BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

Integrating ICTs in TVET in readiness for economic digitisation, Gaborone
13-14 October 2021

Presenters: Prof. A.A. Ogwu, Prof. P. Makepe, Dr. D. Mpoeleng

Date: 13-14 October 2021

Venue: Botho Campus/ Virtual

Presenters

Professor Abraham Atta Ogwu, FinstP, FIMMM

DVC RD&I, BIUST, Botswana

Professor Patricia Makepe,

Director, Centre for Business Management, Entrepreneurship and General Education, BIUST, Botswana

Dr. Dimane Mpoeleng,

Ag. Director, Technology and Transfer, BIUST

TVET Education (Human Capital Theory --- HCT)

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

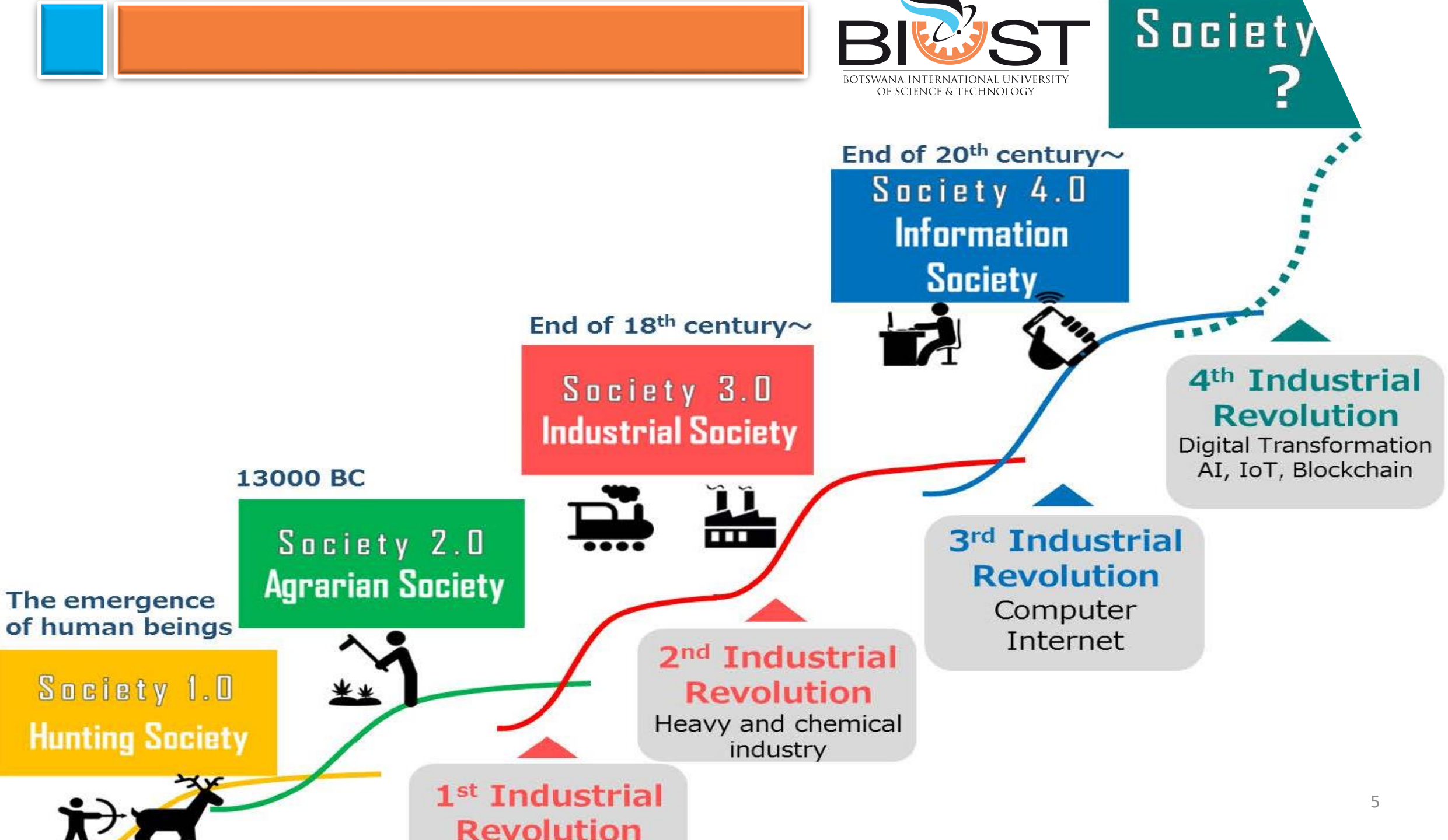
- Formal education improves the production capacity of a population.
- Education is an engine for growth and the key to the development of every society
- Education is also an economic good. Economists regard education both as a consumer and a capital good
- Education offers utility (satisfaction) to a consumer and creates the human resources necessary for economic and social transformation of societies (value)
- Human capital theory (HCT) is based on the argument that investment in human capital will lead to greater economic outputs.

TVET Education and Human Capital Theory

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

- Industrialised countries have much higher stocks of human capital then developing countries
- There is an apparent correlation between an educated population and technological innovation in a society
- A one-year increase in the average years of schooling increases per capital GDP by 1.7% to 12.9% depending on the environment. Barro and Lee (2010)
- A one-year increase in the average years of schooling is estimated to give a return-on-investment increase in GDP of 12.3% to 22.1%. Cohen and Soto (2007)
- A lack of human capital could lead to social Darwinism and economic stagnation.

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY



Singapore : The economic transformation of an Asian Tiger.

Global Trends

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

Current global work pattern trend in 2021

There is a rapid convergence between face-to-face work in physical locations and virtual online based work in digital space.

- Professor Derek Bok, former president of Harvard University has dwelt on the competition between the commercialisation of higher education and the preservation of educational values, in his book titled “Universities in the marketplace, the commercialisation of higher education” Princeton University Press (2010)
- A simplified definition of academics will be to describe it as a search for the truth and knowledge and the application of the acquired knowledge to create wealth, usually through scientific and technological innovation.
- However, commerce, commercialisation and entrepreneurship involve the exchange of goods and services in such a profitable way, that it will lead to the accumulation of material wealth, in an expected never-ending cycle.

Strategic Importance of TVET Education within the Educational Framework and Landscape

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

- **University and research institutes:** Their main purpose is to continuously create new innovations through fundamental research and seek ways to apply this new knowledge to create economic and social improvements.
- **Polytechnics (TVET):** Their role is to train people with the relevant skills to implement the innovation developed within universities in a reproducible, effective, and economically viable fashion for a mass production system. University education cannot lead to proper industrialisation, without trained professionals from the polytechnics.
- **Technical schools/ Apprenticeship Training (TVET):** Their role is to train professionals to ensure smooth enough operations at the operational level and monitor reproducibility levels in manufacturing, production, and service-related sectors of an economy e.g., ICT services.
- **Strategic Importance:** All the above segments of the educational landscape through their combined efforts or activities provide enormous benefit to society despite their different but complementary training.

PROPOSED ICT EXPORT/ IMPORT SUBSTITUTION ORIENTED STRATEGY FOR BOTSWANA

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

Strategic Action in E-commerce and related areas proposed for Botswana

Export sales/licensing of software developed in Botswana into international Markets

Create a 24 Hour ICT service/call Centre industry(outsourcing from abroad), including computer assisted design facilities in Botswana.

Create a thriving computer games development industry in Botswana

Creation of E-Business based service industries

Creation of E-finance based service industries

Creation of E-governance service based industries

Creation of E-Health based service industries

Creation of E-Tourism based service industries

Creation of E-Agriculture based service industries

Creation of E-Education based service industries

economic opportunities in TVET BASED e-business, e-commerce AND digital marketing TRAINING

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

1. Social Media Marketing/Online Marketing
2. Mobile Marketing
3. Pay per Click
4. Electronic Billboards
5. Website Enhancement
6. E-mail Marketing
7. Google analytics
8. Web-based Advertise
9. Text and Multi-media messages
10. Search Engine Optimization

3rd Industrial Revolution

- **Third Industrial revolution**
- Digital Computer age
- Personal Computer
- Internet
- World Wide Web
- Information and Communication technologies
- Robotics
- Computer aided manufacturing

- **Benefits to the U.S. for leading the third industrial revolution**.
- NASA and space programmes
- Satellite communication technologies.
- IBM, Amazon, Google, Apple, Facebook

4IR

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

Fourth industrial revolution

- New computing technologies for global financial transactions including Blockchain, Fintech and Crypto-currencies transactions
- Internet of things and industrial internet of things
- Artificial intelligence, Machine learning and Robotics
- Manufacturing 4.0, Additive Manufacturing, 3D and Multi-dimensional printing
- Advanced Materials
- Drone technologies
- Autonomous Vehicles

TVET's SKILLS GAP

Industrialization : The building blocks and gap analysis (TVET)

- Presence of highly skilled workforce consisting of Engineers and Scientists, Technologists, Technicians, i.e. middle level manpower (TVET based training)

Action : Increase in current trained workforce is an absolute necessity

Global skills trends and demands for ICT TVET Specialists

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

- Database Specialists
- Network Administrator
- Cybersecurity specialists
- Webmasters/Web Developer
- Software Developers
- Computer Games Developers

International Engineering and ICT Education Accords

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

- Washington Accord (1989): A global platform for the platform for the recognition of professional engineering training.
- Sydney Accord (2001): A global platform for the recognition of the training of engineering technologists (TVET)
- Dublin Accord (2002): A global platform for the recognition of the training of engineering technicians (TVET)
- Seoul Accord (2008): A multi-lateral global agreement among agencies responsible for the accreditation or recognition of tertiary level computing and IT-related qualifications. It is a quality assurance authority for education in computing and IT-related professions.
- All Botswana ICT or computing based or related TVET training are expected to be compliant with the Seoul Accord.

Internationally leading training in ICT by top TVET institutions in Scotland, U.K

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

University of the Highlands (Perth College)

- HNC in Administration and Information Technology
- HNC Computer Games and Computer Animation
- HND 3D Computer Animation

West Lothian College , Scotland

- HNC Cyber Security
- HNC Digital Design and Web Development
- HNC Computing
- HNC /HND Computing Software Development.

Concluding Remarks

- Partnerships & Collaboration
- Build capacity and capabilities
- Role exists for BIUST in facilitation
- Greater autonomy needed to create space for entrepreneurial TVETS

Professor Abraham Atta Ogwu, FinstP, FIMMM,

DVC RD&I, BIUST, Botswana

Thanks for your attention

BIUST
BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

www.biust.ac.bw

BIUST | Driving Change