for the period 2021-2027. The updated EU Bio-Economy Strategy recognizes the need to exploit synergies among EU and national instruments and funds, particularly the Horizon Europe Framework Program and the ESIF. As part of the proposed budget for the 2021-2027 European research framework program, Horizon Europe, a EUR 10 billion budget has been earmarked to support research and innovation in food, agriculture, rural development and the bio-economy. In the context of the CAP, the European Agricultural Fund for Rural Development (EAFRFD) can support actions that promote sustainable management practices, value chain collaborations, innovation partnerships, community-led local development initiatives, and associated infrastructure investments. The European Maritime and Fisheries Fund (EMFF), on the other hand, can provide support to solutions addressing sea pollution, increased eco-friendly aquaculture production, development of value-added products and services from underused biomass, and the promotion of the „blue economy“ through community-led local development initiatives.

e) **Duration:** 7 years (2021-2027)

f) **Estimated amount of funding required:** A national project investment pipeline amounting to EUR 103.8 million has been identified and is expected to expand under the EU’s Horizon Europe Framework Program, ESIF, CAP and CFP/IMPE for the period 2021-2027.

g) **Preconditions - points for consideration before the project can begin:** Both national (top-down) and sub-national/territorial (bottom-up) bio-economy strategies and plans are required to build sustainable and circular bio-economies in rural areas. A National Bio-Economy Strategy will be necessary to define the inter-linkages and common bio-economy actions across EU and national funding sources and programs. Meanwhile, given that natural resource assets vary across the country,
bio-economy strategies must be tailored to specific regional/territorial contexts so as to ensure ownership and long-term commitment of local stakeholders. While working at the regional/territorial level, spatially explicit analyses can help guide the planning process by (i) mapping sustainable biomass potentials so as to minimize potential adverse consequences (particularly in food production); and (ii) identifying promising regional biomass resources and value chains for the establishment of bio-economy clusters. Spatial assessments will also be critical to determine logistical and supportive services’ needs so as to facilitate more effective utilization of biomass feedstock (i.e. agricultural and forest residues as well as organic wastes). In general, improved data and modeling capacities must be developed in partnership with the European Bio-Economy Knowledge Center and Joint Research Center to enable evidence-based bio-economy policies, strategies, and plans.

h) **Project leader:** Ministry of Agriculture

i) **Beneficiaries:** Family agricultural holdings, agri-business companies, cooperatives, employees in companies involved in fish farming/processing, and public institutions (e.g. local/regional governments, research institutions, advisory services) participating in sustainable and circular bio-economy projects.

### 7.4 Developing Croatia’s Blue Economy: Supporting Integrated and Sustainable Economic Development in Healthy Seas

a) **Description of flagship project:** The project would support the development of integrated, sustainable and healthy marine and coastal resources in Croatia.

b) **Project’s relevance to national strategic framework:** The proposed program would contribute primarily to the following development directions included in the national strategic framework: (i) *Competitive, Entrepreneurial, and Innovative Croatia*; (ii) *Regional Croatia*; and (iii) *Connected Croatia*.

c) **Economic potential and exploitation:** The project would consider 4 focus areas: (i) Improving fisheries by tackling the underlying causes of overfishing and addressing aquaculture sustainability; (ii) Addressing threats posed to the health of marine and coastal resources by marine pollution, including litter and plastics from marine or land-based sources; (iii) Sustainable development of key sectors in coastal areas such as tourism, maritime transport and off-shore renewable energy; and (iv) Building government capacity to manage marine resources.

d) **Sustainability:** Program funding and results would be sustained under the EU policies governing the ESIF for the period 2021-2027.

e) **Duration:** TBD.

f) **Estimated amount of funding required:** TBD.

 g) **Preconditions - points for consideration before the project can begin:** N/A.

h) **Project leader:** Ministry of Agriculture.

i) **Beneficiaries:** Coastal and Island Communities in Croatia.
Annex: Yield gap analysis

Crop Yield Gaps

Source: FAOSTAT (2018)

Maize

Source: FAOSTAT (2018)

Wheat

Source: FAOSTAT (2018)
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Source: FAOSTAT (2018)

### Potatoes

- **Croatia**
- **EU-13**
- **EU-15**

Source: FAOSTAT (2018)

### Primary Vegetables

- **Croatia**
- **EU-13**
- **EU-15**

Source: FAOSTAT (2018)

### Apples

- **Croatia**
- **EU-13**
- **EU-15**

Source: FAOSTAT (2018)
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Source: FAOSTAT (2018)

Livestock Yield Gaps

Source: FAOSTAT (2018)
Agriculture, fisheries, and food processing in Croatia's food & bio-economy

Source: FAOSTAT (2018)