LIMITATION AND CHALLENGES IN DIGITALIZATION

Harald Kitzmann (к.е.н. МГТУ им. Н.Э. Баумана)
Professor
Institute of Circular Economy and Technology
TTK University of Applied Sciences, Tallinn Estonia

1. **INTRODUCTION**
2. **IMPACT ON DEMAND AND ON EFFECTIVE AND EFFICIENT USAGE OF RESOURCES**
3. **LEGITIMACY ON DEMAND AND USAGE OF RESOURCES**

1. INTRODUCTION

Digitalization (definition):

- digital transformation, presentation, implementation of information and communication
- digital modification of instruments, devices and vehicles to preserve and to make analogue available data available to a wider range of target or user group
- to support the development process in volatile environments.

Wider understanding:

- Aspects of digital Revolution/digital changing

1. INTRODUCTION

History:

In the 20th century information technology (IT) mainly used for

- automation and optimization,
- modernizing private household and workplaces,
- creating computer networks and software products (Office programs and Enterprise Resource Planning systems)

At the beginning of the 21st century, the focus was on

- disruptive technologies and innovative business models,
- autonomous activities, flexibility and individualization in digitalization.

Nower days: Fourth Industrial Revolution/ Industry 4.0 (also "Enterprise 4.0")

1. INTRODUCTION

Impact of digitalization:

- effective and efficient demand and usage of resources
  (executing workforce, material, immaterial factors and dispositive workforce)
- legitimacy aspects on digitalisation

2. EFFECTIVE AND EFFICIENT DEMAND AND USAGE OF RESOURCES

Increasing of the data volume (170 zettabyte in 2025, which means a tenfold increase since 2015) has impact on

- creation and maintenance of devises for data entry, transfer and storage,
- methods to process data and creating information, knowledge and wisdom.

⇒ Significant increasing (+60%) of energy demand in the next 5 years (based on dealing with higher data volumns)

⇒ Demand on rare earth materials creates significant increasing of especially external costs (access to these materials based on their limited availability)

=> Higher risk and efforts in protection of unallowed access to information and their change or destroying.

2. EFFECTIVE AND EFFICIENT DEMAND AND USAGE OF RESOURCES

Actual research activities in describing of the process of creating knowledge and wisdom are focusing:

- overcoming the limitation of causality understanding
- Handling the dualism in decision making (intuition and delibration, operative and strategic, etc)
- Digitalisation of decision making
  - = Quantum Decision Theory (Yukalov, V.I. ;Sornette, D)
  - = Tri-partite Management (Rüegg-Stürm, St. Gallen)
  - = cybernetic management (e.g. flexibility management acc. Kitzmann)
  - = screenplay approaches (Urbanek, Krail)
- development of digital business models,
- the quantitative business modelling and the usage of big data
- digital products

Causality is limitating the describing process of creating knowledge and wisdom

2. EFFECTIVE AND EFFICIENT DEMAND AND USAGE OF RESOURCES

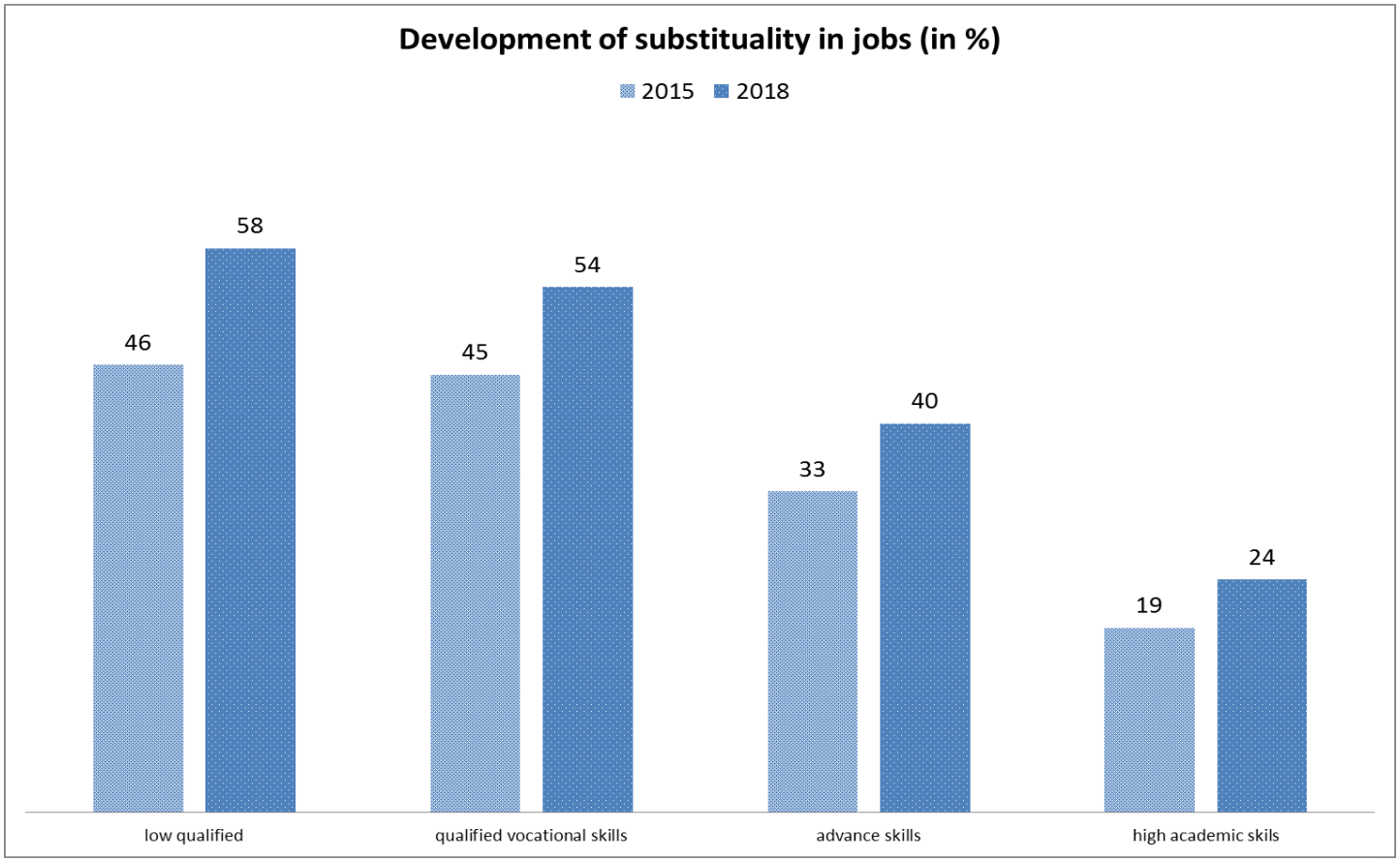
Advantages in using crypto currencies and Blockchain concepts as replacement for fiat money and commodity money,

Limitations in technological and economical feasibility in using them for covering all worldwide payment transactions; especially limits in regard to create crypto money.

=> credit cards or gold request significant lower energy amount to create and manage.

100 % crypto payment transactions => technological and economical not feasible

2. EFFECTIVE AND EFFICIENT DEMAND AND USAGE OF RESOURCES



Digitalisation will not replace workforces, and potential on substituality will not be used

3. LEGITIMACY ON DEMAND AND USAGE OF RESOURCES

Questions in the focus of the actual discussion:

- Ownership of information

- Methods to process data and creating information, knowledge and wisdom
  => aspects of reliability, authencity and validity

3. LEGITIMACY ON DEMAND AND USAGE OF RESOURCES

Individual development of nations slowing down global challenges of digitalization

Understandings of ownership and rights on information are not regulated globally

- **Russian Federation and the Peoples Republic of China** follow the OECD guideline and focusing on global agreements

- **The US** has different regulation on state and national level, as well as case law and company specific regulations; mainly focus on protecting the economical individuals and ensure their developments.

  => protecting the power of economical individuals.

- **Europe and especially in Germany** – individual data protecting rules to have control over the personal data

3. LEGITIMACY ON DEMAND AND USAGE OF RESOURCES

Understandings of ownership and rights on information are not regulated globally

understandings from the European side (ethical aspects)

- beside economic and targets of growth considering social and environmental targets, development policy and policy of peace to ensure the smooth sustainable development
- consider and support democratic processes,
- Regulate the accessibility to all market participants of the resource information and control and avoid monopolistic behaviour in the market,
- Ensure the critical and emancipatory usage of digitalisation and digital technologies, which includes also the ability the evaluation of validity of information
- Strength the producer's liability to move the liability from the software user to the producer
- Ensure the lifelong maintenance of devises and software without planned obsolescence.

3. LEGITIMACY ON DEMAND AND USAGE OF RESOURCES

Different future scenarios setting limits to a general view on digital development

Sustainable development of life

Priority setting of digitalization compare to other development targets:

- Competition between rare earth material and other sources (agriculture)
- Mining of rare earth material and their negative ecological impact

CONCLUSION

Main limitations are

- Ensuring the technological feasibility of devises to storage and transport of information,
- Challenges in research in regard to the creation of information, knowledge and wisdom especially with focus on decision making (technical and ethical aspects)

Impact on the workplaces and sustainable development

- Unclear because of different understandings and challenges in defining a common sense in regard of the future of life and the globe.

Challenge for the Controlling:

- Dealing with strategic and operational uncertainties in a holistic view of developments

Спасибо за внимание!