Assessment of international markets of trout products for measuring export market potential of trout aquaculture in Pakistan

WAPI factsheet to facilitate evidence-based policy-making and sector management in aquaculture

January 2020
Preparation of this factsheet

- This factsheet summarizes the results of an international market assessment of trout products conducted to support the FAO Mission on “Assessment of market opportunities for an expanded Pakistani aquaculture” (August/September, 2019; FAO/World Bank Cooperative Programme).

- The assessment was based on data and statistics from the UN Comtrade Database (accessed on 30 July, 2019). Data reported by exporters or importers were used to measure the trout trade between them – see Slide 6 for details about the data processing methodology, which is similar to the one used by Junning Cai, Xiao Liang, Nianjun Shen and Weiwei Wang in a previous assessment of global tilapia markets conducted in 2017.

- The term “country” used in this factsheet includes non-sovereign territory. The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

- Unless noted otherwise, country grouping in this factsheet follows the United Nations M49 standard.

- The preparation of the factsheet has benefited from tables and charts generated by the World Aquaculture Performance Indicator (WAPI) Module on Fish Trade. The trade module is currently for FAO internal use, yet another two WAPI modules (one on aquaculture production and the other on fish consumption) are available for test use. Visit the WAPI webpage for more information about WAPI information and knowledge products.

- The factsheet was prepared by Junning Cai and Giulia Galli. The validity and relevance of the results depend on the quality (in terms of timeliness and accuracy) of the underlying data and statistics used in the analyses. Errors could also occur in the analyses despite our efforts to minimize them. Please let us know if you have any concern.

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Data and methodology
Market indicators

- **Market size** is measured by two indicators: (i) trade volume and (ii) trade value.

- **Market price** is measured by trade value divided by trade volume. It should be noted that at an aggregate level, directly using trade value divided by trade volume may result in an inaccurate measure of trade price because some Comtrade data points report only trade value but not trade volume. While such data points are included in the calculation of trade volume or trade value, they have been excluded from the calculation of trade prices at the aggregate level.

- **Number of suppliers** in a market has two measures. One is the **actual number of suppliers** that measures how many countries or territories export to the market. The other is the **effective number of suppliers** that measures the diversity of suppliers (i.e., the evenness of the market share distribution among suppliers). The effective number of suppliers in a market is calculated by \( \exp(-\sum s_i \ln s_i) \), where \( s_i \) denotes supplier \( i \)'s share in the market (equal to its export to the market divided by the total export of all suppliers to the market). For example, while 26 countries/territories exported trout products to Japan in 2017 (Slide 18) – i.e., the actual number of suppliers being 26 – the effective number of suppliers is only 3.67 (Slide 16), reflecting the situation that Japan's trout import market in 2017 was dominated by three suppliers, Chile (60.7 percent), Norway (13.6 percent) and Viet Nam (12.1 percent) – see Slide 18.

- **Per capita import** is calculated by dividing a country’s import of a commodity by its total population – the population data are from the United Nations World Population Prospects 2019. This indicator could give some indication of market potential, i.e., a country that has a relatively small per capita import of a commodity may have a relatively large potential in importing the commodity.
Data and methodology
The international market assessment used annual data from the UN Comtrade Database, accessed on 30 July, 2019.

Trade patterns for recent three years (2015–2017) were examined, with year 2017 being the focus. While the data for 2018 were available for many countries, they were not used because the data for China (a major trout market) were only updated to 2017 at the time of this analysis.

International trade between two countries can be measured by trade volume or value reported by the importer (i.e. import data) or that reported by the exporter (i.e. export data).

In this exercise, import data are used as the primary data, whereas export data are used as supplementary data when the import data are not available or less complete – the procedure of determining whether to use import or export data is illustrated by the flow chart on the right.

The Comtrade data on export (or import) include re-exports (or re-imports). In order to assess international trade patterns more accurately, re-exports (or re-imports) have been removed from the export (or import) data used in this exercise.

Procedure of determining whether to use import or export data

```
Import data available for 2015, 2016 and 2017
  Yes → Import data
  No → Export data

Export data available for 2015, 2016 and 2017
  Yes → Export data
  No → Import data

Import data available for 2016 and 2017
  Yes → Import data
  No → Export data

Export data available for 2016 and 2017
  Yes → Export data
  No → Import data

Import data available for 2017
  Yes → Import data
  No → Export data

Export data available for 2017
  Yes → Export data
  No → Import data

Import data available for 2016
  Yes → Import data
  No → Export data

Export data available for 2016
  Yes → Export data
  No → Import data

Import data available for 2015
  Yes → Import data
  No → Export data

Export data available for 2015
  Yes → Export data
  No → Import data

No data
```

**Trout commodities:** The trade volume or value of 6-digit HS (Harmonious System) code commodities at the country level are directly obtained from the Comtrade database. These basic data are aggregated into high-level commodity groups.

<table>
<thead>
<tr>
<th>Trout commodities</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alltrouts products</td>
<td>HS030191 + HS030211 + HS030314 + HS030321 + HS030442 + HS030482 + HS030543</td>
</tr>
<tr>
<td>Trouts, whole</td>
<td>HS030211 + HS030314 + HS030321</td>
</tr>
<tr>
<td>Trouts, fresh whole</td>
<td>HS030211</td>
</tr>
<tr>
<td>Trouts, frozen whole</td>
<td>HS030314 + HS030321</td>
</tr>
<tr>
<td>Trouts, fillet</td>
<td>HS030442 + HS030482</td>
</tr>
<tr>
<td>Trouts, fresh fillet</td>
<td>HS030442</td>
</tr>
<tr>
<td>Trouts, frozen fillet</td>
<td>HS030482</td>
</tr>
<tr>
<td>Trouts, live</td>
<td>HS030191</td>
</tr>
<tr>
<td>Trouts, smoked</td>
<td>HS030543</td>
</tr>
</tbody>
</table>
World trout market
World import of trout products, 2015–2017
The world market of trouts declined in tonnage yet increased in value between 2015–2017 with the share of smoked trouts increased from 6.95 percent (or 14.1 percent in value) to 9.7 percent (or 16.29 percent in value). The market size was nearly 0.255 million tonnes (USD 2.035 billion) in 2017, including 56.83 percent (in terms of quantity) of whole trouts, 24.74 percent of trout fillets, 8.73 percent of live trouts and 9.7 percent of smoked trouts.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>2015</th>
<th>Share (%)</th>
<th>2016</th>
<th>Share (%)</th>
<th>2017</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes</td>
<td></td>
<td>Tonnes</td>
<td></td>
<td>Tonnes</td>
<td></td>
</tr>
<tr>
<td>All trouts products</td>
<td>279 339</td>
<td>100.00</td>
<td>288 606</td>
<td>100.00</td>
<td>255 421</td>
<td>100.00</td>
</tr>
<tr>
<td>Trouts, whole</td>
<td>176 747</td>
<td>63.27</td>
<td>180 864</td>
<td>62.67</td>
<td>145 146</td>
<td>56.83</td>
</tr>
<tr>
<td>Trouts, fillet</td>
<td>62 756</td>
<td>22.47</td>
<td>63 909</td>
<td>22.14</td>
<td>63 202</td>
<td>24.74</td>
</tr>
<tr>
<td>Trouts, live</td>
<td>20 410</td>
<td>7.31</td>
<td>22 241</td>
<td>7.71</td>
<td>22 293</td>
<td>8.73</td>
</tr>
<tr>
<td>Trouts, smoked</td>
<td>19 426</td>
<td>6.95</td>
<td>21 591</td>
<td>7.48</td>
<td>24 780</td>
<td>9.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value</th>
<th>2015</th>
<th>Share (%)</th>
<th>2016</th>
<th>Share (%)</th>
<th>2017</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USD 1 000</td>
<td></td>
<td>USD 1 000</td>
<td></td>
<td>USD 1 000</td>
<td></td>
</tr>
<tr>
<td>All trouts products</td>
<td>1 633 123</td>
<td>100.00</td>
<td>1 952 979</td>
<td>100.00</td>
<td>2 034 886</td>
<td>100.00</td>
</tr>
<tr>
<td>Trouts, whole</td>
<td>766 732</td>
<td>46.95</td>
<td>1 004 576</td>
<td>51.44</td>
<td>909 746</td>
<td>44.71</td>
</tr>
<tr>
<td>Trouts, fillet</td>
<td>549 741</td>
<td>33.66</td>
<td>595 930</td>
<td>30.51</td>
<td>690 650</td>
<td>33.94</td>
</tr>
<tr>
<td>Trouts, live</td>
<td>86 450</td>
<td>5.29</td>
<td>92 487</td>
<td>4.74</td>
<td>102 913</td>
<td>5.06</td>
</tr>
<tr>
<td>Trouts, smoked</td>
<td>230 201</td>
<td>14.10</td>
<td>259 986</td>
<td>13.31</td>
<td>331 577</td>
<td>16.29</td>
</tr>
</tbody>
</table>

Note: See Slide 7 for a detailed list of trout commodities.
Product composition of world trout international market, 2017

World trout international market (quantity, 2017)

All trout products: 255,421 tonnes
- Whole: 56.8%
- Fillet: 24.7%
- Fresh: 30.7%
- Frozen: 26.1%
- Live: 8.7%
- Smoked: 9.7%

World trout international market (value, 2017)

All trout products: 2,034,886 thousand USD
- Whole: 44.7%
- Fillet: 33.9%
- Frozen: 24.8%
- Fresh: 9.1%
- Live: 5.1%
- Smoked: 16.3%

Notes: See Slide 7 for a detailed list of trout commodities.
### Top 10 trout exporters (by value) to the world market, 2017

<table>
<thead>
<tr>
<th>Top 10 suppliers by value</th>
<th>Export of trout products to the world market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value (USD 1 000)</td>
</tr>
<tr>
<td>Chile</td>
<td>530 005</td>
</tr>
<tr>
<td>Norway</td>
<td>426 625</td>
</tr>
<tr>
<td>Denmark</td>
<td>170 346</td>
</tr>
<tr>
<td>Poland</td>
<td>152 509</td>
</tr>
<tr>
<td>Turkey</td>
<td>130 444</td>
</tr>
<tr>
<td>Sweden</td>
<td>92 374</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>40 926</td>
</tr>
<tr>
<td>China</td>
<td>40 199</td>
</tr>
<tr>
<td>Italy</td>
<td>39 568</td>
</tr>
<tr>
<td>Peru</td>
<td>36 346</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>375 543</td>
</tr>
<tr>
<td>World</td>
<td>2 034 886</td>
</tr>
<tr>
<td>Southern Asia</td>
<td>2 928</td>
</tr>
<tr>
<td>Pakistan</td>
<td>90</td>
</tr>
</tbody>
</table>
Regional trout markets
Regional trout markets

Ranked by market value
- Europe (47.92 percent of the world market value).
- Asia (38.39 percent)
- Northern America (11.88 percent)
- Latin America and the Caribbean (LAC; 0.77 percent).
- Oceania (0.59 percent)
- Africa (0.36 percent)

Ranked by market price
- Oceania (USD 15.74/kg)
- Northern America (USD 11.79/kg)
- Asia (USD 10.16/kg)
- Europe (USD 6.43/kg)
- LAC (USD 4.09/kg)
- Africa (USD 3.68/kg)

Ranked by per capita import (kg/person)
- Europe (0.2 kg; USD 1.31)
- Northern America (0.06 kg; USD 0.76)
- Oceania (0.02 kg; USD 0.29)
- Asia (0.02 kg; USD 0.17)
- LAC (0.01 kg; USD 0.02)
- Africa (0.002 kg; USD 0.01)

Regional markets of trout export, 2017

<table>
<thead>
<tr>
<th>Regional markets</th>
<th>Trout import of each region</th>
<th>Per capita import</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value (USD 1 000)</td>
<td>Share of total world import (%)</td>
</tr>
<tr>
<td>Africa</td>
<td>7 369</td>
<td>0.36</td>
</tr>
<tr>
<td>Americas</td>
<td>257 486</td>
<td>12.65</td>
</tr>
<tr>
<td>LAC</td>
<td>15 719</td>
<td>0.77</td>
</tr>
<tr>
<td>Northern America</td>
<td>241 766</td>
<td>11.88</td>
</tr>
<tr>
<td>Asia</td>
<td>781 294</td>
<td>38.39</td>
</tr>
<tr>
<td>Europe</td>
<td>975 127</td>
<td>47.92</td>
</tr>
<tr>
<td>Oceania</td>
<td>11 949</td>
<td>0.59</td>
</tr>
<tr>
<td>World</td>
<td>2 034 886</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Notes: LAC = Latin America and the Caribbean. World market value or volume may include that of unspecified areas.
Sub-regional trout markets (share of the world market value)
- Eastern Asia (30.8 percent)
- Western Europe (21.45 percent)
- Eastern Europe (12.91 percent)
- Northern America (11.88 percent)
- Northern Europe (10.89 percent)
- South-Eastern Asia (6.44 percent)
- Southern Europe (2.67 percent)
- Western Asia (0.83 percent)
- Australia and New Zealand (0.58 percent)
- Caribbean (0.57 percent)
- Southern Africa (0.26 percent)
- Southern Asia (0.25 percent)
- South America (0.1 percent)
- Central America (0.1 percent)
- Central Asia (0.08 percent)
- Northern Africa (0.07 percent)
- Western Africa (0.02 percent)
- Eastern Africa (0.01 percent)
- Pacific islands (0.007 percent)
- Middle Africa (0.001 percent)

Regional/sub-regional markets of trout exports, 2017

Notes: regions or sub-regions with a less than 0.5 percent share of the world market may not be labelled in the chart.
Countries and trade unions
Major country or trade union markets of trout export, 2017: EU and Japan were the largest international trout markets (together accounting for over 60 percent of the world market). NAFTA accounted for 11.95 percent of the world market, reflecting primarily the trout import of the United States of America (8.49 percent of the world total). EAEC/EurAsEC and ASEAN are another two trade blocs with relatively large trout imports. Pakistan as well as its neighbouring regions (GCC and SAARC) had only a small amount of trout import in 2017.

<table>
<thead>
<tr>
<th>Top 10 trout markets</th>
<th>World trout export to each market</th>
<th>Number of suppliers</th>
<th>Per capita import</th>
<th>Actual</th>
<th>Effective</th>
<th>USD/person</th>
<th>kg/person</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU28</td>
<td>792 255</td>
<td>38.93</td>
<td>124 730</td>
<td>6.33</td>
<td>69</td>
<td>12.68</td>
<td>1.55</td>
</tr>
<tr>
<td>Japan</td>
<td>546 300</td>
<td>26.85</td>
<td>46 310</td>
<td>11.80</td>
<td>26</td>
<td>3.67</td>
<td>4.28</td>
</tr>
<tr>
<td>United States of America</td>
<td>172 747</td>
<td>8.49</td>
<td>14 759</td>
<td>11.70</td>
<td>37</td>
<td>5.92</td>
<td>0.53</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>76 429</td>
<td>3.76</td>
<td>11 186</td>
<td>6.83</td>
<td>12</td>
<td>5.54</td>
<td>0.53</td>
</tr>
<tr>
<td>Canada</td>
<td>68 843</td>
<td>3.38</td>
<td>5 725</td>
<td>12.03</td>
<td>32</td>
<td>6.20</td>
<td>1.87</td>
</tr>
<tr>
<td>Belarus</td>
<td>58 166</td>
<td>2.86</td>
<td>7 838</td>
<td>7.42</td>
<td>12</td>
<td>1.99</td>
<td>6.15</td>
</tr>
<tr>
<td>Thailand</td>
<td>55 775</td>
<td>2.74</td>
<td>6 782</td>
<td>8.22</td>
<td>15</td>
<td>2.77</td>
<td>0.81</td>
</tr>
<tr>
<td>China</td>
<td>53 075</td>
<td>2.61</td>
<td>6 629</td>
<td>8.01</td>
<td>12</td>
<td>4.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>32 405</td>
<td>1.59</td>
<td>6 783</td>
<td>4.78</td>
<td>15</td>
<td>6.03</td>
<td>0.34</td>
</tr>
<tr>
<td>Switzerland</td>
<td>26 111</td>
<td>1.28</td>
<td>2 271</td>
<td>11.50</td>
<td>24</td>
<td>5.93</td>
<td>3.09</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>152 779</td>
<td>7.51</td>
<td>22 407</td>
<td>6.82</td>
<td>214</td>
<td>22.32</td>
<td>0.25</td>
</tr>
<tr>
<td>World</td>
<td>2 034 886</td>
<td>100.00</td>
<td>255 421</td>
<td>7.96</td>
<td>115</td>
<td>13.75</td>
<td>0.27</td>
</tr>
<tr>
<td>NAFTA (North American Free Trade Agreement)</td>
<td>243 225</td>
<td>11.95</td>
<td>20 602</td>
<td>11.81</td>
<td>46</td>
<td>6.98</td>
<td>0.50</td>
</tr>
<tr>
<td>EAEC/EurAsEC (Eurasian Economic Community)</td>
<td>136 028</td>
<td>6.68</td>
<td>19 288</td>
<td>7.05</td>
<td>23</td>
<td>6.31</td>
<td>0.72</td>
</tr>
<tr>
<td>ASEAN (Association of Southeast Asian Nations)</td>
<td>131 137</td>
<td>6.44</td>
<td>18 242</td>
<td>7.19</td>
<td>39</td>
<td>4.70</td>
<td>0.20</td>
</tr>
<tr>
<td>GCC (Gulf Cooperation Council)</td>
<td>4 184</td>
<td>0.21</td>
<td>1 024</td>
<td>4.08</td>
<td>30</td>
<td>7.84</td>
<td>0.08</td>
</tr>
<tr>
<td>(SAARC) South Asian Association for Regional Cooperation</td>
<td>407</td>
<td>0.02</td>
<td>152</td>
<td>2.68</td>
<td>19</td>
<td>5.46</td>
<td>0.00</td>
</tr>
<tr>
<td>Pakistan</td>
<td>4.4</td>
<td>0.0002</td>
<td>0.6</td>
<td>7.73</td>
<td>1</td>
<td>1.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Notes: The members of NAFTA include Canada, Mexico and the United States of America. The members of GCC include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. The members of EAEC/EurAsEC include Belarus, Kazakhstan, Kyrgyzstan, Russian Federation and Tajikistan. The members of ASEAN include Brunei Darussalam, Cambodia, Indonesia, Lao People’s Democratic Republic, Malaysia, Myanmar, Philipines, Singapore, Thailand and Viet Nam. The members of SAARC include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
EU: Import of trouts, 2017

Note: See Slide 7 for a detailed list of trout commodities.
Japan: Import of trouts, 2017

Japan import of trout products (2017): 46 310 tonnes

- Whole: 29.5%
- Fillet: 67.0%
- Smoked: 3.5%
- Frozen: 27.1%
- Fresh: 1.7%

Top 10 trout exporters to Japan (2017, tonnes):

- Chile: 28 114 tonnes
- Norway: 6 303 tonnes
- Viet Nam: 5 587 tonnes
- China: 1 830 tonnes
- Denmark: 1 121 tonnes
- Iceland: 961 tonnes
- Peru: 491 tonnes
- Turkey: 346 tonnes
- Finland: 331 tonnes
- Poland: 282 tonnes
- Rest of the world: 945 tonnes

Note: See Slide 7 for a detailed list of trout commodities.
NAFTA: Import of trouts, 2017

Notes: NAFTA (North American Free Trade Agreement) includes Canada, Mexico and United States of America. See Slide 7 for a detailed list of trout commodities.
EAEC/EurAsEC: Import of trouts, 2017

Note: The members of SAARC include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. See Slide 7 for a detailed list of trout commodities.
ASEAN: Import of trouts, 2017

Note: ASEAN (Association of Southeast Asian Nations) includes Brunei Darussalam, Cambodia, Indonesia, Lao People’s Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. See Slide 7 for a detailed list of trout commodities.
Gulf Cooperation Council (GCC): Import of trouts, 2017

Notes: The members of GCC include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. See Slide 7 for a detailed list of trout commodities.
South Asian Association for Regional Cooperation (SAARC): Import of trouts, 2017

Note: The members of SAARC include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. See Slide 7 for a detailed list of trout commodities.
Pakistan’s trout exports
Pakistan’s trout exports (2017): The Comtrade statistics record 20 tonnes of trout exports from Pakistan in 2017, including 16 tonnes of frozen whole trout to Thailand and 3.18 tonnes and 0.51 tonnes of fresh whole trout to UAE and Oman, respectively.

Note: See Slide 7 for a detailed list of trout commodities.
Export marketing strategy for trout aquaculture in Pakistan
Export marketing strategy for trout aquaculture in Pakistan

- Trout is a high-value, niche farming species in Pakistan with no established export markets.
- In the short run, Pakistan could target the neighbouring GCC (Slide 22) and SAARC (Slide 23) markets, which primarily import fresh whole trout from neighbouring suppliers.
- Pakistan could also target the EAEC/EurAsEC (Slide 20) and ASEAN (Slide 21) markets, which primarily import fresh or frozen whole trout.
- In the long run when Pakistan has established its competitiveness in trout farming, it could target major trout markets, including EU (Slide 17), Japan (Slide 18) and NAFTA (Slide 19).