



Online Summer School Course in
"Sustainable manufacturing in Industry 4.0: technologies and solutions"



co-organized by the Norwegian University of Science and Technology (NTNU) and
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (KPI)

COMPETITON 4.0



Anna Kukharuk
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Igor Sikorsky Kyiv Polytechnic Institute

Ph.D. in Economics since 2014, Associate Professor at Igor Sikorsky Kyiv Polytechnic Institute. Education: economist-auditor, teacher of economics. Anna has practical experience in the field of receivables management of international companies and advertising. The subject of her scientific work: competition and competitiveness of a company.

Lecturer at the university since 2010.

She is the author of more than 70 scientific papers and 4 books.

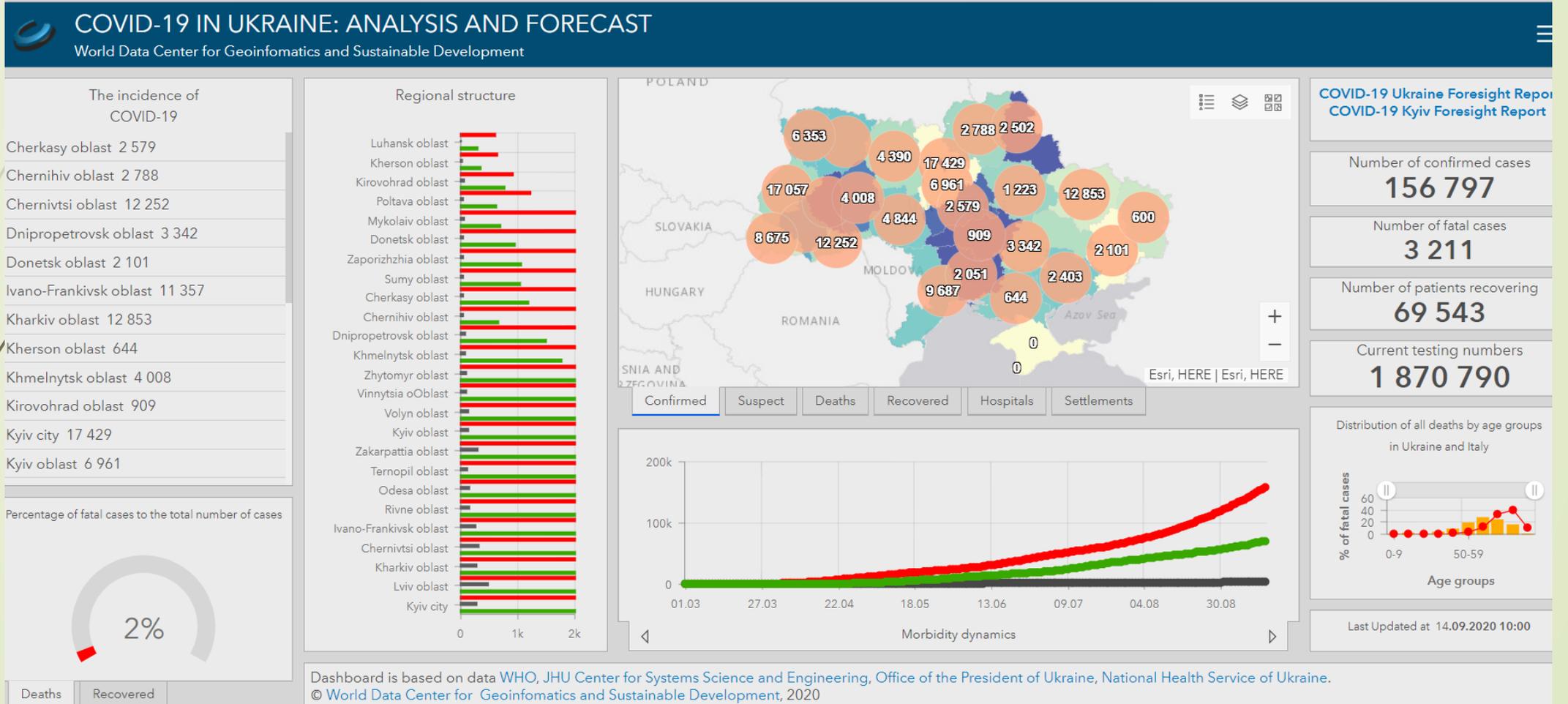
My scientific interests today:

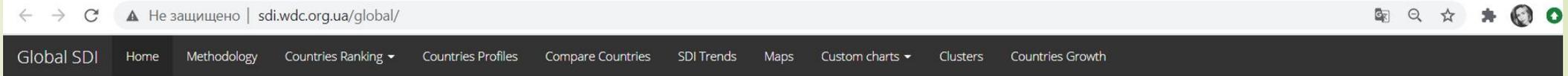
- ❖ Business competition
- ❖ Economic sustainability of a company
- ❖ Industry 4.0: economic measurement
- ❖ Sustainable development

In 2017-2019 I worked as a researcher in the World data center for geoinformatics and sustainable development

<http://wdc.org.ua/en>







Sustainable Development Modeling 2020

The modeling based on Metrics for measuring the Sustainable Development processes were proposed and copyrighted by ISC WDS World Data Center for Geoinformatics and Sustainable Development .

Proposed models takes into account three components: economic, environmental and social. And total quantitative assesement of sustainable development of territories in context of quality and safety of human life is provided through the **Sustainable Development Index (SDI)**.



Structure of the lecture

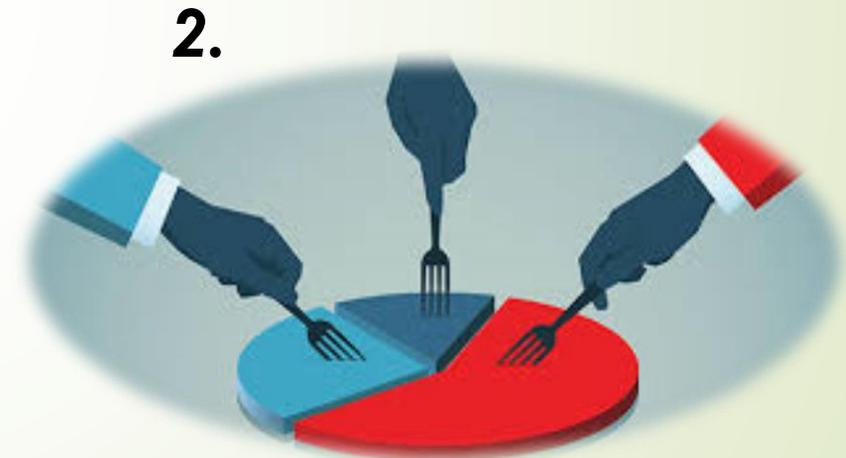
- The Concept and debates
- The components of the successful business
- Industry 4.0 environment
- Tools of competition in business
- Factors of competitiveness of machine-building companies
- Main challenges and solutions for business

I. The Concept of Competition

Competition is the rivalry between *companies/countries* selling/exporting *similar products and services* with the goal of achieving *revenue/domestic income, and market share growth*. It's the core of the success or failure of firms, industries, regions and countries.



Competition
nowadays



Competition
in the past

Competition between....

Companies

Business models

People and
machines

Products

Ideas

People

What profession robots will never replace?

Important names

8



Michael Eugene Porter

(born May 23, 1947)

An American academic known for his theories on economics, business strategy, and social causes. He is the Bishop William Lawrence University Professor at Harvard Business School, and he was one of the founders of the consulting firm The Monitor Group (now part of Deloitte) and FSG, a social impact consultancy. He is credited for creating Porter's five forces analysis, which is instrumental in business strategy development today.



Paul Robin Krugman

(born February 28, 1953)

An American economist who is the Distinguished Professor of Economics at the Graduate Center of the City University of New York, and a columnist for The New York Times. In 2008, Krugman was awarded the Nobel Memorial Prize in Economic Sciences for his contributions to New Trade Theory and New Economic Geography.

Krugman vs Porter



Countries do not compete the way corporations do.



Even though firms compete each other for getting a greater market share and the success of a business means the failure of another, the success of a country or a region creates more than destroys the opportunities for others and as known, trade among nations is not a game "without result".

What Are the Key Components of Competitive Success in Business?



Fig. 1. The main components of the successful busines

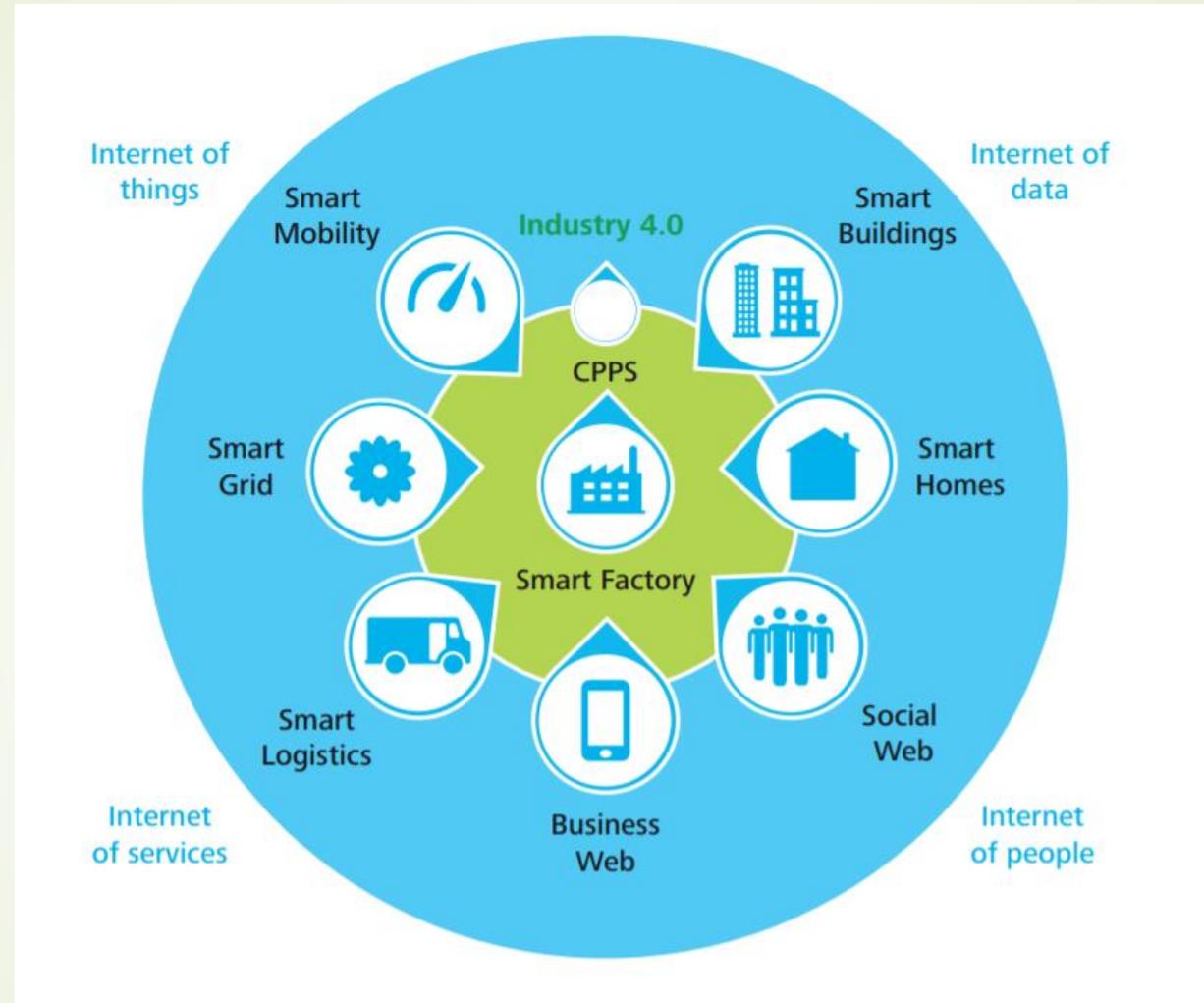


Fig. 2 Industry 4.0 Environment

Deloitte, 2015

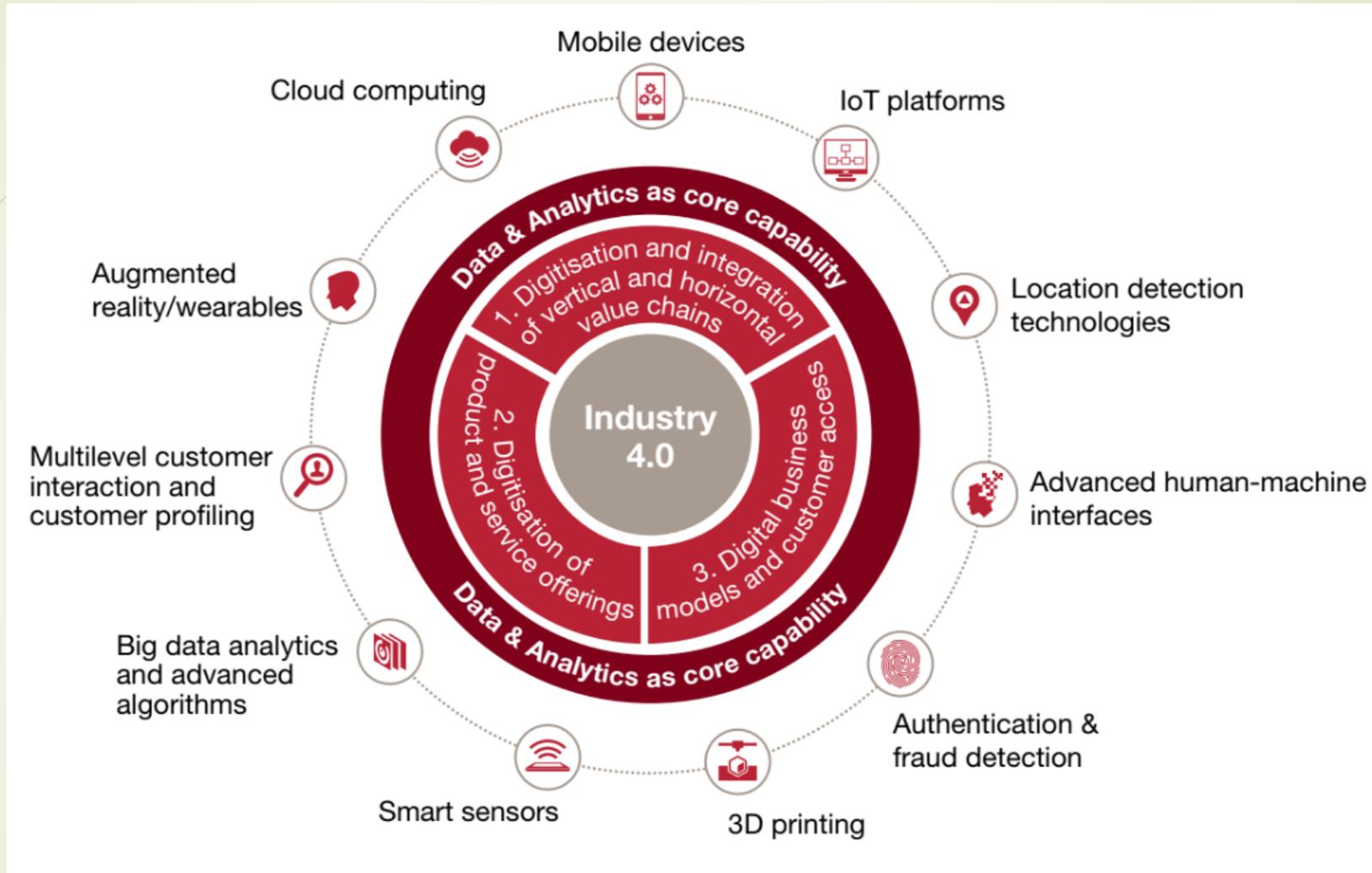


Fig. 3 Sources of competitive advantages of a Company 4.0

PwC, 2016

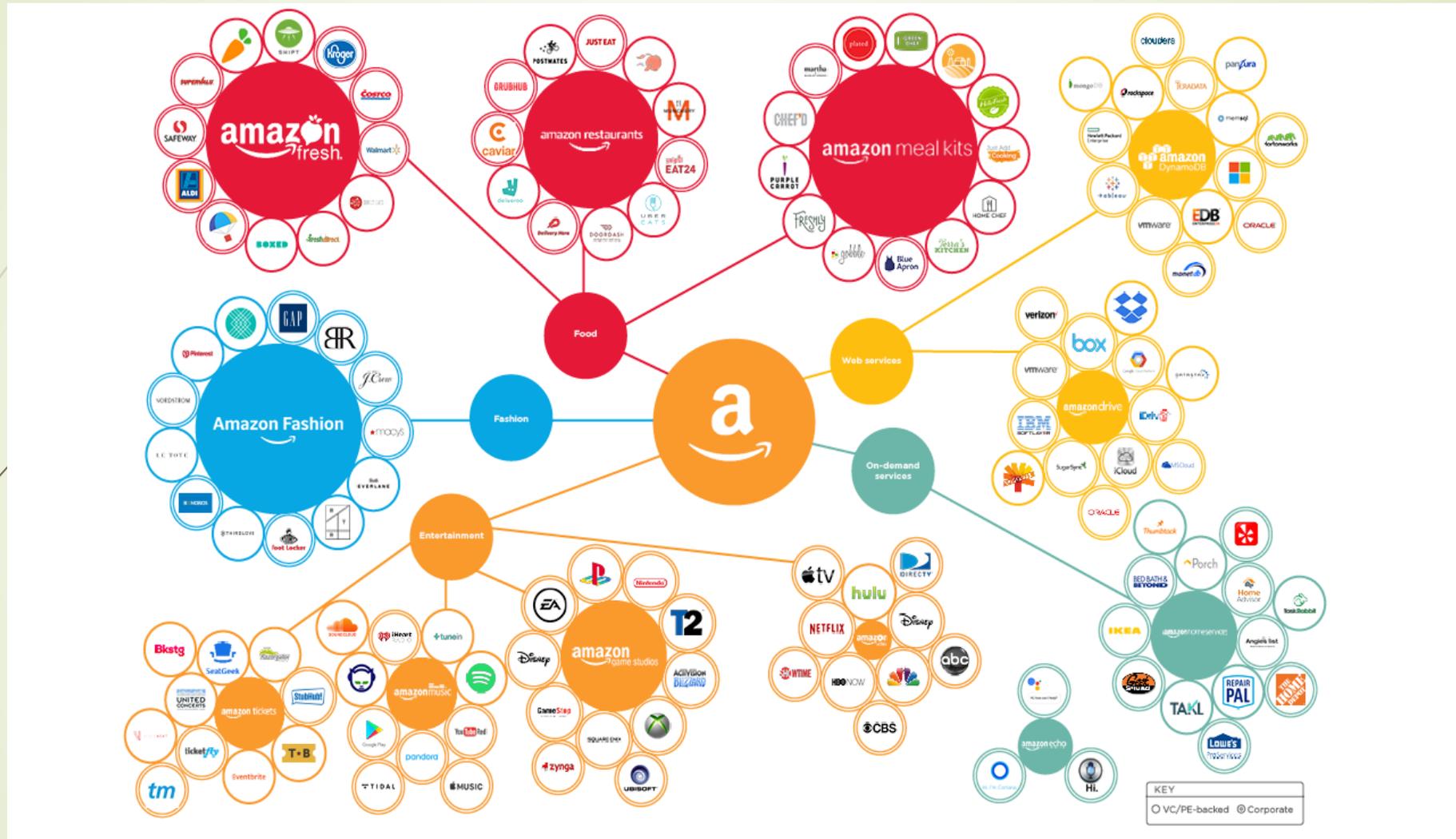


Fig. 4 Development of Amazon

Amazon competitors comparison

| Company | Founded | Headquarters | Annual revenue |
|------------|---------|-----------------------|----------------|
| Amazon | 1994 | Seattle, WA, US | \$280.52B |
| Alibaba | 1999 | Hangzhou, China | \$72B |
| eBay | 1995 | San Jose, CA, US | \$10.75B |
| JD.com | 1998 | Beijing, China | \$82.865B |
| Rakuten | 1997 | Tokyo, Japan | \$7.2B |
| Zalando | 2008 | Berlin, Germany | \$7.7B |
| Flipkart | 2007 | Bangalore, India | \$6.3B |
| Etsy | 2005 | Brooklyn, NY, US | \$818.79M |
| Apple | 1976 | Cupertino, CA, US | \$260.2B |
| Staples | 1986 | Framingham, MA, US | \$20.22B |
| Walmart | 1962 | Rogers, AR, US | \$524B |
| Home Depot | 1978 | Atlanta, GA, US | \$110.2B |
| BestBuy | 1966 | Richfield, MN, US | \$42.88B |
| Target | 1902 | Minneapolis, MN, US | \$78.11B |
| Macy's | 1858 | New York, NY, US | \$24.97B |
| Wayfair | 2002 | Boston, MA, US | \$9.13B |
| Facebook | 2016 | Menlo Park, CA, US | \$70.7B |
| Pinterest | 2009 | San Francisco, CA, US | \$1B |

www.yieldify.com

What are their tools of competition?

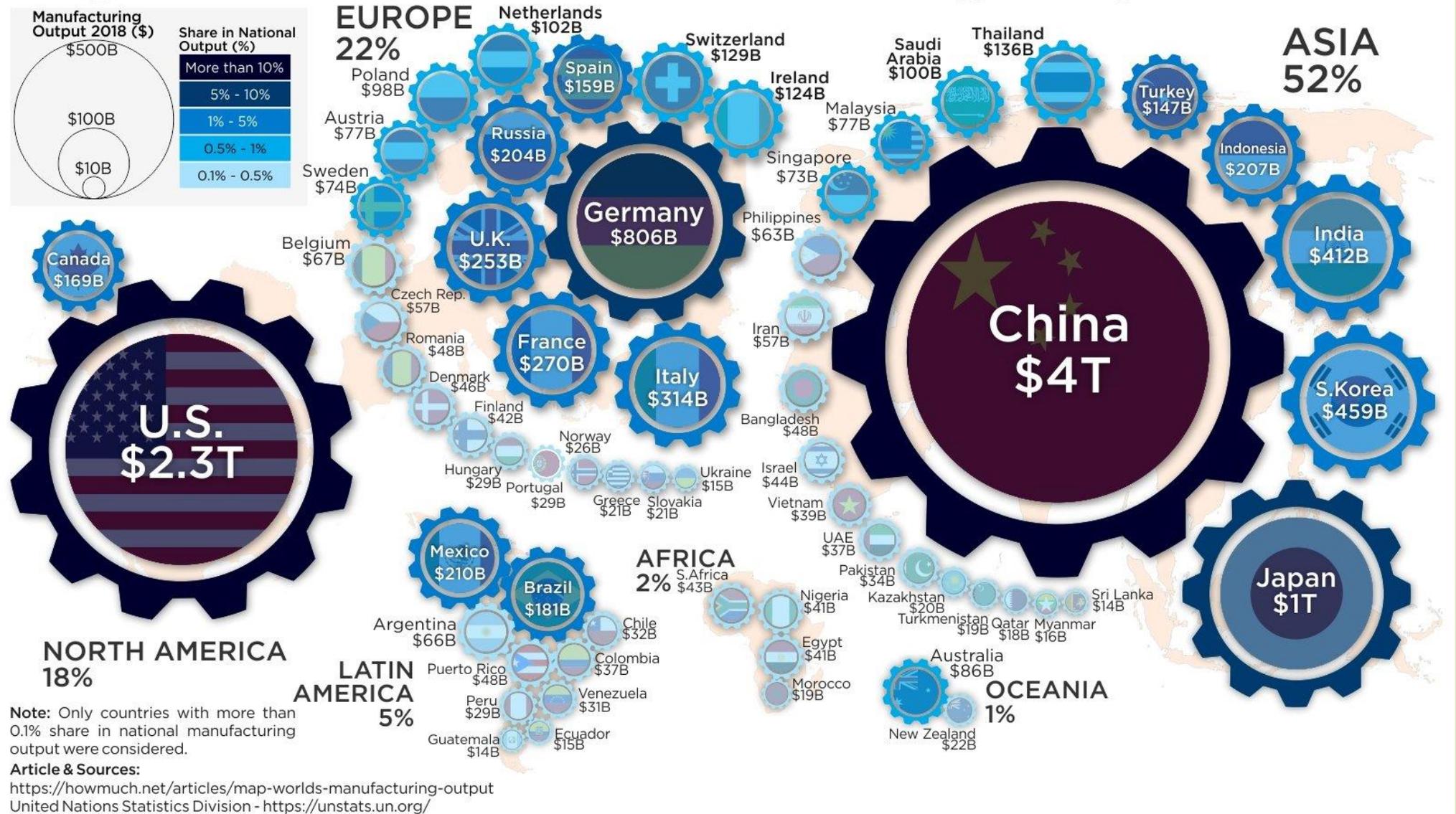


- **Leveraging branding**
- **Customer data usage**
- **Focus on customer experience**
- **Advertising on marketplaces**

What are the tools of competition of an industrial company?



Map of the World's Manufacturing Output



Recent supervised student work

Victoria Vanzha,
Bachelor of Economics,
2020, KPI

Topic of her thesis:

Improving the international competitiveness of
machine-building enterprises in terms of Industry 4.0

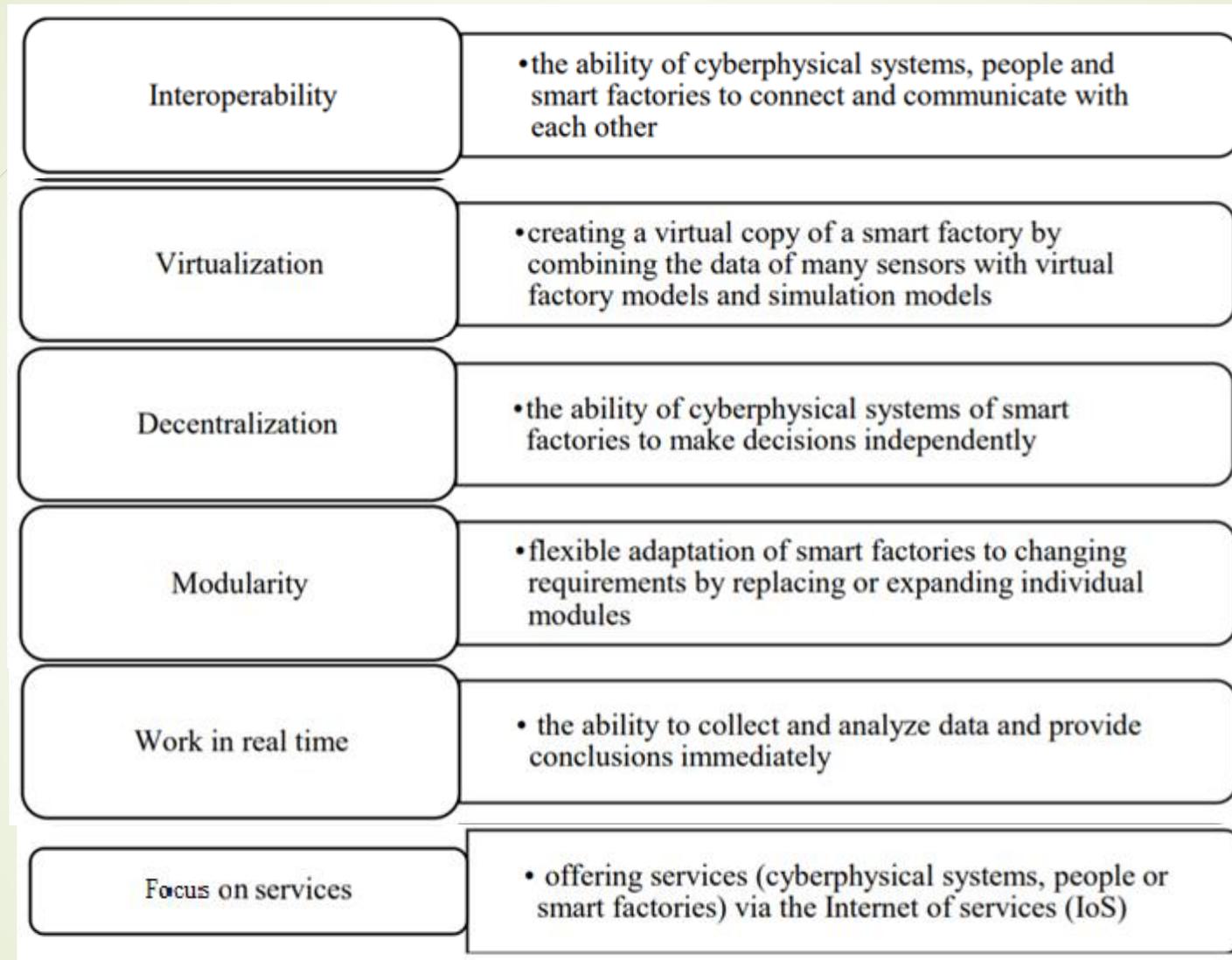


Fig. 4. Components of the competitiveness of machine-building enterprises on the basis of Industry 4.0

Procedure for increasing the competitiveness of the enterprise in terms of Industry 4.0

| | | | |
|---------|---|---|--|
| Stage 1 | Collection of data on the micro and macro environment of the enterprise | | |
| | Identify a group of companies that are functioning in the same external environment | Definition of indicators that determine the competitiveness of the enterprise in the conditions of Industry 4.0 | Collection of data on the internal environment of the enterprise |
| Stage 2 | Analysis and assessment of the current situation at the enterprise | | |
| | Assessment of the current competitiveness of the enterprise | Analysis of current goals and their relevance in the context of Industry 4.0 | Analysis of factors that can be influenced and their impact on the competitiveness of the enterprise |
| Stage 3 | Development of a strategy to increase the competitiveness of the enterprise | | |
| | Defining technological and other goals of the enterprise | Justification of necessary measures in the conditions of Industry 4.0 | Development of a list of measures that will turn potential innovative competitive advantages into actual ones |
| | Identify company problems that can be solved with the latest technology | Finding a contractor who is an expert in digital enterprise transformation | MVP development |
| Stage 4 | Implementation of a strategy to increase the level of competitiveness of the enterprise | | |
| | Identification of priority measures in the short term and their implementation | Identification of priority measures in the long run and search for tools for their implementation | Forming a list of innovations that will increase staff productivity |
| | Professional retraining of staff | The transition to the holistic integration of the latest developments of the enterprise | Practical realization of the planned purposes |
| Stage 5 | Enterprise competitiveness monitoring and feedback system | | |
| | Formation of a system of indicators for the implementation of short- and long-term measures | Monitoring of internal and external factors of competitiveness | Development of corrective actions depending on the impact of the development and implementation of new production and resource saving technologies |

What are the main Industry 4.0 Challenges for Business?



Financial Challenge

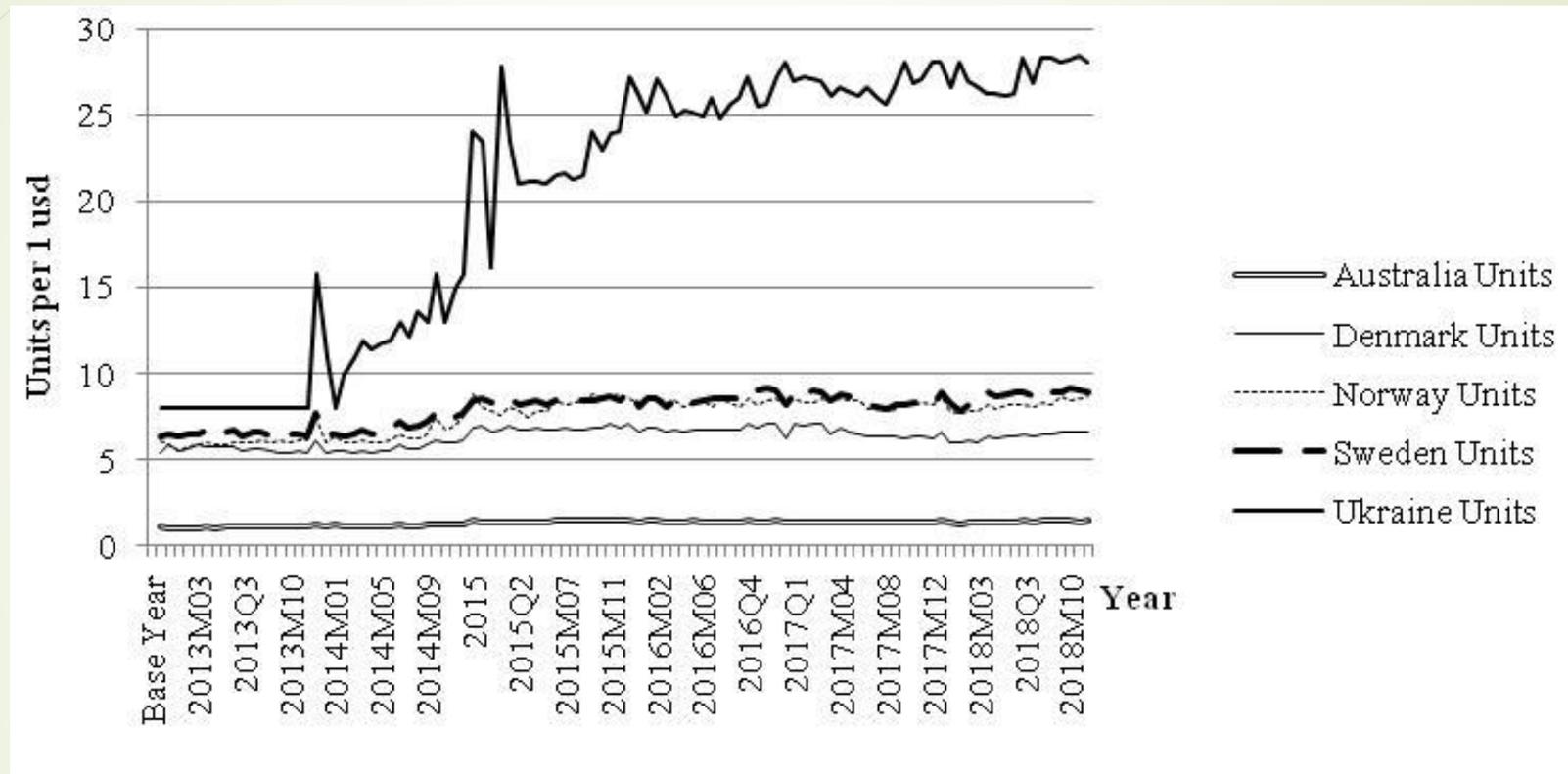


Fig. 5. The dynamics of the exchange rate of the national currency to the US dollar in the countries of the world, units per 1 \$.

What can we do?

In order to overcome the negative influence of the financial factor, the following steps of the CME are needed:

Continuous financial selfassessmen

Identification of priority sources of financing for production and commercial activity and innovation projects

Development of strategy for diversification of financial risks

Development of export strategy, including search for ways to minimize transaction costs

Informational Challenge

In the conditions of the rapid development of the digital economy, the ability to quickly obtain the necessary information and use it as a tool for economic growth has a strategic importance for enterprises in all industries.

The components of information resources of the enterprises are as follow:

data in the production information system, as well as knowledge and experience of the staff;

knowledge and experience of consumers, partners and other contractors of the enterprise, its brand, image, and communication circuits.

What can we do?

- ✦ Cybersecurity must become an ordinary thing
- ✦ The intellectual capital must work



Technological Challenge

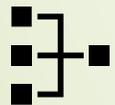
Industry 4.0 has some very **important advantages** for people, business, and government, namely:



An unprecedented (exponentially, not linear) growth of innovation – regarding their speed, volume and impact. This will greatly improve efficiency, productivity and cost savings.



Non-linear growth of data and the possibilities for their use for new technologies already makes it easier to attract different types of developers – customer users and promote development in many ways.



Artificial intelligence becomes a reality – there are many examples may be seen nowadays, e.g. mass robotics and biotechnology.

Technological Challenge



Wealthy countries at the level of property rights own all the new technologies. Poor countries are already becoming the suppliers of the raw material and human resources for the rich ones.



Threat of cyber security will grow – a lot of polls in the world point to managers' concerns about new threats of cyber attacks.

What Are the Key Components of Competitive Success in Business?



KEY SME'S COMPETITIVENESS COMPONENTS

| Source of the competitive advantages | Particular components of the competitiveness | Key for Industry 4.0 |
|--|---|----------------------|
| Production potential | Main production assets; efficiency, availability of capacities, the possibility of their rapid involvement, ability to meet relevant market needs | - |
| Resources | Material resources: sufficiency, quality, level of expenses for supply and storage, dependence on suppliers. Labor: sufficiency, level of education, experience, etc. Information: availability of data and databases, the possibility to update them constantly. | - |
| Financing | Availability and stability of financing; the possibility of investing in innovative projects. | + |
| Management | The possibility of rapid transfer of managerial decision to execution, controllability. Managers: professionalism, credibility, trust. | + |
| R&D | Own laboratory raw materials and products quality control. Waste reducing. Development of new products. Rationalization of production. | + |
| Marketing | Market research. Distribution of manufactured products (use of existing networks, creation of own network) etc. | - |
| Information potential | Ability to involve, use and develop informational resources. | + |
| Technological readiness and development | Ability to improve the available technology, to change or develop the main technology of production, to use new methods for automated quality control, implementing Internet of Things concept. | + |

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Thanks!