The file **Export\_data.xlsx** contains World Bank data on various export-related variables by countries for the year 2018.

Source: <https://databank.worldbank.org/source/world-development-indicators>

**Variables Description**

* CountryName - Country Name
* CountryCode - Country Code
* Agriculturalrawmaterialsexpor - Agricultural raw materials exports (% of merchandise exports)
* ArmsexportsSIPRItrendindica - Arms exports (SIPRI trend indicator values)
* Commercialserviceexportscurr - Commercial service exports (current US dollars)
* Communicationscomputeretc - Communications, computer, etc. (% of service exports, BoP)
* Exportsofgoodsandservices - Exports of goods and services (% of GDP)
* Exportsofgoodsandservicesa - Exports of goods and services (annual percent growth)
* ExportsofgoodsandservicesB - Exports of goods and services (BoP, current US dollars)
* Exportsofgoodsandservicesc - Exports of goods and services (constant 2010 US dollarc)
* Foodexportsofmerchandisee - Food exports (% of merchandise exports)
* GoodsexportsBoPcurrentUS - Goods exports (BoP, current US dollars)
* Fuelexportsofmerchandisee - Fuel exports (% of merchandise exports)
* Hightechnologyexportsofma - High-technology exports (% of manufactured exports)
* Hightechnologyexportscurrent - High-technology exports (current US dollars)
* TaxesonexportscurrentLCU - Taxes on exports (current LCU)
* Transportservicesofservice - Transport services (% of service exports, BoP)
* Travelservicesofcommercial - Travel services (% of commercial service exports)
* Travelservicesofserviceex - Travel services (% of service exports, BoP)

Please consider the following tasks.

1. Conduct a factor analysis using the following variables:

* Arms exports (SIPRI trend indicator values)
* Commercial service exports (current US$)
* Communications, computer, etc. (% of service exports, BoP)
* Travel services (% of commercial service exports)
* High-technology exports (% of manufactured exports)
* Agricultural raw materials exports (% of merchandise exports)
* Food exports (% of merchandise exports)
* Transport services (% of service exports, BoP)
* Fuel exports (% of merchandise exports)

2. Evaluate the data factorability. Interpret the results.

3. Calculate communalities. Interpret the results.

4. Give your comments on the cumulative variance of the initial variables explained by the factor model.

5. Describe the rotated factor loading matrix.

6. Describe each factor. Give a name to each factor. It’s very important here to describe what each factor means and what it evaluates.

7. Save factors as new variables in the original dataset.

8. Evaluate another specification of the factor model (based on different set of variables for which the analysis is appropriate).

Please send the Jupyter Notebook with comments and answers to amelikyan@hse. The task should be done **individually**.The deadline for submitting the task is **6 April 21:00**.