Technical University of Munich

Project Study

Chair of Corporate Sustainability

Technical University of Munich

# Is TUM School of Management Sustainable?


| | |
|---|---|
| Examiner: | Univ.-Prof. Dr. Frank-Martin Belz |
| Person in Support: | Esther Salvi, M.Sc. |
| Submitted by: | Amannda Pereira Barbosa (03723381) |
| | Harsha Agarwal (03738268) |
| | Song Thuy Nguyen (03737500) |
| | Soumya Singh (03744139) |
| | Veena Balakrishnan (03737336) |



Submitted on: 30th October 2021

## Table of Contents

## List of Tables



## List of Figures

# 1. INTRODUCTION

Education plays a central role in addressing the contemporary problems we face at a societal, economic, and environmental level. The United Nations recognized the importance of education in their declaration of the Decade for Education for Sustainable Development (2005-2014) (Rose et al., 2014). Along these lines, Principles for Responsible Management Education (PRME) was established in 2007 as a United Nations initiative and, according to Haertle et al. 2017, was seen by engaged universities as an ideal opportunity to challenge faculty and staff to review the institution's development. It imbibes six principles (detailed under *literature review* section), which provide a closer look at the universities' curriculum and research topics, the ways universities engage with society, and how they work with the private sector.

PRME's primary objective is to establish a path for management and business schools worldwide to take the lead in shaping and achieving the global sustainable development goals (UN Sustainable Development Goals). In order to achieve this global agenda, partnerships with higher education institutions are crucial. In 2013, the TUM School of Management (TUM SOM) signed on to PRME, stating that this initiative would trigger the integration of sustainability into research and teaching (TUM Sharing Information on Progress, 2019). Over the years, TUM SOM has consistently aimed to raise awareness of responsible management, ethics, and sustainability among its students and faculty. (TUM Sharing Information on Progress, 2019). The institution reports periodically to PRME and has increased the offering of modules that have sustainability at their core (rated "A" in the codebook).

This project study has been realized to help raise the TUM SOM's sustainability profile by creating a methodology/tool for the qualitative analysis of the sustainability content in the courses offered by the school. The main objective of this project is to qualitatively analyze the sustainability content in modules offered in the Master in Technology and Management program at the TUM SOM. In addition, it contributes towards enhancing TUM SOM's commitment to the PRME principles, especially the fourth ("method"), by creating a tool that will allow a systematic analysis of sustainability in teaching activities.

The next chapters will present more information about the methodology adopted, results, outcomes, and discussion.

## 2. LITERATURE REVIEW

The discourse about the current global sustainability challenges includes the role of higher education institutions in enabling students with the necessary abilities to deal with these challenges. Management and business education play an interesting role in this scenario as it not only has a major influence on answering these challenges, but businesses hold maximum responsibility for most of these challenges to be faced in coming times (Olalla and Merino, 2019). As a precursor to a global agreement on the responsibility of institutions towards training the future leaders of the world, the Talloires declaration was signed in France in 1990 by 22 higher education institution representatives that stated, "Universities educate most of the people who develop and manage society's institutions. For this reason, universities bear profound responsibilities to increase the awareness, knowledge, technologies and tools to create an environmentally sustainable future" (Talloires Declaration, 1990).

PRME was a voluntary initiative founded with the support of the United Nations in 2007. It aims to improve sustainability in higher education business institutions worldwide and functions based on six principles: Purpose, Values, Method, Research, Partnership, and Dialogue. The aim of the PRME initiative is to help institutions associate education with the Sustainable Development Goals (SDGs) while promoting the skills needed to create a balance in sustainability and economic goals. Thus, globally over 800 institutions have volunteered to be part of this initiative, and there has been much research in this area to analyze the sustainability content of courses offered at institutions and to achieve the goals the PRME targets (PRME, 2020).

Business schools worldwide are implementing varied methods to evaluate and improve the sustainability content of their courses. The University of Leeds utilizes a quantitative approach and employs a tool for this purpose (Lozano and Young, 2012). A study by Olalla & Merino (2019) in Spanish universities did a "content analysis is based on the theoretical frameworks of competencies for sustainability and transformative learning". They found that there was a large gap in the implementation of transformative learning. Figueiro and Raufflet (2015) found through a review of literature that in order to include sustainability in their curriculum, most management schools emphasize a change in the curriculum but lack a plan to implement such useful change. Thus, current literature indicates that there is no standard approach to evaluating the sustainability content and profile for management schools.

The TUM SOM has incorporated the six PRME principles in order to achieve a high sustainability profile. As a part of the first principle, Purpose, the school aims to build on the areas of excellence in the university and become one of Europe's leading schools through delivering solutions to societal challenges. The second

principle, Values, is incorporated into the system through a commitment to maintaining high ethical standards that include but are not limited to honesty, fairness, integrity, diversity, and trust. The third principle, Methods, is included in the attempt to evaluate the sustainability content in all the taught courses using qualitative and quantitative methods. The fourth principle, Research, is incorporated in various aspects of research conducted at the school and is a core element of current studies. The fifth principle, Partnership, is implemented as part of the collaboration with multiple external stakeholders such as governments and communities in sustainable initiatives. The external stakeholders include the TUM SEED Centre (Sustainable Energies, Entrepreneurship and Development), which encourages research at the nexus of sustainable energy and entrepreneurship. The sixth principle, Dialogue, is demonstrated in the school's Equal Opportunity Commission, which enables female academics and faculty to create a healthy dialogue regarding sustainability and social responsibility (Kytagora et al., 2021).

The TUM SOM aims to integrate the SDG goals into its curriculum to improve its sustainability profile and create a future with socio-economically responsible future leaders who strive to promote sustainable businesses globally. The primarily focused goals are SDG 5 - Gender Equality, SDG 7 - Affordable and clean energy, SDG 12 - Responsible Consumption and Production, and SDG 13 - Climate Action. The previous study conducted at the TUM School of Management (Kytagora et al., 2021), in order to assess the sustainability content of courses offered, created a tool that analyzed the content of courses through qualitative analysis, using two coding indicators: firstly, a measure of the number of courses having sustainability content; and secondly the exact SDG addressed by each course. The study analyzed 75 courses from two programs offered at the School, the Master in Management and the Master in Consumer Science. The study concluded that 19.1% of the courses assessed highly addressed sustainability, on a sustainability scale of 1 to 5, addressing that SDGs 8 (Decent Work and Economic Growth) and 9 (Industry Innovation and Infrastructure) were the most addressed in all courses. As an alternative approach for this previous study, our research aims to propose an in-depth qualitative approach utilizing the SDG targets as indicators for sustainability assessment of course content.

# 3. METHODOLOGY

A literature review was conducted to systematically address TUM School of Management's adherence to UN PRME principles, which can be defined as gaining an "unbiased and comprehensive" understanding of existing literature (Bryman & Bell, 2018, p.96). Following the literature review, the researchers of this project came together to identify a suitable methodology to carry out this research project through the trial-and-error method to get unbiased results. The methodology adopted is explained in the following chapters.

## 3.1. Selection of Program

TUM School of Management offers five master's programs, namely - Master in Management and Technology, Master in Management, Master in Consumer Science, Master in Finance and Information Management and, Master in Sustainable Management and Technology. The program Master in Management and Technology was chosen for analysis as it is the flagship program of the institution. Being the flagship program, it attracts students from all over the world and is one of the most representative study programs in our school. Therefore, understanding the current level of sustainability integration in this study program can be considered an optimal starting point. Nevertheless, systematic analysis of sustainability integration in other study programs has not to be neglected and is an important task to be carried on in future projects.

## 3.2. Selection of Courses

The next step after the program selection was the selection of representative courses for the analysis within the program. The program itself has two major tracks - one was Management, and the other was Technology. The Management track has 263 courses under seven specializations within. The Technology track has 212 courses under 13 specializations within. Since the program had over 400 courses, the decision was made to analyze only one track. The Management track was selected for analysis.

Despite the selection of the Management Track in the analysis carried out within this project study, systematic analysis of sustainability integration in the Technology Track has not to be neglected. It is an important task to be carried on in future projects.

After selecting the Management track within the Master Program in Management and Technology, the analysis of sustainability integration was conducted on representative courses from this track. The representative courses were selected from the seven specializations after having ensured an equal weightage for each specialization. The process of selection of the representative courses was handled in the two steps reported below.

**Step 1: Acquisition of all data available for courses within the Management Track**

Table 1 depicts the total number of courses offered in the Management track of the Master Program in Management and Technology and the split counts of the initially available sources. Out of the 263 courses in the Management track, data was available for coding for 52 of them through reliable sources - TUM online, Module Handbook, syllabus, and course material.

Table 1: Summary of courses by module and data availability in the Management track

| Specialization | Total number of courses | Initial available source |
|---|---|---|
| Specialization in Management: Innovation and Entrepreneurship | 68 | 15 |
| Specialization in Management: Marketing, Strategy and Leadership | 65 | 20 |
| Specialization in Management: Operations and Supply Chain Management | 24 | 3 |
| Specialization in Management: Finance and Accounting | 65 | 5 |
| Specialization in Management: Economics and Policy | 25 | 4 |
| Specialization in Management: Energy Markets | 6 | 3 |
| Specialization in Management: Life Sciences and Management | 10 | 2 |
| **Total** | **263** | **52** |

Compared to the total number of courses in this track (263), the courses with data available (52) were inadequate for quality evaluation. Additionally, not all the 263 courses listed were active. While most courses were offered each semester, it included some outdated courses that have been suspended for a while, and some courses that have never been taught, despite being listed. For instance, the following courses have never been active; therefore, they were excluded from the analysis.

- Advanced Seminar Finance & Accounting: Digital Innovation and Business Planning [MGT001296]
- Advanced Seminar Finance & Accounting: EU FinTech Regulation [MGT001301]
- Advanced Seminar Economics & Policy: Advanced Resource Economics, Water, Soil and other Natural Resources [MGT001314]

**Step 2: Acquisition of additional data**

Given the low number of courses with reliable data sources (TUM online, Module Handbook, Syllabus, and course material) available for the analysis, the research group decided to acquire additional data and conduct the analysis on a representative sample of courses within each specialization. In particular, the research team decided to code 30 percent of the 263 courses, which equals 80 courses. This way, the analysis is conducted

on a representative sample of courses belonging to the Management track and yield a satisfactory assessment. With this conclusion, data was requested for additional randomly selected 35 courses. The requesting process was initiated in the following two ways:

- By requesting students study the respective course modules
- By reaching the respective lecturers who deliver this course

Although we had 2 ways of collecting course material, the second one - reaching lecturers proved to be more effective and yielded better results. With support from the Chair of Corporate Sustainability, requests were sent for 35 additional courses covering all the seven specializations (Table 1). Out of the seven, three specializations - IE, MSL, FA (refer to List of Abbreviations) have the greatest number of courses, which are 68, 65, and 65, respectively. Therefore, the requests for syllabi were not only to collect enough material but also to focus on these specializations, especially for FA, due to the general lack of its syllabi.

The objective was to get a minimum of 30% of courses per specialization coded. However, as many courses in the FA specialization are not recently active, only 20% of the entire module could be coded. At the same time, 26% of the IE track has been achieved. This limitation is due to the lack of material. Nevertheless, the overall target of 30% was therefore achieved as planned.

Table 2: Summary of the course selection, source of the data collected, and percentage weightage of each specialization

| **Specialization** | **Number of courses** | **Source available** | **Syllabi emails requested** | **Course coded** | **Coded rate** |
|---|---|---|---|---|---|
| Specialization in Management: Innovation and Entrepreneurship (IE) | 68 | 15 | 2 | 18 | 26% |
| Specialization in Management: Marketing, Strategy and Leadership (MSL) | 65 | 20 | 5 | 22 | 34% |
| Specialization in Management: Operations and Supply Chain Management (OSCM) | 24 | 3 | 7 | 9 | 38% |
| Specialization in Management: Finance and Accounting (FA) | 65 | 5 | 11 | 13 | 20% |
| Specialization in Management: Economics and Policy (EP) | 25 | 4 | 5 | 9 | 36% |
| Specialization in Management: Energy Markets (EM) | 6 | 3 | 2 | 5 | 83% |
| Specialization in Management: Life Sciences and Management (LSM) | 10 | 2 | 3 | 4 | 40% |
| **Total** | **263** | **52** | **35** | **80** | **30%** |

## 3.3. Selection of coding methodology

The first step for coding the course material was to identify appropriate methods between inductive, deductive, and abductive types of coding. Initially, 9 courses were selected by 5 coders (approximately 2 each) where different coding methods were tried. In this trial, the chosen courses were then mapped to the relevant SDGs and SDG targets following an inductive method of coding, where the codes were developed ground-up from the data. After a discussion with the project supervisor later, it was decided that a deductive approach to coding would be more suitable for this project, given the amount of data that had to be coded for the assessment. An additional reason for not continuing with inductive coding was to simplify the codebook. As courses to be coded were diverse, following an inductive method would result in numerous codes and make the assessment considerably more challenging.

## 3.4. Coding Procedure

Considering the different limitations elaborated in the previous section, the final coding methodology was established as presented in Figure 1 and described as follows

**Step 1 - Deciding Deductive Codes:** The aim behind the analysis was to pinpoint how the different courses can build responsible leaders of tomorrow delivering on the targets laid out under the SDGs rather than the broad 17 goals (Wersun et al., 2018). Hence, the 167 targets of the SDG goals were chosen as the deductive codes because they are tangible and specific, thereby promoting positive actions by the TUM School of management. Thus, following from here, the deductive codes and SDG targets are used interchangeably.

**Step 2 - Derivation of Empirical Evidence (EE):** The aim was to scan the different sources like module handbooks, lecture slides, learning outcomes, module descriptions and choose the relevant EEs which provide a comprehensive insight and include different aspects of sustainability within the course. It was decided to choose 3-6 pieces of evidence per course depending on their relation to sustainability. However, for a few courses, there are only 2 EEs because the sources did not provide quality information about the course. All the EEs were added to the comprehensive codebook with additional details on the name of the concerned professors, type of source, source reference, along the week and date it was coded.

**Step 3 - First Level of Coding (Aligning EE with the SDG targets**): Once the EEs were in place, the next step was to find the closest SDG targets connecting to the EEs for the course. Section 3.3.1 explains the selection of relevant SDG targets for each EEs in more detail.

**Step 4 - Second Level of Coding (Grading of the Course):** Next, the module was analyzed as a whole rather than in terms of EEs to understand whether or not SDG was at the core of the module. It has been termed as the ABC analysis, which is explained in detail in section 3.3.2

**Step 5 - Establishing Intercoder Reliability and Agreement:** After deciding the coding methodology, it was essential to establish inter-coder reliability and agreement (Campbell et al., 2011) within our research team of five coders. The intercoder reliability and agreement give credibility to our findings and help us reduce bias. The method has been further elaborated in section 3.3

**Step 6 - Continued coding:** Once sufficient intercoder reliability (>50%) and agreement (100%) had been achieved among the researchers, the remaining courses were divided among the researchers for individual coding to maximize efficiency.

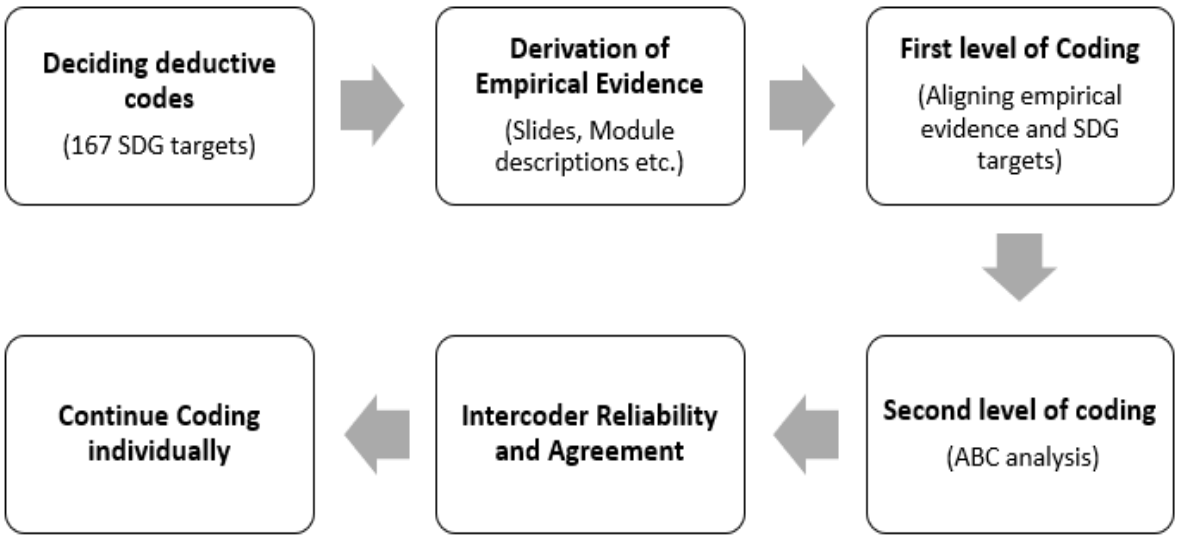



Figure 1: Steps of the coding procedure

## 3.5. Assessment of sustainability in courses

We established a two-level coding methodology to ensure scientific rigor in our analysis. The first level of codes directly aligns SDG targets with EEs, thereby providing a strong basis to assess whether sustainability is targeted within the course. In contrast, the second level of assessment (ABC analysis) is a scoring system that provides a cumulative rating to each course. The following section explains in detail the two levels of assessments conducted by the researchers.

### 3.5.1. First Level of Coding

The United Nations Sustainable Development Goals (SDGs) are structured as 17 SDGs with a total of 169 targets. The comprehensive codebook prepared along with this report includes a database for all the targets and the corresponding SDGs. Hence, after selecting the EEs, the next step was to find the most relevant SDG that aligns with each EE. The alignment was done based on the keyword search and interpreted the meaning of the EE and the SDG targets. Following this, based upon the evidence and the course name, each evidence was assigned a corresponding suitable SDG target number and description or was assigned a value of '0' and described as 'No SDG Goals were targeted'.

In table 3 the first empirical evidence and the course name has keywords like "equality", "sex", "leadership responsibility", "discrimination" related overall to the SDG goal 10 of Reduced Inequalities. In particular, SDG target 10.2 focuses on empowering and promoting inclusion of everyone irrespective of their sex, origin, race, religion, disability, or economic status. The module intends to achieve reduced inequalities by promoting healthy discussion around inclusion and avoiding discrimination on any grounds mentioned before in the workplace. However, the second empirical evidence highlights that the module aims to develop scientific skills without direct application to any sustainability targets. Hence, it was coded as "no SDG goals were targeted" and numbered as 0. A similar process was followed by the researchers while developing the codebook for all the analyzed courses. Since the codes are developed directly from the EEs, it is called the first level of coding (FL) here on.

Table 3: Key illustrative examples for the first level of coding

| No. | Course Name | Empirical Evidence | Deductive Code 1 | SDG Target |
|---|---|---|---|---|
| 1. | [WI001160] Sex and Conflict at Work | Insights about LGBTIQ + in a work context (leadership responsibility, discrimination, etc.) equality, sexual harassment in the workplace and will be able to critically discuss and understand them | By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status | 10.2 |
| 2. | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | the steps in writing a scientific seminar paper, including how to evaluate academic literature, interact with an academic debate, prepare and elaborate academic arguments and defend one's work in front of a knowledgeable audience | No SDG Goals were targeted | 0 |

### 3.5.2. Second level of coding

The scale for the second level of coding (see table 4) was chosen as an ordinal scale with polytomous scoring. An ordinal scale indicates that there is an inherent order to the values assigned in the scale, and polytomous scales have three or more levels assigned to the measured variable, which is the sustainability score here. There were three scores assigned to indicate the sustainability profile for each course that was coded. This is indicated in the table below:

Table 4: Scale for the second level of coding

| **Score** | **Meaning** |
|---|---|
| A | **Sustainability is targeted at the core** (sustainability is at the core of the course, each evidence is directly linked to sustainability-related topics) |
| B | **Sustainability targeted but not at the core** (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some evidences are directly linked to sustainability-related topics) |
| C | **Sustainability not targeted** (no content in the course is linked to sustainability-related topics) |

The scores were chosen for each course by comparing the identified SDG targets for the evidence extracted from each course.

Score A was assessed to a course when its first level codes showed a clear connection to the SDG targets, i.e., majority of its EEs were labelled with the SDG targets, and the course's content was associated with sustainability at a very core. For instance, the course "Renewable Energy Systems in the Global South" addressed SDG targets 7.b ("*By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support*"), 7.2 ("*By 2030, increase substantially the share of renewable energy in the global energy mix*") according to the empirical data from the module descriptions. Moreover, the module teaches students about the different aspects of establishing renewable energy systems in emerging economies like Africa and sustainability is seen to be at the core of the module. Hence, the course was graded as "A". (See Row 1 in Table 5)

Score B was chosen when only few pieces of evidence corresponded to certain targets. Take the course "Strategic Interaction - in Theory, Lab, and Field" as an example, it was found to relate to only one SDG target

(8.8 - "*Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment*"). The module does associate with sustainability even though it is not the key target of the course. It informs about lobbying within an organization, communication skills and critical analysis of information. (See Row 2 in Table 5)

"B" was also given in the cases where there was no target found corresponding to the evidence, but the course title and content had an overall inclination towards sustainable topics when viewed through inference and application-based lenses. The course "Young Entrepreneurs in Science" did not relate to any SDG targets but helped students begin their entrepreneurial journey and develop their social and consulting skills, which are needed highly in the field of sustainability. Hence, it was graded "B" as sustainability was targeted but was not found at the core of the module. (See Row 3 in Table 5)

Score C was chosen for the courses that showed no evidence to support the exploration of sustainability-linked topics. The course "Planning and Scheduling of Complex Operations" was a technical course that could not be related to any SDG targets. Moreover, it was graded as a "C" because the module focused on technical skills about how to schedule and plan complex operations with no evidence on application to sustainability. (See Row 4 in Table 5)

This coding process added a second layer of analysis by combining the inferences from FL and overall indication from the module towards sustainability. Hence, it is termed as the second layer of coding (SL) here on. The inferences are explained as remarks to account for researcher bias and rationale behind the scores in the comprehensive codebook.

Table 5: Key illustrative examples for second level of coding

| No. | Course Name | Remarks | Deductive Code 2 |
|---|---|---|---|
| 1 | [WI001255] Lecture Series Renewable Energy Systems in the Global South | The module is graded a A because the module deals in depth with the renewable energy systems in the Global South. The empirical evidence directly relates to multiple targets and is relevant to the future of energy transition. | A |
| 2 | [WI001133] Advanced Seminar Economics & Policy: Strategic Interaction - in Theory, Lab, and Field | The module could not be directly related to many sustainable targets; however, it talks about how to effectively lobby in an organization, conduct marketing, understand communication, understand what is true and what is not, which are all needed in sustainability practices. Hence, it was agreed as B instead of A | B |

| | | | |
|---|---|---|---|
| 3 | [MGT001308] Young Entrepreneurs in Science | The module is graded B even though there is no direct target that relates to the empirical evidence. This is because the content of the module inherently teaches students to hone their social skills, consulting skills which is highly needed in the field of sustainability | B |
| 4 | [WI200541] Planning and Scheduling of Complex Operations: Models, Methods and Applications | Operation planning oriented with technical methods and applications | C |

## 3.6. Establishing Intercoder Reliability

The coding exercise was divided between five researchers, which made it essential to establish a measure of reliability. The aim was to make the codes reproducible, also called intercoder reliability, to ensure that all the "coders code the same data the same way" (Campbell et al., 2013, p. 295). Hence, Intercoder reliability is the measure that two or more equally capable coders operating in isolation select the same code for the same unit of text. Moreover, along with reliability measures, the researchers discussed their discrepancies in coding over two weeks to establish an intercoder agreement. It measures the ability of two or more coders to reconcile through discussion whatever coding discrepancies they may have for the same unit of text.

Based on Campbell et al. (2013), we decided to use 10% of the total module to be coded for the intercoder reliability and agreement measurement. As previously mentioned, the total courses to be coded was 263, even though the final count of modules was lower due to the unavailability of sources to code. Hence 10% of 263 equals approximately 26 courses which were rounded off to 30 courses.

The task was divided into two weeks, 15 courses per week. The courses were randomly selected and split among the researchers to derive the empirical evidence from the sources (module handbook, learning outcomes, etc.). Next, to achieve reproducible coding, the evidence was coded by all the researchers individually, as explained in the previous section. The individual exercise was followed by an extensive discussion about the differences in the chosen target and the rationale behind the choices. Post discussion, the most relevant code was chosen, and remarks were noted to inform the reader behind the decision. The same process was repeated for week 2, followed by calculation of intercoder reliability and agreement using the formula by Campbell et al. (2013) as discussed below

- **Intercoder Reliability Measure**: Total number of identical codes among coders/ total numbers of codes
- **Intercoder Agreement Measure**: No. of codes agreement achieved after discussion OR No. of codes agreed after discussion/ total number of codes.

For the purpose of the analysis, as the research team was a group of five coders, we adapted this approach to a number of 5 coders calculating the intercoder reliability of the first level and the second level coding through a weighted scale of intercoder reliability, given different weights if 2, 3, 4 or 5 researchers came up with the same codes in the process of independent coding.

The weights are described in table 6 and refer to the Appendix for a sample calculation of the ICR.

Table 6: Weightage on ICR depending on the number of researchers chosen the same code during individual coding

| Number of researchers chosen the same code | Weightage |
|---|---|
| 5 | 1 |
| 4 | 0.75 |
| 3 | 0.5 |
| 2 | 0.25 |

As 100% reliability is not possible in group research, we aim for a safe percentage in the range of 70-94% (Campbell et al., 2013, p. 310) to proceed to the next stage of individual coding. An additional reason for looser standards is because the research was exploratory in nature (Campbell et al., 2013). Table 7 shows the calculated values of the intercoder reliability that have been improved from 76% to 80% for the FL of coding and from 88% to 90% for the SL of coding from week 1 to week 2. It also presents the intercoder agreement, which equals 100%, as researchers reached a consensus for all the codes during the discussions. Figure 3 visualizes again the intercoder reliability improvements between the two weeks. Ultimately, an average percentage of 78% and 89% was achieved fitting in the range suggested by Campbell et al. (2013).

Table 7: Intercoder Reliability (ICR) and Intercoder Agreement (ICA) results for first level coding (FL) and second level coding (SL) over week 1 & 2

| Week No. | ICR-FL | ICR-SL | ICA-FL | ICA-SL |
|---|---|---|---|---|
| Week 1 | 76% | 88% | 100% | 100% |
| Week 2 | 80% | 90% | 100% | 100% |

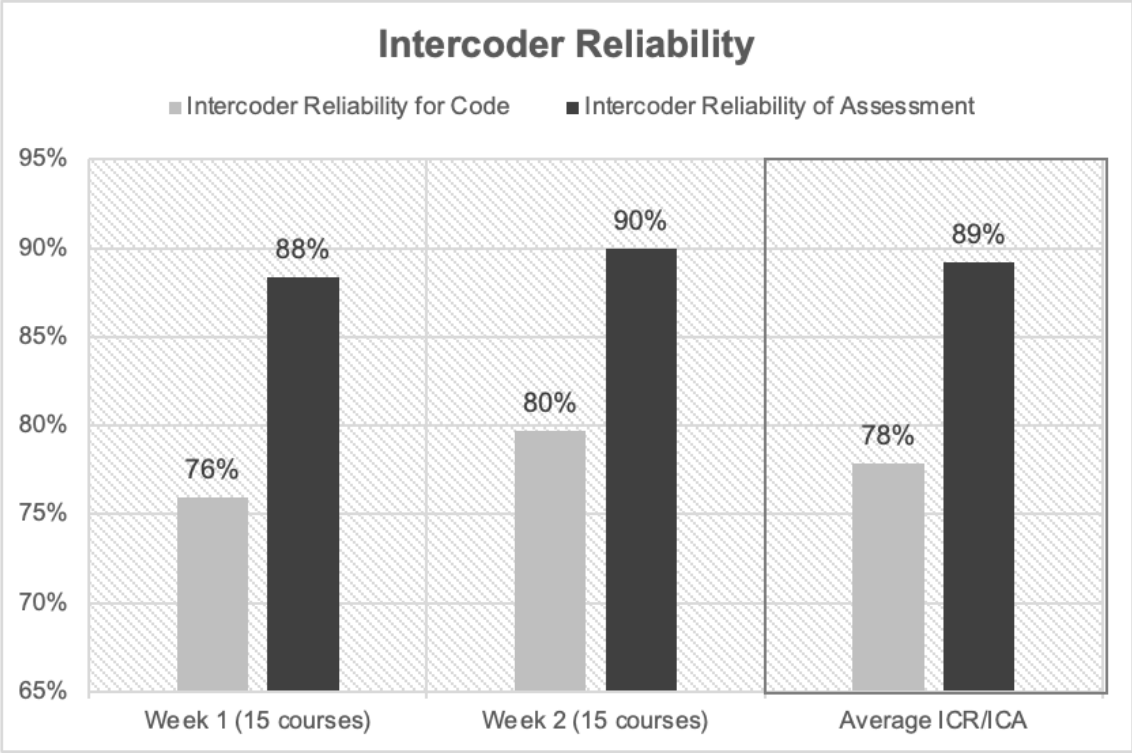



Figure 2: Graphical representation of ICR and ICA showing improvement from Week 1 to Week 2

# 4. RESULTS

The comprehensive codebook was split into *First Level Codebook* and *Second Level Codebook*. In the FL codebook, EEs were selected by the researchers and the SDG targets were assigned to them accordingly. The SL Codebook was comprised of the same courses as in the FL Codebook and the ABC sustainability analysis was done as per the course's overall assessment.

Based on the results collected from the *FL Codebook*, the most mentioned SDG goals were goal 12 - *Responsible Consumption and Production* and goal 7 - *Affordable and clean energy*, from which 12.2 ("*By 2030, achieve the sustainable management and efficient use of natural resources"*), 12.8 ("*By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature"*), and 7.1 ("*By 2030, ensure universal access to affordable, reliable and modern energy services"*) occupied the most counts of all. Overall, the coding results showed that a considerable portion of the courses in the Master in Management and Technology was offered in line with the core SDG goals and targets that TUM SOM is willing to achieve.

Sustainable teachings at TUM SOM were assessed using the empirical evidence retrieved from the analyzed 80 courses. The *SL Codebook* shows that 47 courses were assessed as being connected with sustainability, meaning that 59% of the courses were considered either associated with sustainability at the core or sustainability was somehow reflective in their course contents.

The following sections will provide in-depth results of the comprehensive codebook.

## 4.1. First Level Codebook

This section presents the results of the SDG Targets codebook that is split into two parts. The first part includes the result demonstration of the courses and EEs in full. Furthermore, for the second part, results are exclusively filtered to be mapped with the sustainability aims at TUM SOM in correspondence with the UN SGD goals and targets.

### 4.1.1. The 360-degree view from the First Level Codebook

With 80 courses being coded throughout the seven specializations in the Management track, 251 pieces of EEs were generated in the First Level Codebook, from which 104 EEs were assigned with SDG targets and 147 EEs were connected to no SDG targets at all.

Figure 4 summarizes the breakdown of the 104 EEs by SDG Target (the full list of SDG targets can be found in the Appendix section) after excluding the non-target ones (147 pieces). As shown on the graph, out of the 42 SDG targets covered in the codebook, target 12.2 ("*By 2030, achieve the sustainable management and efficient use of natural resources"*) took up the highest number with 16 EEs, followed by target 12.8 ("*By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature"*) with 10 pieces of evidence assigned. SDG goal 12 - *Responsible consumption and production* can, therefore, be seen as the most prominent among all, with a total count of 32 EEs.

The next highlighted goal is goal 7 - *Affordable and clean energy*. Even though the numbers are not as high as the 12.2 and 12.8, the 7.1 ("*By 2030, ensure universal access to affordable, reliable and modern energy services"*) and 7.a ("*By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology"*) considerably stand out from the crowded by 7 and 6 EEs respectively, a total sum of 19 rows was assigned to this goal. The rest of the evidence is scattered among the 38 SDG targets listed in the codebook, with the counts ranging from one to four pieces.

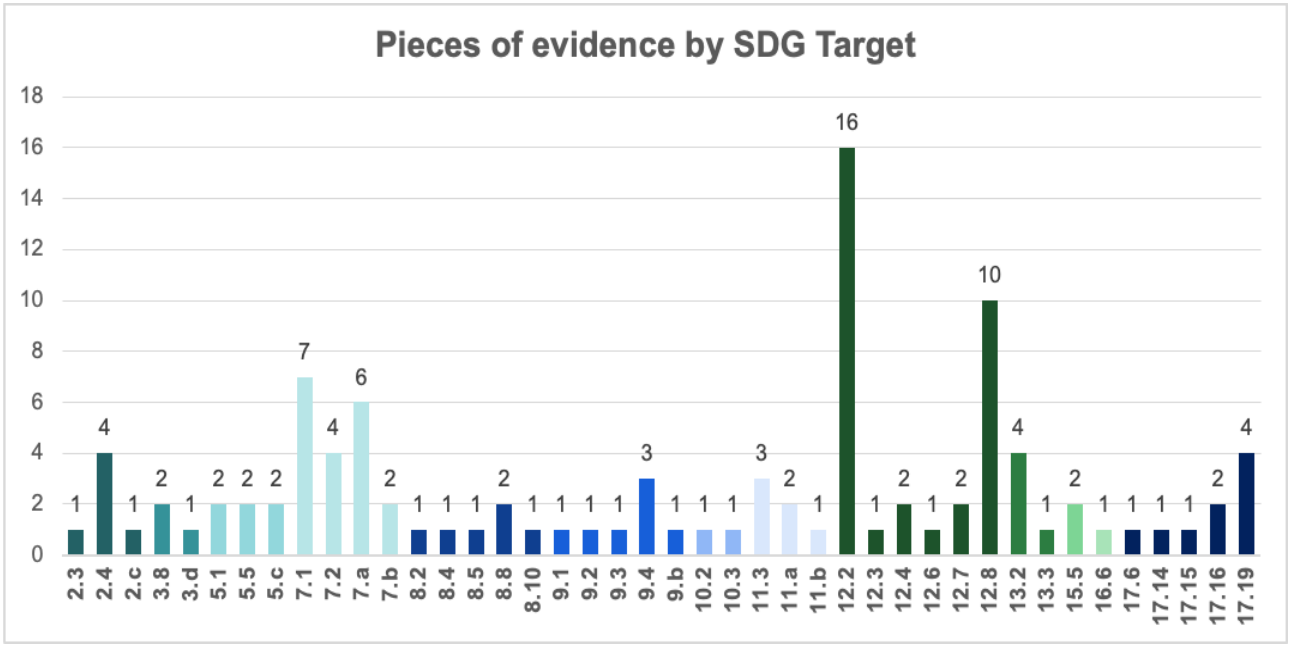


Figure 3: Breakdown of the EEs by SDG Target

Although several targets were assigned to the EEs, not all SDG goals were present in the *First Level Codebook*. They, more specifically, are

- Goal 1 - *No Poverty*
- Goal 4 - *Quality Education*
- Goal 6 - *Clean water and sanitation*
- Goal 14 - Life *below water*

In the next section, discussions on the outputs and suggestions for improvement related to this matter will be presented.

### 4.1.2. Core SDG goals supported by TUM SOM

The four SDG goals picked up by TUM SOM as core actions supporting the 17 UN SGDs are goals 5, 7, 12, and 13 (see Figure 5). All were covered in the FL Codebook with 44 EEs, namely are:

- Goal 5 - *Gender Equality*: 2 EEs
- Goal 7 - *Affordable and clean energy*: 19 EEs
- Goal 12 - *Responsible Consumption and Production*: 18 EEs
- Goal 13 - *Climate Action*: 5 EEs


Figure 4: SDG goals focused by TUM SOM

Under those four goals, 14 focused subgoals/targets at TUM SOM are listed in figure 6, and 10 out of the 14 targets were mapped with the 44 mentioned EEs, whereas the other four targets could not be matched to any evidence. The 10 SDG targets are with the following details:

- Target 5.5 - “Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.”
- Target 7.1 - “By 2030, ensure universal access to affordable, reliable and modern energy services.”
- Target 7.2 - “By 2030, increase substantially the share of renewable energy in the global energy mix.”
- Target 7. a - “By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.”
- Target 7. b - “By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support.”
- Target 12.2 - “By 2030, achieve the sustainable management and efficient use of natural resources.”
- Target 12.3 - “By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”
- Target 12.6 - “Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.”
- Target 13.2 - “Integrate climate change measures into national policies, strategies and planning.”
- Target 13.3 - “Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.”

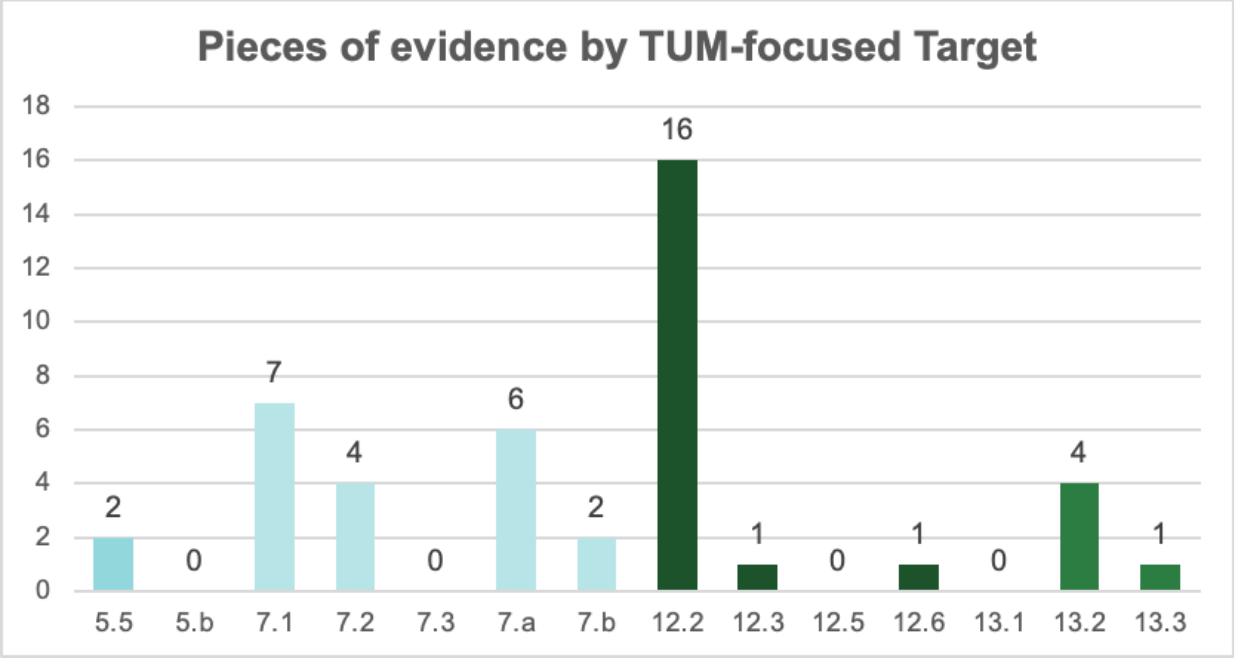


Figure 5: Breakdown of EEs by TUM-focused target

On the other hand, four targets that were not found in any EEs of the 80 courses are the following

- Target 5. b - "*Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.*"
- Target 7.3 - "*By 2030, double the global rate of improvement in energy efficiency.*"
- Target 12.5 - "*By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.*"
- Target 13.1 - "*Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.*"

From the above mentioned, approximately 71% of the focused targets at TUM SOM have been covered in the 80 coded courses. More importantly, the leading targets 12.2, 7.1, and 7. a are part of the TUM SOM's sustainability aim.

## 4.2. Second Level Codebook (ABC Assessment)

When it comes to sustainability assessment, data were analyzed at the course level. From the 80 courses in the *Second Level Codebook*, 33 courses were evaluated as not being linked to sustainability but rather about research approaches and/or technical knowledge such as digital transformation, marketing techniques, and operational enterprise management. These non-related courses represent 41% of the codebook (figure 7). In contrast, the sustainability-related courses occupies the remaining 59% with 47 courses. This number (47) is made up of the two assessment scales:

- A (sustainability at the core): 21 courses (26%)
- B (sustainability targeted but not core): 26 courses (33%)

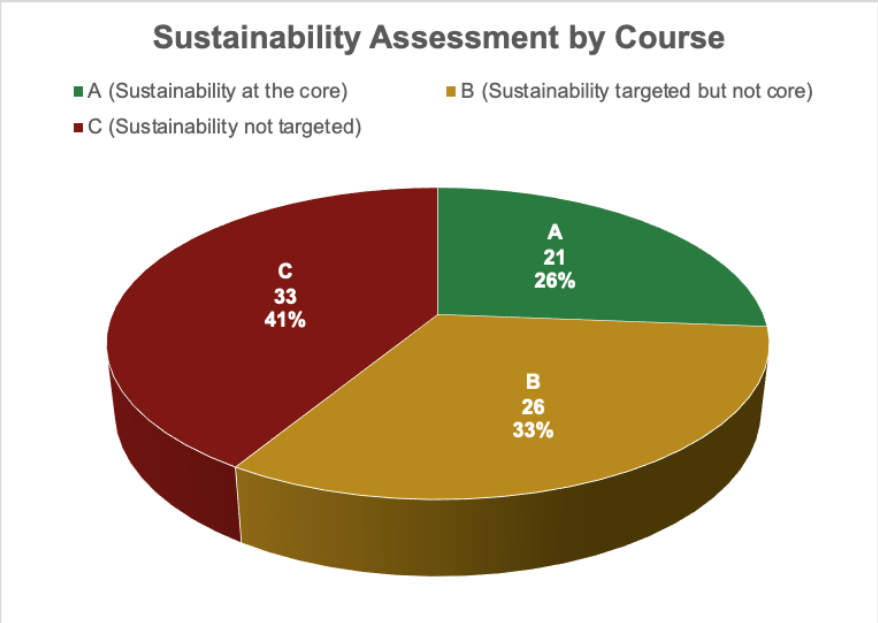



Figure 6: Sustainability assessment by course

The figure can be further broken down into specializations showcased in figure 8. The highly- and relatively sustainable specializations like Energy Markets, Economics and Policy, and Innovation and Entrepreneurship received higher assessment scores in terms of sustainability, namely 80% (5 out of 6 courses), 78% (7 out of 8), and 61% (11 out of 18) of the corresponding specializations, respectively, are considered sustainability-related. Meanwhile, specializations like Marketing, Strategy and Leadership, and Finance and Accounting were more often found irrelevant regarding sustainability, although it is not always the case.

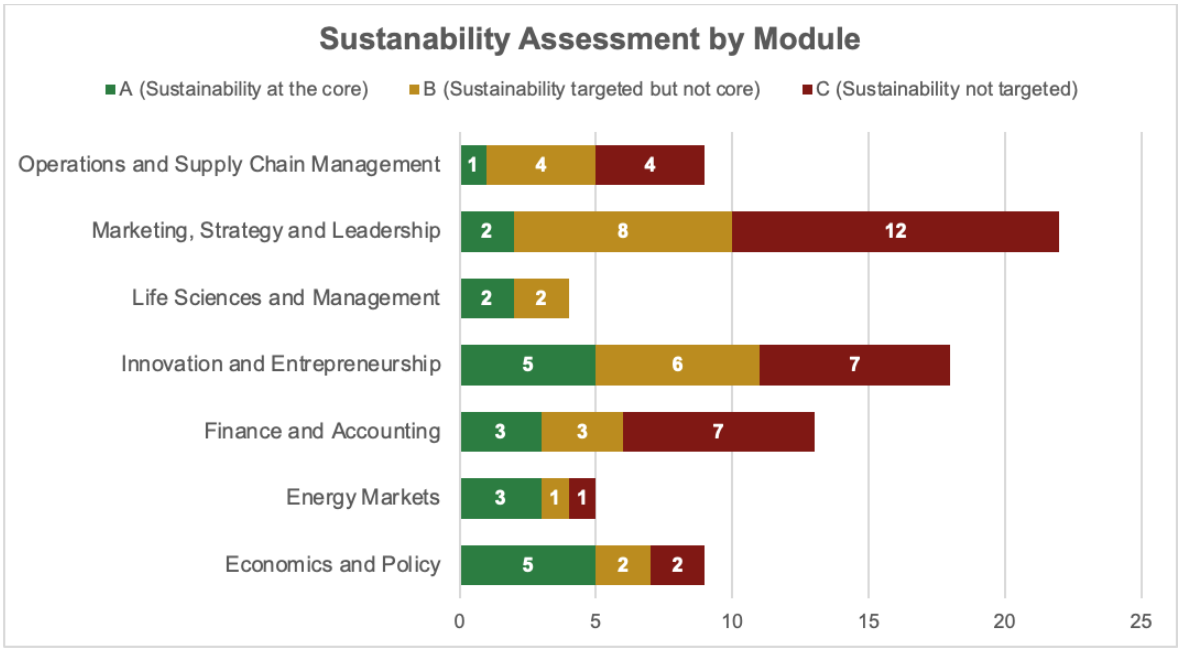



Figure 7: Sustainability assessment by module

# 5. DISCUSSION

## 5.1. Key learnings

From the *FL Codebook*, 104 EEs were labelled with SDG targets, out of which 44 were matched with the 10 (of 14) focused targets from TUM SOM. These 10 targets were fully categorized under the four core SDG goals that TUM SOM.

As one of the top business schools, it is important for TUM SOM to teach students the themes related to responsibility in consumption and production. These factors are present in various business majors such as Leadership, Policy, Supply Chain, and Entrepreneurship. The overwhelming occupation of the SDG targets from goal 12 in our codebook is, therefore, rational and suitable. At the same time, energy topics are a highly specific that EEs can be more straightforward to mapped out with the SDG targets when the courses are evaluated. With the 83% coding rate of Energy Markets studies, the positive, sustainable outcome is something quite predictable. From these figures, we can confidently say that TUM SOM is heading in the right direction that aligns well with its key goals and targets. However, there is always room for improvement.

In summary, 14 SDG targets were aimed at TUM SOM; unfortunately, four targets were missed out of the codebook. In the absence of those targets within the scope of research, it can be judged that either the contents related to the SDG targets were not provided in the courses or they were not clearly described making the targets being left out during the coding process. Thus, transparency and accessibility to the course material play a crucial role in creating the success of this project.

The SDG goals 4 - *Quality Education*, 6 - *Clean water and water sanitation*, and 14 - *Life below water* were also missing in the analysis (figure 9). Goal 4 has been missed out from the overall assessment as the goal focuses more on educational topics such as developing skills for students to become future leaders, such can be seen as the primary objective of any lecture at TUM SOM. Coding the course material means to extract the knowledge of the contents that can be applied in the real-life context rather than emphasizing on which skills students will develop from the courses. At the same time, goal 1 about "No Poverty" and goals 6 and 14 related to "Water" themes were not explored in the codebook. Although they are now not part of the focused goals from TUM SOM, poverty issues, clean water, and underwater lives are among the heating topics that will be potential to explore further.

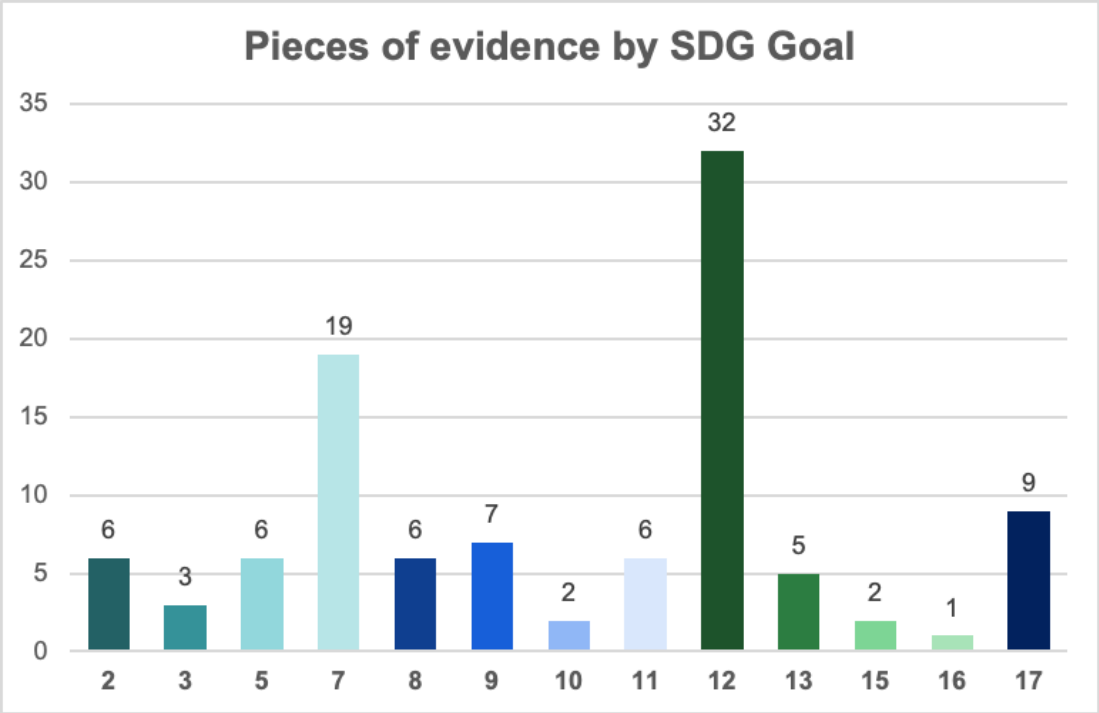


Figure 8: Number of EEs by SDG Goal

In terms of the overall sustainability assessment of the 80 courses, the sustainability level was measured based on the global outlook of the course contents in connection with the SDGs standard. The dual approach resulted in some courses, which had no SDG targets assigned in any of its FL codes, were still ranked B. It means that there are sustainability features attached in their courses, despite not being at a core. Meanwhile, the courses that could be proven with empirical evidence of their sustainability-oriented contents were scored A in the SL Codebook, and those without any signs of sustainability were given C. In a nutshell, by using this ABC scaling method, 59% of the courses were assessed as either at the core (A) or somehow targeted to sustainability (B). This achievement rate is acceptable given that a fair amount of sustainable and unsustainable-related modules was considered in the codebook. Nevertheless, additional effort will be required for improvement.

## 5.2. Limitations

The study done has some limitations, which can be looked upon as avenues for future research. One of the limitations is that it has analyzed only 30% of courses in one track of this program. A more comprehensive study encompassing all courses could yield different results. Thus, the study was limited by a lack of accessibility to course-relevant materials to assess. At the same time, the quality of the available material varies depending on each course and/or each lecturer, hence the overall assessment in some cases may not reflect the whole truth about the contents they are really offering.

Additionally, a qualitative approach was adopted to evaluate sustainability contents in courses that may evoke researcher bias. The research group has together read scientific papers and referred to relevant

activities from the other universities as reference for developing deeper understandings about sustainability, PRME initiative, and the SDGs. Sustainability assessment that moved from an individual point of view, later evolving to a group level, and was eventually rounded into common perspectives with collective understandings. Bias can thereby derive from both individual and group level. Moreover, since the project used only a qualitative approach, a quantitative method to identify and/or confirm the parameters influencing sustainability contents that could also yield relevant insights remain unexplored.

## 5.3. Suggestions

The learnings derived from the current PRME study report can be applied for furthering the management education values of sustainability in several ways. One of these could be to promote exchanges with other universities interested in implementing PRME principles in the curriculum. TUM SOM could support the creation of biannual events that discuss this agenda and invite professors to present their work, providing them with the opportunity to share their expertise, results, and discussions achieved in the modules they teach. This initiative would tighten cooperation between institutions, bolstering TUM SOM's commitment to PRME, especially the fifth principle - Partnership.

Another approach to improving the sustainability profile of the activities at TUM SOM is to offer seminars on PRME & SDGs to academics and encourage them to participate. By doing so, the sixth principle of PRME, Dialogue, would be enhanced, and more space for debate would be created, allowing students to exchange ideas, inquire and propose solutions to discussed topics.

Also, to assess the effectiveness of the Method principle of PRME, creating a feedback system that targets students' views and opinions regarding their learnings about sustainability in the concerned modules could be developed and shared at the end of each semester. Professors could consider potential changes/adjustments for upcoming semesters - starting with the Master in Management and Technology and gradually expanding to the other SOM programs.

Moreover, using SDG targets as a reference source for the design and improvement of the course curriculum would be an advisable course of action for the lecturers at TUM SOM to fulfil the requirement for SDG relevant content, and this would also be in line with the second and third PRME principles, Values and Methods.

Several electives and extracurricular offers for TUM students like project studies, student initiatives, and semester-wise soft skill seminars (TUM School of Management, 2021) are difficult to locate and are obscure within the official study curriculums of both the bachelor's and master's programs. These learning opportunities would become more transparent and accessible if they were added in a separate section under each curriculum to reflect the sustainable and reliable teaching activities happening at the TUM SOM and

could be considered for an assessment under the PRME project. This would advance the fourth PRME principle, Research at the TUM SOM.

# 6. CONCLUSIONS

The goal of the PRME study was to analyze if and to what extent TUM School of Management is addressing sustainability in its curriculum and equipping students with sufficient knowledge in the current and future sustainability. This study be considered as the basis for discussions around sustainability in Management education at TUM SOM. Especially now, when sustainability is the global discourse and challenges of sustainable development are required for managers to be able to handle these complexities, the theme of sustainability is only getting more relevant.

As seen from the coding results, 59% of the courses assessed according - but not restricted to the UN Sustainable Development Goals (social, environmental, and economic) were considered to address sustainability elements. Despite that, from the selected courses, not all SDGs were covered, nor equal weightage was given. As the current study focuses on the course material with limitations, students' feedback and their evaluation on sustainability issues of the courses can be incorporated in the post-course survey and used as the future expansion in research scope. This will potentially open wider scope for the future studies, as seen in chapter 5 - Discussion.

The results of this study should be shared with the lecturers and professors and could be used to create awareness about the deficiency of sustainability topics, showcase details about PRME and its importance to TUM SOM in a long run, possibly encourage the lecturers to integrate sustainability discussions in their lectures. Through this, students can be immersed further in areas of sustainability. The professors can also collaborate with each other or with professors from other universities and organize seminars and events around sustainability challenges. As a further step, mandatory sustainability courses can be introduced into the Management curriculum.

Given that the codebook structure developed for this study has been done with care and a proven high efficiency, it is recommended for the next researchers to make well use of it, leverage the structure where possible, expand the scope of research, while really putting enough efforts on being self-educated about sustainability, PRME, and the SDGs targets. More courses and the second track of Master in Management and Technology - Specialization in Technology should be covered to ensure the quality of the analysis, also for the other programs offered by TUM SOM. Finally, deploying a quantitative study after having collected the qualitative analysis results will increase the credibility of the future research.

## REFERENCES


Campbell, John L., Charles Quincy, Jordan Osserman and Ove K. Pedersen. (2013). Coding In-Depth Semi-Structured Interviews: Problems of Unitization and Inter-Coder Reliability and Agreement. *Sociological Methods and Research*, 42(3), 294-320.

Figueiró, P. S., & Raufflet, E. (2015). Sustainability in higher education: a systematic review with focus on management education. *Journal of cleaner production*, 106, 22-33.

Haertle, J.; Parkes, C.; Murray, A. & Hayes, R. (2017). PRME: Building a global movement on responsible management education. *The International Journal of Management Education*. 15. 66-72. 10.1016/j.ijme.2017.05.002.

Kytagora, L., Sheikh, A.K., Vishukumar, V., Patel, F. (2021). TUM School of Management Going Sustainable. Chair of Corporate Sustainability, Technical University of Munich.

Lozano, R., & Young, W. (2013). Assessing sustainability in university curricula: exploring the influence of student numbers and course credits. *Journal of cleaner production*, 49, 134-141.

Olalla, C. B., & Merino, A. (2019). Competences for sustainability in undergraduate business studies: A content analysis of value-based course syllabi in Spanish universities. *The International Journal of Management Education*, 17(2), 239-253.

Principles of Responsible Management Education (2020). What We do, Six Principles. Retrieved from https://www.unprme.org/what-we-do

Rose, G., Ryan, K., & Desha, C. (2015). Implementing a holistic process for embedding sustainability: a case study in first year engineering, Monash University, Australia. *Journal of Cleaner Production*, 106, 229-238.

Talloires Declaration. Talloires Declaration of University Leaders for a Sustainable Future. (1990). Available online: http://ulsf.org/wp-content/uploads/2015/06/TD.pdf (accessed on 1 October 2021).

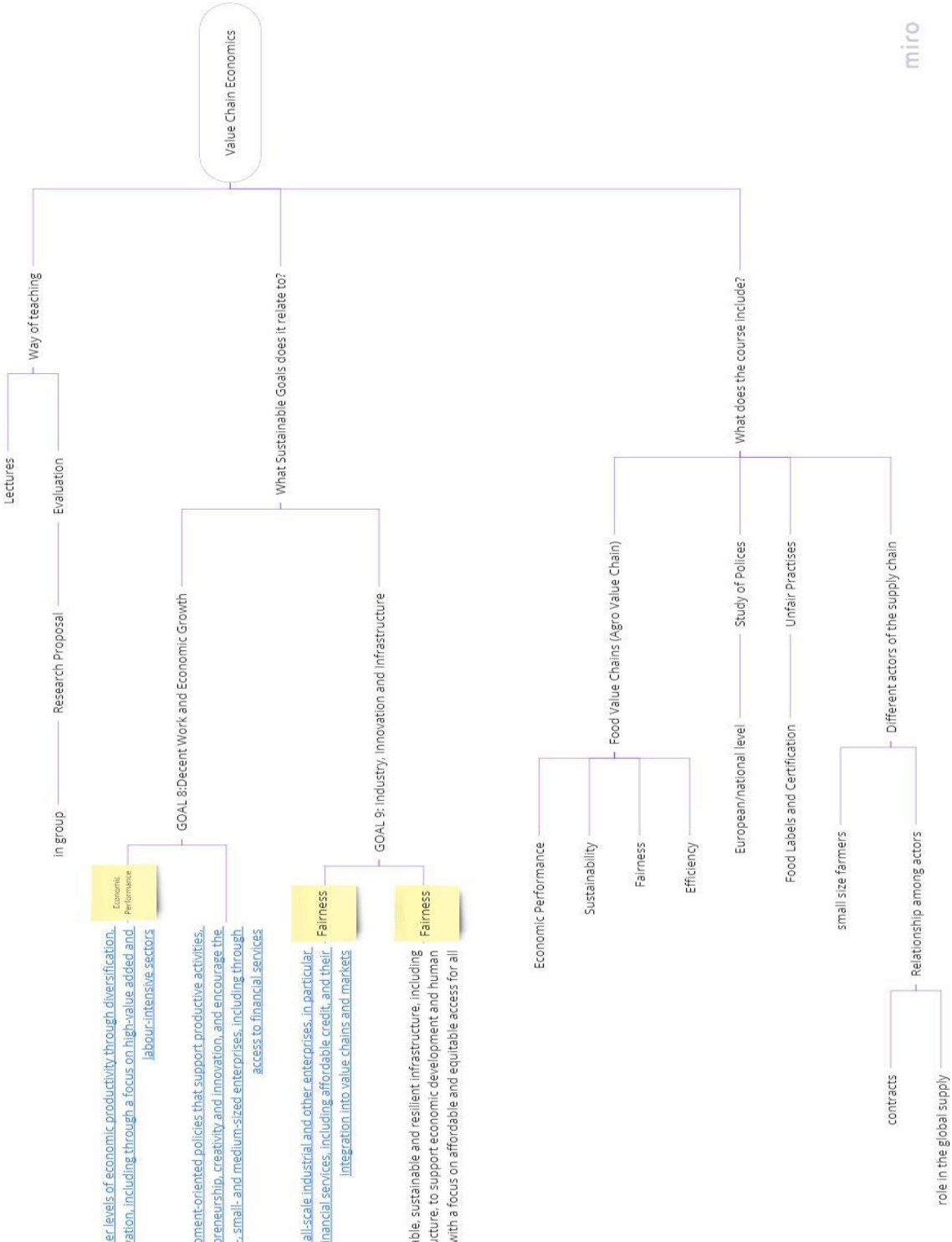
TUM School of Management. (2019). Sharing Information on Progress, pp 4 & 16. Retrieved from https://d30mzt1bxg5llt.cloudfront.net/public/uploads/sip-reports/PRMESIPTUMSoM_2020_2021-04-21-135232.pdf

TUM School of Management. (2021). Softskills Seminars – Winter Semester 2021/22. Retrieved from https://www.wi.tum.de/wp-content/uploads/2016/09/Information_Softskillseminars_WS21_22.pdf

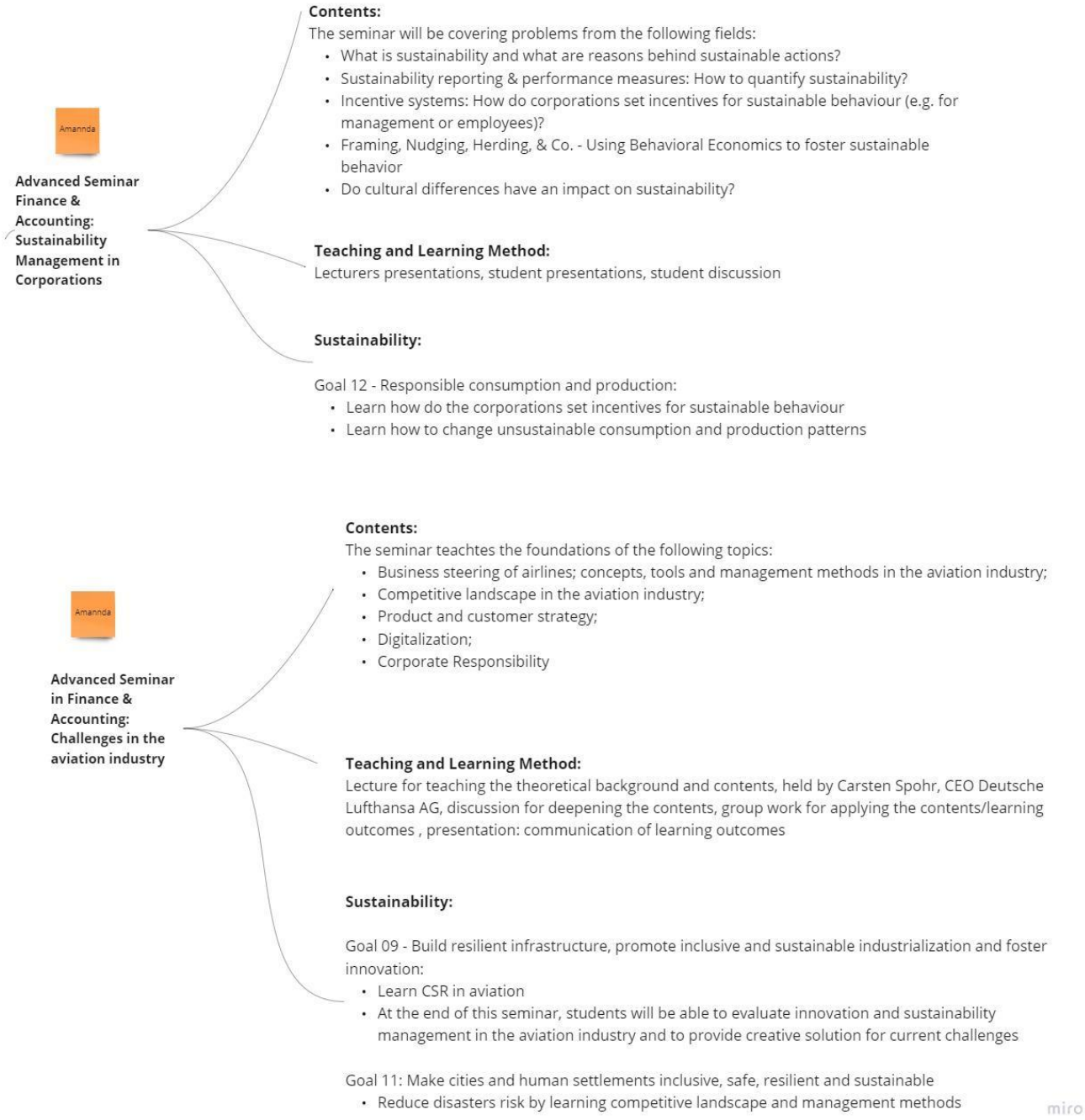
# APPENDIX

**LIST OF APPENDIX** **29**

Miro brainstorming - Considering SDG targets



Miro brainstorming - Without considering SDG targets




**Here is the LINK to Miro.**

Sample Calculation of ICR and ICA

Consider the sample code in the below figure (I), each row is given a weight based on the number of the same codes according to table 5. In the first row, three researchers coded the EEs as no SDG targets (0) and the other two chose 4.4, thus the weight is 0.5 because three researchers agreed with 0. Likewise, the second row has four researchers agreed with 0 target, thus 0.75 is the ICR score. A similar method is followed for all the remaining codes. Next, the intercoder agreement is calculated based on the average of the ICR scores of all the codes selected each week. Agreement column was finalized in the discussions among the researchers after the individual coding process.

Example from figure I, the calculation is as follows

- Intercoder Reliability = (0.5+0.75+0.5+0.5+1)/5*100% = 65%
- Intercoder Agreement = 5/5*100 = 100%

| Amannda | Harsha | Soumya | Veena | Thuy | | |
|---|---|---|---|---|---|---|
| SDG Target (number) | SDG Target (number) | SDG Target (number) | SDG Target (number) | SDG Target (number) | Agreement | Intercoder Reliability |
| 4.4 | 0 | 4.4 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 8.4 | 0 | 0.75 |
| 0 | 0 | 0 | 12.8 | 16.7 | 0 | 0.5 |
| 4.7 | 0 | 0 | 0 | 12.2 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 |

Figure I: Sample code for calculating ICR and ICA

## Full list of SDG Goals and Targets

| Goal | Category | Target Number | SGD Target |
|---|---|---|---|
| | | 0 | No SDGs Subgoals targeted |
| 1 | No Poverty | 1.1 | By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day |
| 1 | No Poverty | 1.2 | By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions |
| 1 | No Poverty | 1.3 | Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable |
| 1 | No Poverty | 1.4 | By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance |
| 1 | No Poverty | 1.5 | By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters |
| 1 | No Poverty | 1.a | Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions |
| 1 | No Poverty | 1.b | Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions |
| 2 | Zero Hunger | 2.1 | By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round |
| 2 | Zero Hunger | 2.2 | By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women an |
| 2 | Zero Hunger | 2.3 | By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment |
| 2 | Zero Hunger | 2.4 | By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality |
| 2 | Zero Hunger | 2.5 | By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed |
| 2 | Zero Hunger | 2.a | Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries |
| 2 | Zero Hunger | 2.b | Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the man |
| 2 | Zero Hunger | 2.c | Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility |
| 3 | Good health and well-being | 3.1 | By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births |
| 3 | Good health and well-being | 3.2 | By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births |
| 3 | Good health and well-being | 3.3 | By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases |

| | | | |
|---|---|---|---|
| 3 | Good health and well-being | 3.4 | By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being |
| 3 | Good health and well-being | 3.5 | Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol |
| 3 | Good health and well-being | 3.6 | By 2020, halve the number of global deaths and injuries from road traffic accidents |
| 3 | Good health and well-being | 3.7 | By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes |
| 3 | Good health and well-being | 3.8 | Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all |
| 3 | Good health and well-being | 3.9 | By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination |
| 3 | Good health and well-being | 3.a | Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate |
| 3 | Good health and well-being | 3.b | Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all |
| 3 | Good health and well-being | 3.c | Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States |
| 3 | Good health and well-being | 3.d | Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks |
| 4 | Quality education | 4.1 | By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes |
| 4 | Quality education | 4.2 | By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education |
| 4 | Quality education | 4.3 | By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university |
| 4 | Quality education | 4.4 | By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship |
| 4 | Quality education | 4.5 | By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations |
| 4 | Quality education | 4.6 | By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy |
| 4 | Quality education | 4.7 | By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development |
| 4 | Quality education | 4.a | Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all |
| 4 | Quality education | 4.b | By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries |
| 4 | Quality education | 4.c | By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States |
| 5 | Gender Equality | 5.1 | End all forms of discrimination against all women and girls everywhere |
| 5 | Gender Equality | 5.2 | Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation |
| 5 | Gender Equality | 5.3 | Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation |
| 5 | Gender Equality | 5.4 | Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate |
| 5 | Gender Equality | 5.5 | Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life |

| | | | |
|---|---|---|---|
| 5 | Gender Equality | 5.6 | Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences |
| 5 | Gender Equality | 5.a | Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws |
| 5 | Gender Equality | 5.b | Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women |
| 5 | Gender Equality | 5.c | Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels |
| 6 | Clean water and sanitation | 6.1 | By 2030, achieve universal and equitable access to safe and affordable drinking water for all |
| 6 | Clean water and sanitation | 6.2 | By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations |
| 6 | Clean water and sanitation | 6.3 | By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally |
| 6 | Clean water and sanitation | 6.4 | By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity |
| 6 | Clean water and sanitation | 6.5 | By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate |
| 6 | Clean water and sanitation | 6.6 | By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes |
| 6 | Clean water and sanitation | 6.a | By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling a |
| 6 | Clean water and sanitation | 6.b | Support and strengthen the participation of local communities in improving water and sanitation management |
| 7 | Affordable and clean energy | 7.1 | By 2030, ensure universal access to affordable, reliable and modern energy services |
| 7 | Affordable and clean energy | 7.2 | By 2030, increase substantially the share of renewable energy in the global energy mix |
| 7 | Affordable and clean energy | 7.3 | By 2030, double the global rate of improvement in energy efficiency |
| 7 | Affordable and clean energy | 7.a | By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology |
| 7 | Affordable and clean energy | 7.b | By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support |
| 8 | Decent work and economic growth | 8.1 | Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries |
| 8 | Decent work and economic growth | 8.2 | Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors |
| 8 | Decent work and economic growth | 8.3 | Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services |
| 8 | Decent work and economic growth | 8.4 | Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead |
| 8 | Decent work and economic growth | 8.5 | By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value |
| 8 | Decent work and economic growth | 8.6 | By 2020, substantially reduce the proportion of youth not in employment, education or training |
| 8 | Decent work and economic growth | 8.7 | Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms |

| | | | |
|---|---|---|---|
| 8 | Decent work and economic growth | 8.8 | Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment |
| 8 | Decent work and economic growth | 8.9 | By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products |
| 8 | Decent work and economic growth | 8.10 | Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all |
| 8 | Decent work and economic growth | 8.a | Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries |
| 8 | Decent work and economic growth | 8.b | By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization |
| 9 | Industry, innovation and infrastructure | 9.1 | Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all |
| 9 | Industry, innovation and infrastructure | 9.2 | Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries |
| 9 | Industry, innovation and infrastructure | 9.3 | Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets |
| 9 | Industry, innovation and infrastructure | 9.4 | By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities |
| 9 | Industry, innovation and infrastructure | 9.5 | Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending |
| 9 | Industry, innovation and infrastructure | 9.a | Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island |
| 9 | Industry, innovation and infrastructure | 9.b | Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities |
| 9 | Industry, innovation and infrastructure | 9.c | Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020 |
| 10 | Reduced inequalities | 10.1 | By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average |
| 10 | Reduced inequalities | 10.2 | By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status |
| 10 | Reduced inequalities | 10.3 | Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard |
| 10 | Reduced inequalities | 10.4 | Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality |
| 10 | Reduced inequalities | 10.5 | Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations |
| 10 | Reduced inequalities | 10.6 | Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions |
| 10 | Reduced inequalities | 10.7 | Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies |
| 10 | Reduced inequalities | 10.a | Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements |
| 10 | Reduced inequalities | 10.b | Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes |

| | | | |
|---|---|---|---|
| 10 | Reduced inequalities | 10.c | By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent |
| 11 | Sustainable cities and communities | 11.1 | By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums |
| 11 | Sustainable cities and communities | 11.2 | By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons |
| 11 | Sustainable cities and communities | 11.3 | By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries |
| 11 | Sustainable cities and communities | 11.4 | Strengthen efforts to protect and safeguard the world's cultural and natural heritage |
| 11 | Sustainable cities and communities | 11.5 | By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations |
| 11 | Sustainable cities and communities | 11.6 | By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management |
| 11 | Sustainable cities and communities | 11.7 | By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities |
| 11 | Sustainable cities and communities | 11.a | Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning |
| 11 | Sustainable cities and communities | 11.b | By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels |
| 11 | Sustainable cities and communities | 11.c | Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials |
| 12 | Responsible consumption and production | 12.1 | Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries |
| 12 | Responsible consumption and production | 12.2 | By 2030, achieve the sustainable management and efficient use of natural resources |
| 12 | Responsible consumption and production | 12.3 | By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses |
| 12 | Responsible consumption and production | 12.4 | By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment |
| 12 | Responsible consumption and production | 12.5 | By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse |
| 12 | Responsible consumption and production | 12.6 | Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle |
| 12 | Responsible consumption and production | 12.7 | Promote public procurement practices that are sustainable, in accordance with national policies and priorities |
| 12 | Responsible consumption and production | 12.8 | By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature |
| 12 | Responsible consumption and production | 12.a | Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production |
| 12 | Responsible consumption and production | 12.b | Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products |

| | | | |
|---|---|---|---|
| 12 | Responsible consumption and production | 12.c | Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities |
| 13 | Climate action | 13.1 | Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries |
| 13 | Climate action | 13.2 | Integrate climate change measures into national policies, strategies and planning |
| 13 | Climate action | 13.3 | Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning |
| 13 | Climate action | 13.a | Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible |
| 13 | Climate action | 13.b | Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities |
| 14 | Life below water | 14.1 | By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution |
| 14 | Life below water | 14.2 | By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans |
| 14 | Life below water | 14.3 | Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels |
| 14 | Life below water | 14.4 | By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics |
| 14 | Life below water | 14.5 | By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information |
| 14 | Life below water | 14.6 | By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation |
| 14 | Life below water | 14.7 | By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism |
| 14 | Life below water | 14.a | Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries |
| 14 | Life below water | 14.b | Provide access for small-scale artisanal fishers to marine resources and markets |
| 14 | Life below water | 14.c | Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The future we want" |
| 15 | Life on land | 15.1 | By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements |
| 15 | Life on land | 15.2 | By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally |
| 15 | Life on land | 15.3 | By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world |
| 15 | Life on land | 15.4 | By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development |
| 15 | Life on land | 15.5 | Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species |

| | | | |
|---|---|---|---|
| 15 | Life on land | 15.6 | Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed |
| 15 | Life on land | 15.7 | Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products |
| 15 | Life on land | 15.8 | By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species |
| 15 | Life on land | 15.9 | By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts |
| 15 | Life on land | 15.a | Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems |
| 15 | Life on land | 15.b | Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation |
| 15 | Life on land | 15.c | Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities |
| 16 | Peace, justice and strong institutions | 16.1 | Significantly reduce all forms of violence and related death rates everywhere |
| 16 | Peace, justice and strong institutions | 16.2 | End abuse, exploitation, trafficking and all forms of violence against and torture of children |
| 16 | Peace, justice and strong institutions | 16.3 | Promote the rule of law at the national and international levels and ensure equal access to justice for all |
| 16 | Peace, justice and strong institutions | 16.4 | By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime |
| 16 | Peace, justice and strong institutions | 16.5 | Substantially reduce corruption and bribery in all their forms |
| 16 | Peace, justice and strong institutions | 16.6 | Develop effective, accountable and transparent institutions at all levels |
| 16 | Peace, justice and strong institutions | 16.7 | Ensure responsive, inclusive, participatory and representative decision-making at all levels |
| 16 | Peace, justice and strong institutions | 16.8 | Broaden and strengthen the participation of developing countries in the institutions of global governance |
| 16 | Peace, justice and strong institutions | 16.9 | By 2030, provide legal identity for all, including birth registration |
| 16 | Peace, justice and strong institutions | 16.10 | Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements |
| 16 | Peace, justice and strong institutions | 16.a | Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime |
| 16 | Peace, justice and strong institutions | 16.b | Promote and enforce non-discriminatory laws and policies for sustainable development |
| 17 | Partnerships for the goals | 17.1 | Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection |
| 17 | Partnerships for the goals | 17.2 | Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries |
| 17 | Partnerships for the goals | 17.3 | Mobilize additional financial resources for developing countries from multiple sources |

| | | | |
|---|---|---|---|
| 17 | Partnerships for the goals | 17.4 | Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries |
| 17 | Partnerships for the goals | 17.5 | Adopt and implement investment promotion regimes for least developed countries |
| 17 | Partnerships for the goals | 17.6 | Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism |
| 17 | Partnerships for the goals | 17.7 | Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed |
| 17 | Partnerships for the goals | 17.8 | Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology |
| 17 | Partnerships for the goals | 17.9 | Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular |
| 17 | Partnerships for the goals | 17.10 | Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda |
| 17 | Partnerships for the goals | 17.11 | Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020 |
| 17 | Partnerships for the goals | 17.12 | Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access |
| 17 | Partnerships for the goals | 17.13 | Enhance global macroeconomic stability, including through policy coordination and policy coherence |
| 17 | Partnerships for the goals | 17.14 | Enhance policy coherence for sustainable development |
| 17 | Partnerships for the goals | 17.15 | Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development |
| 17 | Partnerships for the goals | 17.16 | Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries |
| 17 | Partnerships for the goals | 17.17 | Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships |
| 17 | Partnerships for the goals | 17.18 | By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts |
| 17 | Partnerships for the goals | 17.19 | By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries |

| Module | Classification (mandatory/elective) | Course Name | Lecturer | Source of empirical evidence (e.g. syllabus/course | Empirical evidence | Person in charge of empirical evidence | Week No. | Date | Source link | Deductive code 1 (SDG target description) | SDG Target (number) | SDG Goal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB18812_1] Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Dr. Rebecca Preller | Syllabus | key topics around entrepreneurial opportunity development and work-life-balance based on previously made contributions, identified ways of advancing entrepreneurship research, and good scientific practice | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB18812_1] Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Dr. Rebecca Preller | Syllabus | • Improve diagnostic and analytical skills<br>• Enhance verbal skills, in particular, in class discussions<br>• Build up critical thinking and interpretation skills<br>• Learn to collaborate with others & function effectively in a team<br>• Learn to give constructive feedback, and learn from receiving others' feedback | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB18812_1] Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Dr. Rebecca Preller | Syllabus - Preliminary topics and readings | Stakeholder involvement in EOD<br>Cavazos, D. E., Patel, P., & Wales, W. (2012). Mitigating environmental effects on new venture growth: The critical role of stakeholder integration across buyer and supplier groups. Journal of Business Research, 65(9) | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB18812_1] Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Dr. Rebecca Preller | Syllabus - Preliminary topics and readings | Community of Inquires:<br>Shepherd, D. A., Sattari, R., & Patzelt, H. (2020). A social model of opportunity development: Building and engaging communities of inquiry. Journal of Business Venturing, 106033. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus | follows the entrepreneurial process with a specific focus on understanding how entrepreneurs and new ventures obtain legitimacy, build reputation, use their networks, communication, and secure vital resources for survival and growth | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus | the steps in writing a scientific seminar paper, including how to evaluate academic literature, interact with an academic debate, prepare and elaborate academic arguments and defend one's work in front of a knowledgeable audience | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus | Advance a set of skills including, but not limited to: diagnostic, analytical skills, presentation, academic writing, and critical thinking skills | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus - A selection of relevant papers for topics covered in this seminar | • Aldrich, H., Reese, P. R., & Dubini, P. (1989). Women on the verge of a breakthrough: Networking among entrepreneurs in the United States and Italy. Entrepreneurship & Regional Development, 1(4), 339-356.<br>• Jennings, J. E., & Brush, C. G. (2013). Research on women entrepreneurs: challenges to (and from) the broader entrepreneurship literature?. Academy of Management Annals, 7(1), 663-715. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life | 5.5 | 5 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus - A selection of relevant papers for topics covered in this seminar | Ahl, H. (2006). Why research on women entrepreneurs needs new directions. Entrepreneurship Theory and Practice, 30(5), 595-621. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels | 5.c | 5 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus - A selection of relevant papers for topics covered in this seminar | Baker, T., E. aldrich, H., & Nina, L. (1997). Invisible entrepreneurs: the neglect of women business owners by mass media and scholarly journals in the USA. Entrepreneurship & Regional Development, 9(3), 221-238. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/oper | Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels | 5.c | 5 |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | Syllabus | Lounsbury, M. & Glynn, M. A. (2001). Cultural entrepreneurship: Stories, legitimacy, and the acquisition of resources. Strategic Management Journal, 22(6-7): 545-564. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WIV05001] Advanced Seminar Economics & Policy: Economics of Innovation | Prof. Dr. Hanna Hottenrottt<br>Dr. Zhaoxin Pu | Learning objectives | Understand the current research on topics in innovation economics.<br>Learn to read (empirical) economics research papers: context, data, method, results/key message.<br>Identify gaps in the academic literature and public understanding of focal topic.<br>Derive policy suggestions based on the scientific evidence. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | No SDGs Subgoals targeted | 0 | 0 |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WIV05001] Advanced Seminar Economics & Policy: Economics of Innovation | Prof. Dr. Hanna Hottenrottt<br>Dr. Zhaoxin Pu | Learning objectives | Understand and contribute to academic and public debate on questions related to innovation economics<br><br>You are asked to prepare a presentation (a written report) that<br>• summarizes the current state of economic research on topic [XYZ] and<br>• shows the policy implications for the promotion of innovation activities in your company / country. | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities | 9.b | 9 |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WIV05001] Advanced Seminar Economics & Policy: Economics of Innovation | Prof. Dr. Hanna Hottenrottt<br>Dr. Zhaoxin Pu | Seminar topics | G. Economic Consequences of Innovation in<br>G.1 Drug Development<br>G.2 Energy, Environment and Technological Change<br>G.3 Automation and Jobs | Veena, Thuy | 1 | Aug 15 - 25, 2021 | https://syncandshare.lrz.de/dow | By 2030, achieve the sustainable management and efficient use of natural resources | 12.2 | 12 |

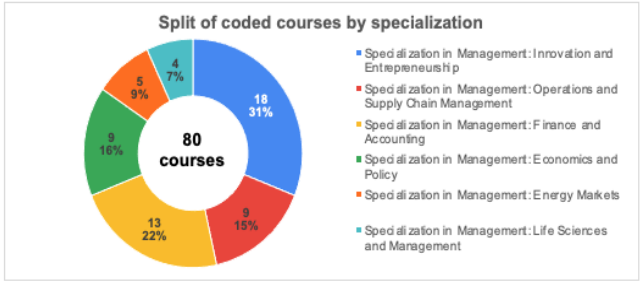
# Comprehensive Codebook - Second Level Codebook

*The full codebook can be found HERE*

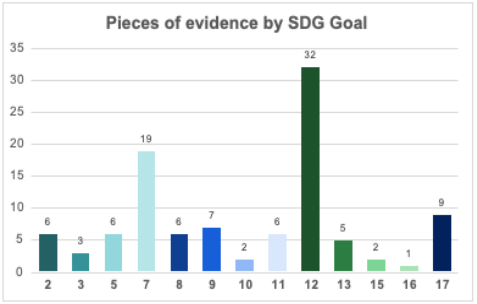
| Module | Classification (mandatory/elective) | Course Name | Lecturer | Source | Remarks | Week No. | Date | Deductive Code 2 (assessment description) | Deductive Code 2 |
|---|---|---|---|---|---|---|---|---|---|
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB18812_1] Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Dr. Rebecca Preller | https://syncandshare.lrz.de | It was agreed for a B because even though the module did not have a direct relation to sustainability targets, innovation and entrepreneurship was highly applicable to sustainability and hence was marked as B | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Innovation and Entrepreneurship | Advanced Seminar Innovation and Entrepreneurship | [WIB271011] Advanced Seminar Innovation & Entrepreneurship: Venture Growth and Internationalization | Benedikt Seigner | https://syncandshare.lrz.de | It was agreed for a B becaase even though the module did not have a direct relation to sustainability targets, venture growth and internationalisation ip was highly applicable to sustainability and hence was marked as B | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WIV05001] Advanced Seminar Economics & Policy: Economics of Innovation | Prof. Dr. Hanna Hottenrottt Dr. Zhaoxin Pu | https://syncandshare.lrz.de | It recieves a B score because even though its mainstream economics, it is applied to the fields of energy and automation and how can we bring innovation to these fields. The changes are supposed to make these industry more sustainabie in the future. | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WI001194] Who is responsible for food and health? Social and cultural perspective on food, health, and technology | Amy Clare, Dr. Julia Feiler, Felix Remter, Sophia Rossmann, Dr. Sarah Schönbauer | https://syncandshare.lrz.de | It was agreed as A as all the empirical evidences related to one or the other sustainability targets. | 1 | Aug 15 - 25, 2021 | Sustainability at the core (sustainability is at the core of the course, each class is directly linked to sustainability related topics) | A |
| Specialization in Management: Marketing, Strategy and Leadership | Elective Modules Marketing, Strategy and Leadership | [WI001231] Advanced Topic Marketing, Strategy & Leadership: Leadership and Strategy in the 21st Century | Prof. Alexandra Borchardt | https://syncandshare.lrz.de | The course recieves a B after in depth conversation with Ms. Esther Salvi and the team as there was some confusion with this module. It teaches how to be a good leader in the uncertain times and unprecedented changes that we see today. It is promoting leadership in the direction of sustainable development | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Marketing, Strategy and Leadership | Elective Modules Marketing, Strategy and Leadership | [WIB05005] Advanced Topics in Marketing, Strategy & Leadership: New Product Development and Marketing | Prof. Dr. Christoph Fuchs | https://syncandshare.lrz.de | Product innovation, understanding of the consumer needs and the needs of the present day are skills needed to create valuable product ideas and market in a way which is acceptable to the consumers. With the world talking about climate change, we need product ideas which innovates and markets valuable product so that impact can be achieved. However, there was no direct relation to sustainable products in the module, hence was scored as B | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Marketing, Strategy and Leadership | Elective Modules Marketing, Strategy and Leadership | [WI001090] Behavioral Pricing: Insights, Methods, and Strategy | Prof. Dr. Florian Bauer | https://syncandshare.lrz.de | No relation with sustainability was found in the module | 1 | Aug 15 - 25, 2021 | Sustainability not targeted (no classes in the module are linked to sustainability related topics) | C |
| Specialization in Management: Marketing, Strategy and Leadership | Elective Modules Marketing, Strategy and Leadership | [WI000739] Consumer Behavior | Irina Dolgopolova | https://syncandshare.lrz.de | The module recieved a B grade because it addresses the consumer culture of today, how the consumers should be provided all the necessary information to help them make their purchasing decisions etc., Howerver, it did not include a lot of examples on organic goods, environment friendly goods etc. | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |
| Specialization in Management: Operations and Supply Chain Management | Advanced Seminar Operations and Supply Chain Management | [WIB19837] Advanced Seminar Operations & Supply Chain Management: Production and Supply Chain Management | Prof. Dr. Martin Grunow | Module Handbook p.29-30 | No relation with sustainability was found in the module | 1 | Aug 15 - 25, 2021 | Sustainability not targeted (no classes in the module are linked to sustainability related topics) | C |
| Specialization in Management: Innovation and Entrepreneurship | Elective Modules Innovation and Entrepreneurship | [WI000258] Empirical Research in Economics and Management | Prof. Dr. Stefan Hirsch | https://syncandshare.lrz.de | No relation with sustainability was found in the module | 1 | Aug 15 - 25, 2021 | Sustainability not targeted (no classes in the module are linked to sustainability related topics) | C |
| Specialization in Management: Marketing, Strategy and Leadership | Elective Modules Marketing, Strategy and Leadership | [WIB21952] Advanced Topics in Marketing, Strategy & Leadership: Performance Measurement: The better you measure the better you manage | Prof. Ulf Steinberg | https://syncandshare.lrz.de | The course is graded as B because of the title itself. A supply chain or a enterprise is sustainable or not sustainable based on the measurement system in place. It is increasingly important to have measures of sustainability in all sectors. And the module teaches how to measure performance overtime eventhough not always tackling direct sustainability topics. | 1 | Aug 15 - 25, 2021 | Sustainability targeted but not core (sustainability is not at the core of the course but some connections to sustainable-related topics are made throughout the course, some classes are directly linked to sustainability related topics) | B |

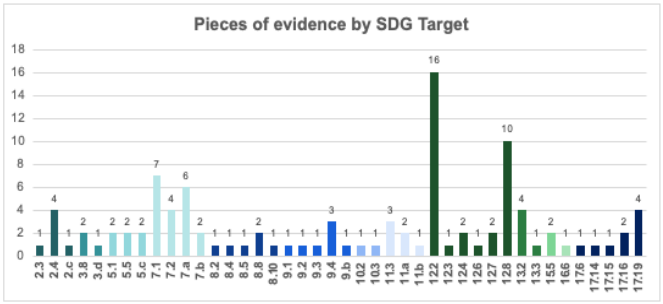
## PRME PROJECT STUDY - CODEBOOK DASHBOARD

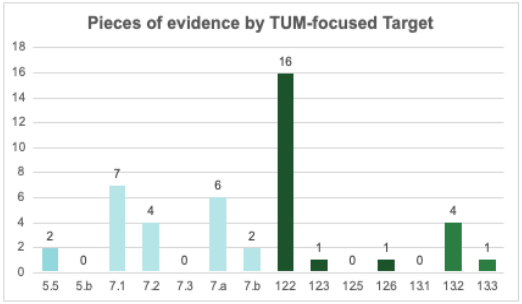
| Specialization/Module | Number of courses | Initially available Source | Syllabi requested | Coded courses | Coded rate |
|---|---|---|---|---|---|
| Specialization in Management: Innovation and Entrepreneurship | 68 | 15 | 2 | 18 | 26% |
| Specialization in Management: Operations and Supply Chain Management | 24 | 3 | 7 | 9 | 38% |
| Specialization in Management: Finance and Accounting | 65 | 5 | 11 | 13 | 20% |
| Specialization in Management: Economics and Policy | 25 | 4 | 5 | 9 | 36% |
| Specialization in Management: Energy Markets | 6 | 3 | 2 | 5 | 83% |
| Specialization in Management: Life Sciences and Management | 10 | 2 | 3 | 4 | 40% |
| **Total** | **263** | **52** | **35** | **80** | **30%** |

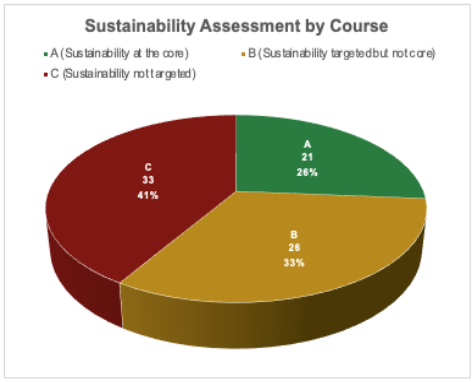


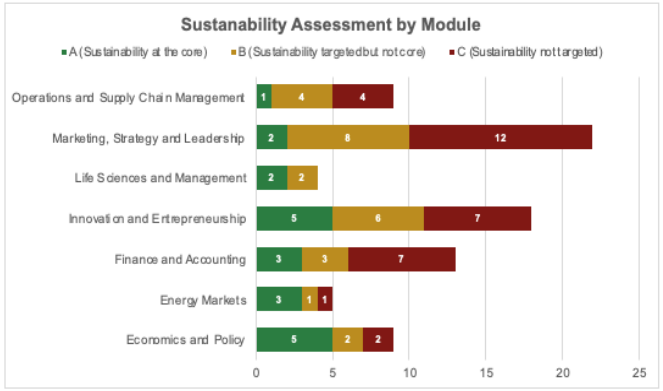

| *Total number of codes* | *No. of EEs WITH SDG Target* | *No. of EEs WITHOUT SDG Target* | *No. of EEs matching TUM SoM Targets* | *Total number of coded courses* | *No. of sustainabile courses (B + C)* |
|---|---|---|---|---|---|
| 251 | 104 | 147 | 44 | 80 | 47 |

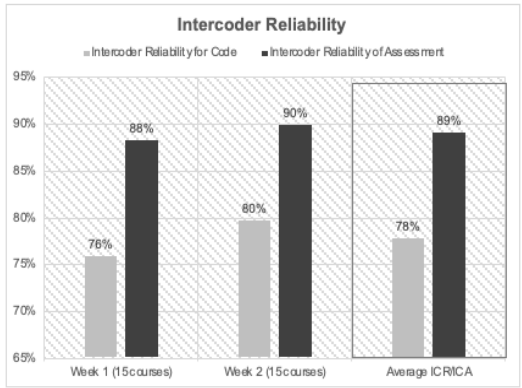


# LIST OF ABBREVIATIONS

**EE**: Empirical Evidence

**EM:** Specialization in Management: Energy Markets

**EP:** Specialization in Management: Economics and Policy

**FA:** Specialization in Management: Finance and Accounting

**FL**: First Level Code

**IE:** Specialization in Management: Innovation and Entrepreneurship

**LSM**: Specialization in Management: Life Sciences and Management

**MMT**: Master in Management and Technology

**MSL:** Specialization in Management: Marketing, Strategy and Leadership

**OSCM:** Specialization in Management: Operations and Supply Chain Management

**PRME**: Principles for Responsible Management Education

**SDGs:** Sustainable Development Goals

**SL:** Second Level Code

**TUM SOM:** Technical University of Munich, School of Management

# GLOSSARY

**Code**: a selected SDG target as per empirical evidence

**Comprehensive Codebook**: include First Level Codebook and Second Level Codebook

**Course**: an individual seminar, an advanced topic, or a lecture

**Empirical evidence:** a piece of evidence selected from the course material such as syllabus, course description, lecture slides

**First level Code:** Choose the most relevant SDG target for the selected empirical evidence

**Module:** same as Specialization, the categorical track split under Management studies

**Second level Code**: Assess the sustainability of the course using ABC scaling based on SDGs and overall sustainability of the course contents