Impact Measurement With SDG Assessment Tools

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OUTCOMES

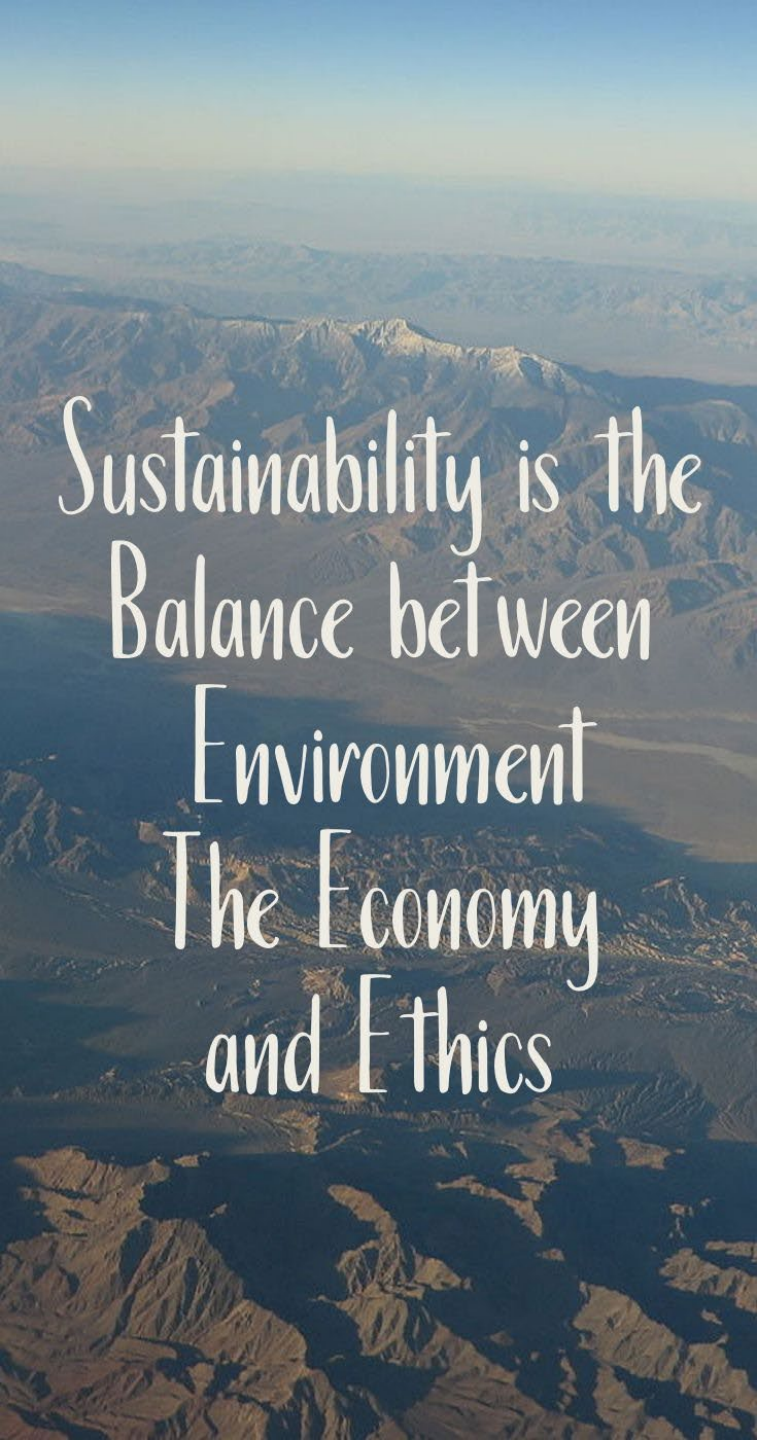
At the end of this session participants will be able to:

a. Relate the Sustainable Development Goal to the Academic Curriculum Design
b. Relate Sustainable Development Competencies to the Programme Learning Outcomes
c. Develop Assessment framework for SDG related learning outcomes

PRESENTATION OUTLINE

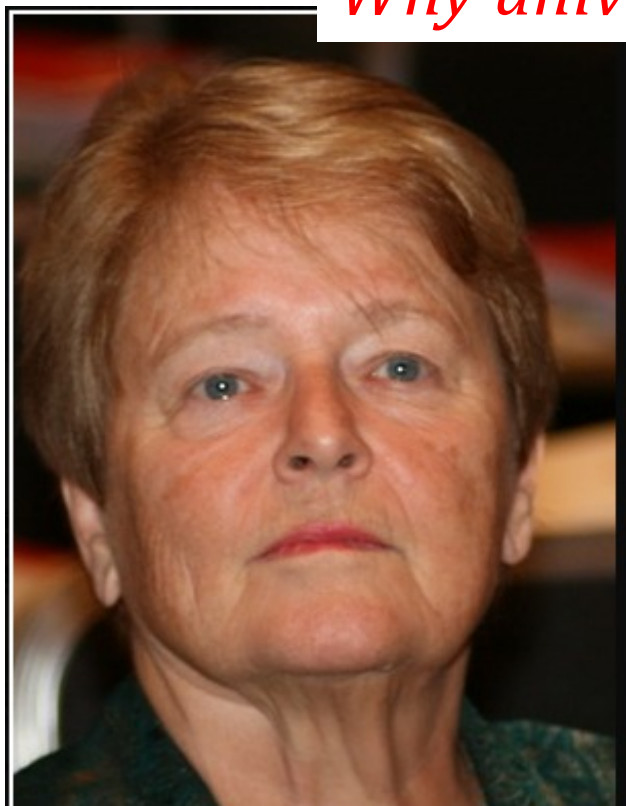
- INTRODUCTION: FROM RIO TO NEW YORK
- COMPETENCIES FOR SDG
- UiTM EDUCATIONAL OBJECTIVES & THE AMANAH OF SDG
- A FRAMEWORK FOR ASSESSMENT
- CONCLUDING REMARKS

INTRODUCTION



- "Earth, provides enough to satisfy every man's need but not every man's greed".

Why universities need SDGs?



Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

— Gro Harlem Brundtland —

AZ QUOTES

Education is the most powerful weapon which you can use to change the world.

- Nelson Mandela

DEFINITIONS OF SUSTAINABILITY

- Sustainability is the capacity to support, maintain or endure; indicating both a goal and a process.
- Sustainability can be maintained at a certain rate or level, as in sustainable economic growth.
- It can also be upheld or defended, as in sustainable definitions of good governance practice.
- Sustaining economic growth vs. sustaining life on earth might be incompatible.

Source: Kopnina, H., The Hague University of Applied Science

FROM RIO(1992) TO NEW YORK(2015)

EVOLUTION OF THE SUSTAINABLE DEVELOPMENT GOALS

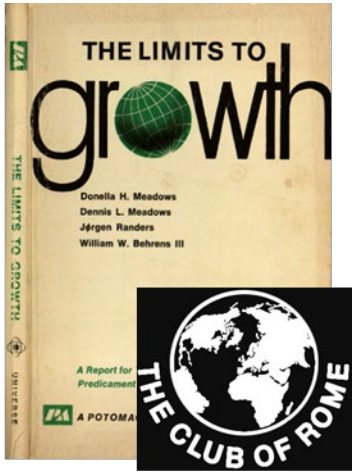
Sustainable Economic Growth

OECD

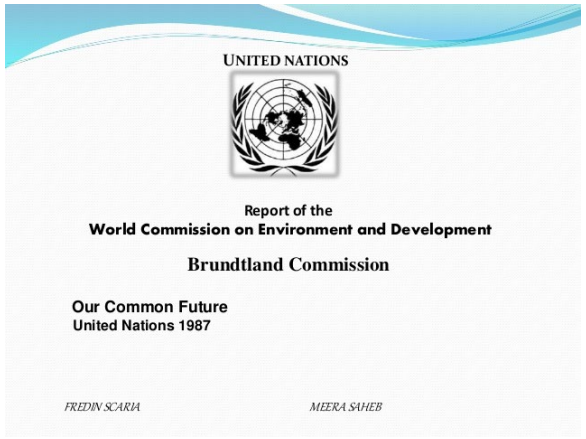
Organisation of Economic Co-operation and Development

1960

Economy based on continuous consumption is not sustainable



1972



1987

1992

1992-2021

2000-2015

2015-2030

What are the 17 Sustainable Development Goals (SDGs)?

WHAT ARE the SDGs ABOUT?

Inclusive economic growth

Inclusion

Resilience

Reduction of mortality

Raising living standards

Adaptation to climate change

COMPETENCIES FOR SDG

COMPETENCIES FOR SDG

SYSTEMS THINKING

CRITICAL THINKING

NORMATIVE

ANTICIPATORY

SELF AWARENESS

STRATEGIC

INTEGRATED PROBLEM SOLVING

COLLABORATION

Systems thinking competency: the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty. (tech-legal-culture)

Anticipatory competency: the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

Strategic competency: the abilities to collectively develop and implement innovative actions that further the goals of the learning organization sustainably.

Critical thinking competency: the ability to question norms, practices and opinions; to reflect on one's own values, perceptions and actions; and to take a position in the disruptive change discourse.

Integrated problem-solving competency: the overarching ability to apply different problem-solving frameworks to complex organizational and societal problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the abovementioned competencies.

Normative competency: the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

Self-awareness competency: the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.

Collaboration competency: the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

UiTM EDUCATIONAL OBJECTIVES & THE AMANAH OF SDG

UiTM EDUCATIONAL OBJECTIVES

Talent with competencies including knowledge, practical skills and attitude to meet the needs of changing world of works

Social capital in the form of citizens with shared norms, values and understandings that facilitates cooperation in community and industry for nation building and development

Talent that will catalyse social mobility in elevating the quality of life.

SD-COMPETENCIES

SYSTEMS THINKING

ANTICIPATORY

STRATEGIC

CRITICAL THINKING

INTEGRATED PROBLEM SOLVING

UEO1

COLLABORATION

NORMATIVE

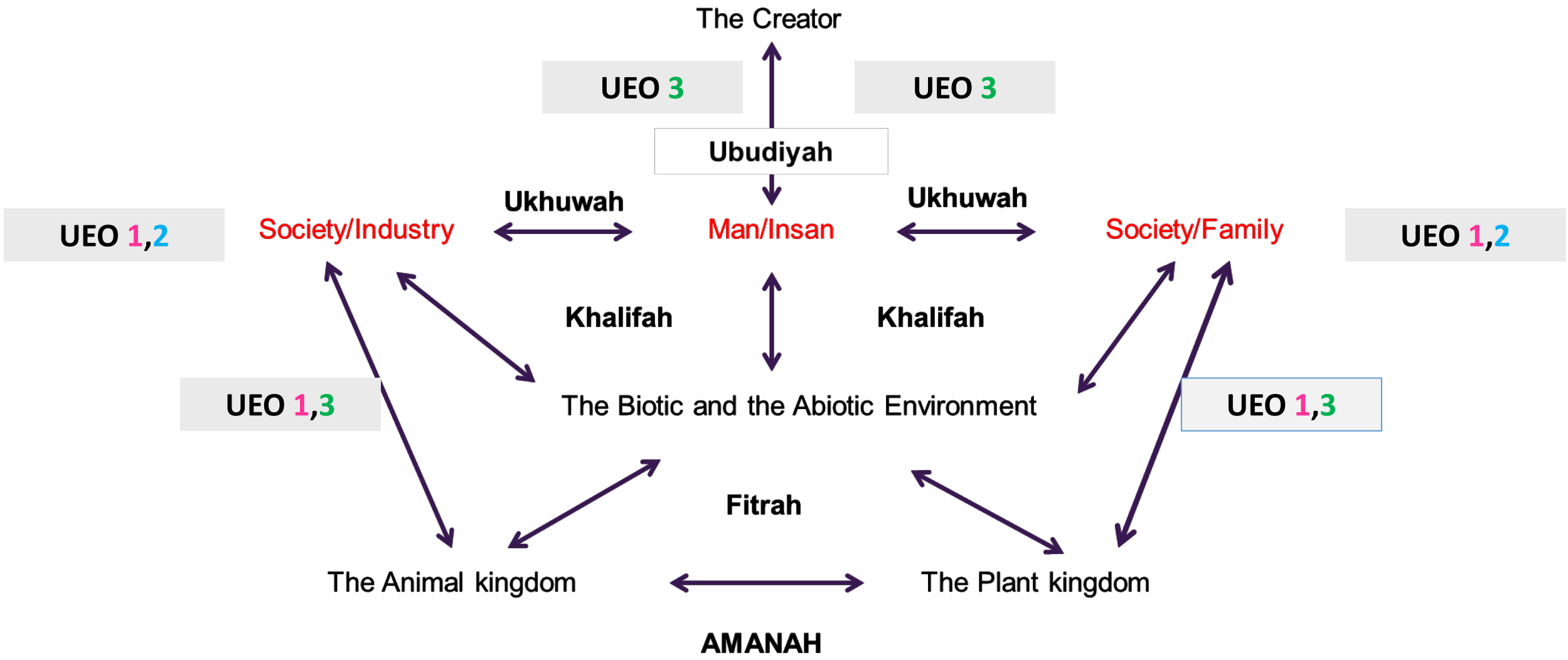
UEO 2

NORMATIVE

SELF AWARENESS

UEO 3

THE AMANAH OF SDG



A FRAMEWORK FOR SDG ASSESSMENT: THE BIG PICTURE

SDG Assessment Tool Framework
Universiti Teknologi MARA

Phase 2 : SDG Implementation

Key component of learning outcome, sub attributes, key indicator according to 17 SDGs (A Competency Framework to Assess and Activate Education for Sustainable Development)

Mapping MQF2.0 vs 17 SDG sub-skillset

Sub-skillset EIE

Measuring implementation towards academic programmes and courses mapped with SDG

A database of case study based on SDG projects.

Phase 1 : Awareness and Knowledge

Self- Assessment (awareness, knowledge, curriculum or course mapping)
Indicator : Direct, Indirect, No impact.

Phase 3 : Impact to Sustainability and Inculturation

- Input, Activity, Output, Outcome and Impact. (Refe THE Indicator)
- Measuring direct impact to curriculum, courses, lecturers, students and society
- THE % Contribute to Curriculum
- Data : Quantitative / Qualitative

NATIONAL EDUCATION PHILOSOPHY (1988;1996)

UN FOUR PILLARS OF LEARNINGS:
Learning to know; learning to do; learning to be; learning to live together
The Treasure Within (Jacque Delors,1998)

Education in Malaysia is an **on-going effort** towards further **developing the potential of individuals** in a **holistic and integrated manner**, so as to produce individuals who are **intellectually, spiritually, emotionally** and **physically balanced** and **harmonious**, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are **knowledgeable and competent**, who possess **high moral standards**, and who are responsible and capable of achieving high level of **personal well-being** as well as being able to contribute to the **harmony** and **betterment of the family, the society and the nation at large**.

The Fifth PILLAR: **Learning to transform yourself & Learning to transform society**
(UNESCO's Education for Sustainable Development Initiative, 2012)

SKILLSETS (LO) – MQF (2017)

1. Knowledge –insights into facts, concepts, ideas, principles, theories, skills aspects – technicalities/ specialization (information/media literacy?) [factual; conceptual; practical/ procedural; meta-cognitive]	**2. Cognitive skills application (R Blooms/Solo) Remember Understanding Applying Analysing Evaluating Creating**	**3. Functional skills application – cross critical skills includes** • **work skills (practical, technical, specialized)** • **Interpersonal & communications,** • **Digital, numeracy** • **Leadership, responsibility and autonomy**
5. Ethic and professionalism	**Application (applied and integrative approach) in context and responsibility**	4. Personal skill-autonomous lifelong learner, self development, reflective, proactive and values Entrepreneurial skills

1. Knowledge & understanding
2. Cognitive skill/problem solving
3. Work skills: practical, specialized, technical /organizational skills
4. Interpersonal skills incl. team skills
5. Communication skills
6. Digital skills
7. Numeracy skills
8. Leadership, responsibility & autonomy
9. Personal-LLL, value ,self- development /autonomous **10. Entrepreneurial skills**
11. Ethics & Professionalism

DISCIPLINE RELATED SKILLSETS
GENERIC SKILLSETS

SD-COMPETENCIES

SYSTEMS THINKING

ANTICIPATORY

STRATEGIC

CRITICAL THINKING

INTEGRATED PROBLEM SOLVING

KNOWLEDGE
COGNITIVE
WORKSKILLS
ETHICS

COLLABORATION

NORMATIVE

COMMUNICATION SKILL
INTERPERSONAL SKILL
RESPONSIBILITY
ACCOUNTABILITY
ETHICS

NORMATIVE

SELF AWARENESS

PERSONAL SKILL
ETHICS

1. Knowledge & understanding
2. Cognitive skill/problem solving
3. Work skills: practical, specialized, technical /organizational skills
4. Interpersonal skills incl. team skills
5. Communication skills
6. Digital skills
7. Numeracy skills
8. Leadership, responsibility & autonomy
9. Personal-LLL, value ,self- development /autonomous 10. Entrepreneurial skills
11. Ethics & Professionalism

A FRAMEWORK FOR ASSESSMENT: CURRICULUM DESIGN

The **Belgrade Charter** aimed 'to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones'

(UNESCO, UNEP 1976).

'ESD empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity. It is about lifelong learning, and is an integral part of quality education. ESD is holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment. It achieves its purpose by transforming society.'

(UNESCO, 2019)

PRINCIPLES OF OBE

<u>Four Organising Principles of OBE:</u>

- Clarity of Outcomes …… ***defining the skillsets***
- Designing Back ….. ***the curriculum & syllabus***
- High Expectations for All Students ….. ***the assessment and the Performance Criteria***
- Expanded Opportunities for Outcomes Achievement .. ***lesson content and creative/innovative delivery***

(Spady, 1992; Abdul-Talib, 2008)

OBE CURRICULUM DESIGN

What is the step-by-step SDG integration process into courses, curricula, and other selected teaching and learning activities? How to relate CLO with SDGs?

SKILLSETS/LEARNING OUTCOMES

Identify Desired results

Wiggins & McTighe (1998)
BACKWARD DESIGN

ASSESSMENT:
PERFORMANCE CRITERIA

Determine acceptable evidence

CURRICULUM
SYLLABUS
LEARNING ACTIVITIES
DELIVERY
CONTENT

Plan learning experience and instruction

GAPs lead to CQI

ASSESSMENT:
TOOLS/INSTRUMENTS

Outcome ⟷ **Measurement** ⟷ **Learning Experience**

CREATE CONDUSIVE LEARNING ENVIRONMENT

INSPIRING EDUCATORS

(Mahmud, 2017; Abdul-Talib, 2018)

ETAC

12 PLO PROGRAM LEARNING OUTCOME

PLO 1 — 1

Knowledge

Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;

PLO 2 — 2, 7

Problem analysis

Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (DK1 to DK4);

PLO 3 — 2

Design/development of solutions

Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (DK5);

PLO 4 — 2, 3

Investigation

Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements;

PLO 5 — 6,7

Modern Tool Usage

Apply appropriate techniques, resources, and modern engineering and IT tools to well- defined engineering problems, with an awareness of the limitations (DK6);

PLO 6 — 4,8

The Engineer and Society

Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well-defined engineering problems (DK7);

PLO 7 — 2

Environment and Sustainability

Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7);

PLO 8 — 11

Ethics

Understand and commit to professional ethics and responsibilities and norms of technician practice;

PLO 9 — 4

Individual and Team Work

Function effectively as an individual, and as a member in diverse technical teams

PLO 10 — 5

Communications

Communicate effectively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;

PLO 11 — 1,8,10

Project Management and Finance

Demonstrate knowledge and understanding of engineering management principles and apply them to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments;

PLO 12 — 9

Life Long Learning

Recognise the needs for, and have the ability to engage in independent updating in the context of specialised technical knowledge;

UiTM EDUCATIONAL OBJECTIVES

Talent with competencies including knowledge, practical skills and attitude to meet the needs of changing world of works

DISCIPLINE RELATED SKILLSETS (PLO1-PLO5)

Social capital in the form of citizens with shared norms, values and understandings that facilitates cooperation in community and industry for nation building and development

GENERIC SKILLSETS (PLO6-7,PLO9-11)

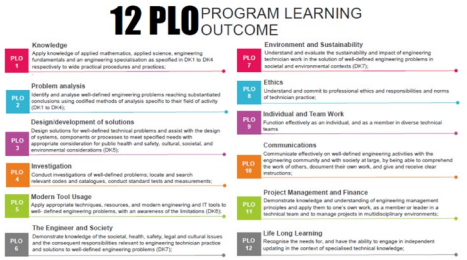
Talent that will catalyse social mobility in elevating the quality of life.

GENERIC SKILLSETS PLO8&PLO12

What is the step-by-step SDG integration process into courses, curricula, and other selected teaching and learning activities?

ENGINEERS WHO EMBRACE TECHNOLOGY & SUSTAINABLE DEVELOPMENT

(SDG WILL BE THE FRAMEWORK FOR CONTENT DEVELOPMENT)



DEVELOPMENT OF PEOs & PLOs
(Based on EAC/ETAC/MQF2.0 & Future Skillsets & ESD)

DEVELOPMENT OF FLEXIBLE & STACKABLE CURRICULUM STRUCTURE
(Three MQF Level 7 Programmes: PG Cert; PG Dip; M.Sc.)

DEVELOPMENT OF COURSES
(Micro-Credential with Credits; Level-7 Assessment; Ind. Cert.; Inter-Disc; SDG & IR4.0)

DELIVERY OF COURSES
(HUMANISED Technology; Taxo-Domain Sensitive; Edu5.0@UiTM – Adab &Akhlak; SDG)

ASSESSMENT OF COURSES
(Alt. Assessment; Taxo-Domain Sensitive; Edu5.0@UiTM – Adab &Akhlak ;SDG)

PROCESS OF ESTABLISHING PEOs and PLOs FOR ACADEMIC PROGRAMMES

UNDERSTAND AND INTERNALISE UiTM Educational Objectives, MQF 2.0 Skillsets, ESD, relevant Future Skillsets for working and living environment.

CATEGORISE SKILLSETS to address knowledge, cognitive and numeracy skills together with technical/specialised skills (including specialised digital skills) related to the discipline; human relationships; personal skills; character and integrity.

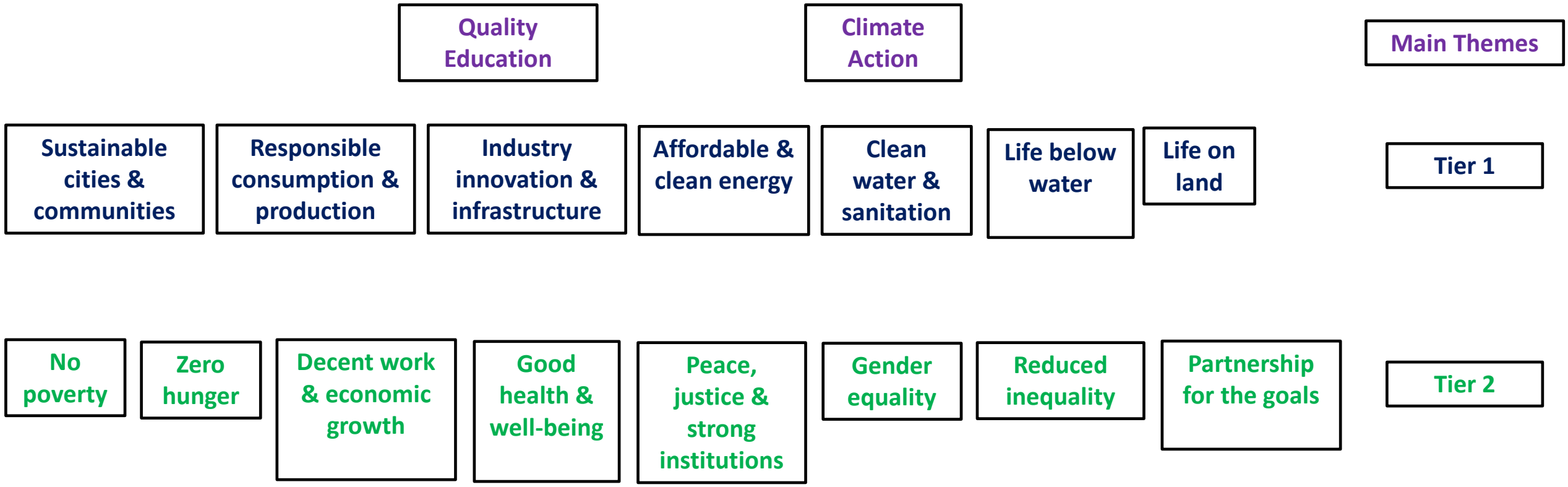
WRITE PEO Statements to address the categories of Skillsets.

WRITE PLO Statements to support the PEO Statements.

MAP PEO & PLO Statements to EAC/ETAC/MQF2.0, UiTM Educational Objectives; UiTM Mission and UiTM Vision

INCORPORATING SDG


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS



MAP Tier 1 & Tier 2 Against the PLOs

MAP Courses Against the PLOs taking into account the related SDGs

THE BLUEPRINT INCORPORATING SDG

					SUSTAINABLE DEVELOPMENT GOALS (SDGs)															
YEAR	SEM	COURSE CODE	COURSE NAME	SLT CREDIT	SDG1 No Poverty	SDG2 Zero Hunger	SDG3 Good Health and Well-Being	SDG4 Quality Education	SDG5 Gender Quality	SDG6 Clean Water and Sanitation	SDG7 Affordable and Clean Energy	SDG8 Decent Work and Economic Growth	SDG9 Industry, Innovation and Infrastructure	SDG10 Reduced Inequalities	SDG11 Sustainable Cities and Communities	SDG12 Responsible Consumption and Production	SDG13 Climate Action	SDG14 Life Below Water	SDG15 Life on Land	SDG16 Peace, Justice and Strong Institutions	SDG17 Partnerships for the Goals
1	I	CTU552	Philosophy and Current issues	18																
		M&EXXX	Mechanical and Electrical Engineering Practice								√									
		ETSXXX	Introduction to Railway Engineering										√		√					
		L3(1)	Third Language I (Mandarin)																	
		KKR (1)	Co-Curriculum I																	
		MAT435	Calculus for Engineers																	
		ECM415	Engineering Drawing					√							√					
		ETSXXX	Statics					√												
	II	ELC590	English for Oral Presentations	20																
		CTU554	Penghayatan Etika dan Peradaban II																	
		L3(2)	Third Language II (Mandarin)																	
		KKR (2)	Co-Curriculum II																	
		MAT455	Further Calculus for Engineers																	
		ECG417	Engineering Geology												√		√		√	
		ECG422	Engineering Survey									√								
		ETGXXX	Public Transportation System				√				√		√		√					√
		ECS435	Engineering Materials										√							
2	III	L3(3)	Third Language III (Mandarin)	19																
		KKR (3)	Co-Curriculum III																	
		MAT580	Further Differential Equations																	
		ECS429	Dynamics					√					√							
		ETSXXX	Superstructure and Substructure Interaction in Railway								√		√		√					
		ETWXXX	Railway Impact Assessment										√		√					
		ECG426	Soil Mechanics									√	√							
		ETGXXX	Railway Geometric Design and Construction										√		√					
	IV	EWC661	English for Report Writing	19																
		STA408	Statistics for Science and Engineering																	
		ETXXXX	Engineering Laboratory I (Civil)							√					√					
		ETGXXX	Ground Exploration									√	√							
		ETSXXX	Railway Track Design					√					√		√					
		ETGXXX	Transportation System and Planning				√				√		√		√					√
		ETMXXX	Transport and Society										√		√					

					SUSTAINABLE DEVELOPMENT GOALS (SDGs)															
YEAR	SEM	COURSE CODE	COURSE NAME	SLT CREDIT	SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
					No Poverty	Zero Hunger	Good Health and Well-Being	Quality Education	Gender Quality	Clean Water and Sanitation	Affordable and Clean Energy	Decent Work and Economic Growth	Industry, Innovation and Infrastructure	Reduced Inequalities	Sustainable Cities and Communities	Responsible Consumption and Production	Climate Action	Life Below Water	Life on Land	Peace, Justice and Strong Institutions	Partnerships for the Goals
3	V	ETWXXX	Geographical Information System for Civil Engineer	18											√						
		M&EXXX	Signaling and Communication in Rail Traffic										√								
		ETGXXX	Safety and Health for Engineers				√						√								
		ETXXXX	Engineering Laboratory II (M&E)								√				√						
		ETMXXX	Railway Policy and Legislation				√					√	√		√						√
			Final Year Project I				√	√	√	√	√	√	√		√		√	√	√	√	
			Elective 1																		
	VI	ETMXXX	Railway Engineering Technology Practices	18				√					√		√						
		M&EXXX	Electrical Power Systems for Railway										√		√						
		ETMXXX	Railway Maintenance and Operation								√		√								
			Elective 2																		
			Elective 3																		
4	VII	ETXXXX	Final Year Project II	18			√	√	√	√	√	√	√		√		√	√	√	√	
		ETMXXX	Technopreneur									√	√								
		ECG553	Geotechnique					√					√								
		ETMXXX	Railway Project Management										√								√
		ETSXXX	Railway, Bridge and Tunnel Engineering										√		√						
	VIII		Industrial Training (24 weeks)	12									√		√						
ELECTIVES	1	M&EXXX	Vibration and Noise in Railway	3			√						√								
	2	M&EXXX	Electromagnetic Technology	3				√					√								
	3	ETMXXX	Railway Technology and Applications	3									√		√						
	4	ETWXXX	Environmental Engineering and Sustainability	3											√	√					
	5	ECG544	Intelligent Transportation System	3			√				√		√		√						√
	6	ETSXXX	Rolling Stock Technology	3				√					√								
	7	ECG575	Geotechnical Engineering	3									√								

Matriks/Pemetaan Kursus kepada
Sustainable Development Goals (SDG) & Revolusi Industri 4.0 (IR4.0)

Course Information					Sustainable Development Goals		
					SDG9	SDG12	SDG13
SEMESTER	COURSE CODE	COURSE NAME	CREDIT UNIT	CATEGORY	INDUSTRY / INNOVATION / INFOSTRUCTURE	RESPONSIBLE CONSUMPTION AND PRODUCTION	CLIMATE ACTION
4	ETXXXX	EMBEDDED SYSTEM	3	CORE	√		
	ETXXXX	INDUSTRY SPECIAL TOPIC	4	CORE			√
5	ETXXXX	CAPSTONE PROJECT*	4	SPECIALIZATION	√	√	√
6	ETXXXX	TOTAL QUALITY MANAGEMENT	3	CORE		√	√
	ETXXXX	INDUSTRIAL AUTOMATION	3	SPECIALIZATION	√		
	ETXXXX	PROCESS CONTROL	3	SPECIALIZATION	√		
7	ETXXXX	FINAL YEAR PROJECT 2*	6	CORE	√	√	
	ETXXXX	SEMICONDUCTOR TECHNOLOGIES	4	SPECIALIZATION	√		

Course Information					Pillars of Industrial Revolution 4.0 (IR 4.0)								
					PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4	PILLAR 5	PILLAR 6	PILLAR 7	PILLAR 8	PILLAR 9
SEMESTER	COURSE CODE	COURSE NAME	CREDIT UNIT	CATEGORY	BIG DATA AND ANALYTICS	AUTONOMOUS ROBOTS	SIMULATION / DIGITAL TWIN	INDUSTRIAL INTERNET OF THINGS	AUGMENTED REALITY	ADDITIVE MANUFACTURING	CYBERSECURITY	CLOUD COMPUTING	HORIZONTAL AND VERTICAL SYSTEM INTEGRATION
4	ETXXXX	ENGINEERING LABORATORY	3	CORE						√			
	ETXXXX	DATA COMMUNICATION & NETWORK	3	CORE								√	
	ETXXXX	INDUSTRY SPECIAL TOPIC	4	CORE					√				
5	ETXXXX	INTERNET OF THINGS (IoT)	3	SPECIALIZATION				√					
	ETXXXX	ARTIFICIAL INTELLIGENCE	3	SPECIALIZATION			√						
6	ETXXXX	SCADA	4	SPECIALIZATION									√
	ETXXXX	CYBER-SECURITY	4	SPECIALIZATION							√		
7	ETXXXX	BIG DATA ANALYTICS	3	SPECIALIZATION	√								
	ETXXXX	ROBOTIC / UAV	4	SPECIALIZATION		√							

STRUKTUR KURIKULUM PENGAJIAN

Jadual 5: Pemetaan kursus kepada SDG

Semester	Kursus	Tier 1			
		SDG13	SDG7	SDG9	SDG12
5 (Universiti)	Malaysian Legal Principle	√			
5 (Universiti)	Technology Entrepreneurship			√	
5 (Teras)	Entrepreneurship Workshop 1			√	
3 (Teras)	Power Engineering		√		√
5 (Pengkhususan)	Artificial Intelligence and Machine Learning			√	√
5 (Pengkhususan)	Internet on Thing and Embedded-based Controllers			√	√
6 (Teras)	Final Year Project for Technologist 1			√	
7 (Teras)	Final Year Project for Technologist 2			√	√
6 (Elektif)	Robotic and Autonomous Systems			√	√
6 (Elektif)	Cloud Infrastructure and Services			√	√
7 (Elektif)	Sustainable Energy Technology		√		√
7 (Elektif)	Cyber Physical Security Systems			√	√
7 (Elektif)	Smart Sensors Technology			√	√

Jadual 6: Pemetaan kursus kepada IR 4.0

Semester	Kursus
5 (Pengkhususan)	*Computer Devices and Network Architecture*
5 (Pengkhususan)	*Artificial Intelligence in Electronic Systems*
5 (Pengkhususan)	*Internet on Things and Embedded-based Controllers*
5 (Pengkhususan)	*Augmented Reality Applications*
6 (Pengkhususan)	*Machine Learning in Vision Systems*
7 (Pengkhususan)	*Microprocessor and Embedded Interfacing Technology*
6 (Teras)	*Final Year Project for Technologist 1*
7 (Teras)	*Final Year Project for Technologist 2*
6 (Elektif)	*Robotic and Autonomous Systems*
6 (Elektif)	*Cloud Infrastructures and Services*
7 (Elektif)	*Integrated Antenna Technology*
7 (Elektif)	*Cyber Physical Security System*
7 (Elektif)	*Smart Sensors Technology*

THE PERFORMANCE CRITERIA

PERFORMANCE CRITERIA FOR COLLABORATION COMPETENCY

(Abdul-Talib, 2021)

	1	2	3	4	5
COLLABORATION	Acknowledge and accept the needs of others in problem solving	Show concern for the needs of others in problem solving	Adapt and balance the needs of others in problem solving	Influence others in resolving conflicts when solving problems	Act upon decision towards collaborative and participatory problem solving
	A1	A3	A4	A5	A5

Collaboration competency: the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

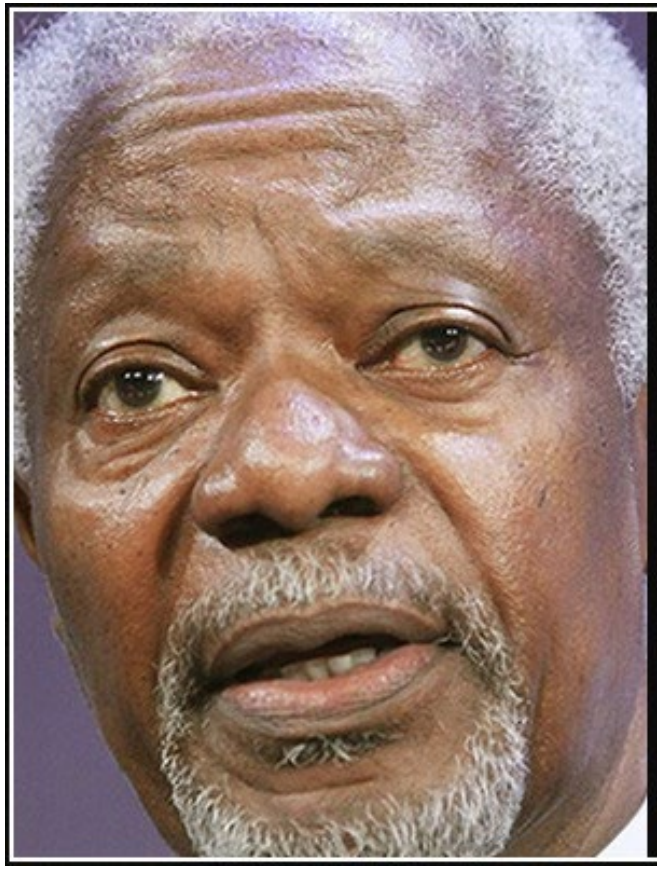
PERFORMANCE CRITERIA FOR ANTICIPATORY COMPETENCY

	1	2	3	4	5
ANTICIPATORY	Recognise and discuss possible outcomes of events/actions	Relate possible outcomes of events/actions	Analyse and compare negative and positive outcomes of events/actions	Evaluate and summarise possible negative outcomes of events/actions	Recommend and develop measures to prevent negative outcomes of events/actions
	C1,C2	C3	C4	C5	C6

(Abdul-Talib, 2021)

Anticipatory competency: the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

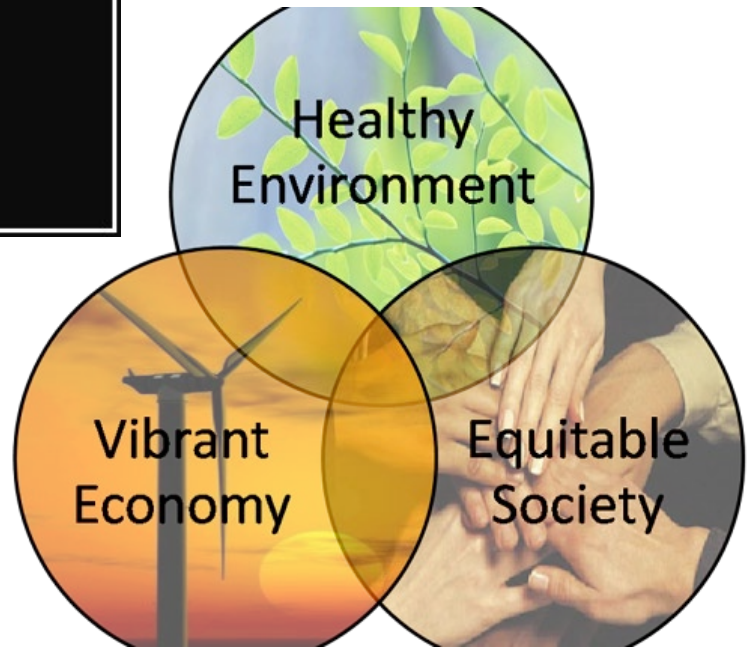
CONCLUDING REMARKS



Our biggest challenge in this new century is to take an idea that seems abstract - sustainable development - and turn it into a reality for all the world's people

— Kofi Annan —

AZ QUOTES



Terimakasih!

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"...ku sempurnakan seikhlas hati..."

Iman Al-Ghazali

Declare your jihad on twelve enemies you cannot see - Egoism, Arrogance, Conceit, Selfishness, Greed, Lust, Intolerance, Anger, Lying, Cheating, Gossiping and Slandering. If you can master and destroy them, then will be ready to fight the enemy you can see.

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