

Reporting on the Impacts of Response Measures: Ghana Case Study

Workshop 2
16/02/2021



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Roundtable on
Climate Change and
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Agenda

1. Background on Response Measures
2. ERCST Methodology for Reporting on the Impacts of Response Measures
3. Methodology for Country Case Study Ghana
4. Step 1, 2 & 3 in detail: process, issues and main results
5. Next steps

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Background on response measures

- We are in a period of transition towards a low GHG economy that needs to be managed
- To alleviate the adverse effects of climate change, countries implement **mitigation policies**, also known as “**response measures**”
- These response measures may have cross-border economic and social impacts on countries
 - **Intended impacts:** GHG reductions, carbon costs, behavioural changes, etc.
 - **Unintended impacts:** employment changes, carbon leakage, changes in trade and investment patterns, energy poverty, etc.

Background on response measures (2)

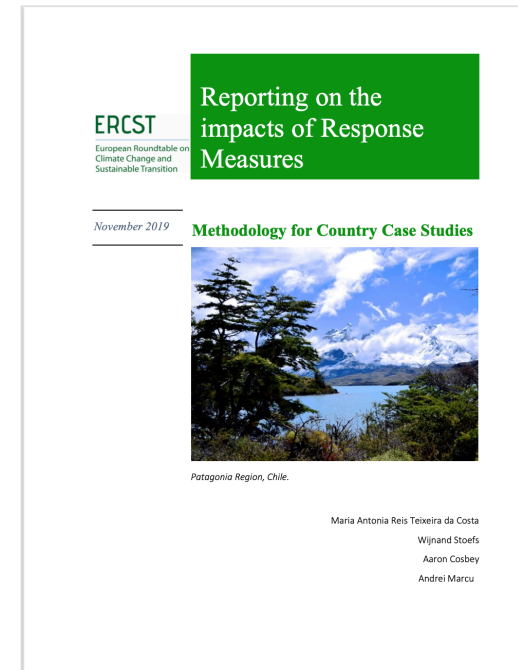
- The **unintended impacts** can be **positive or negative** and will affect all 3 pillars of sustainable development:
 - Economic
 - Social
 - Environmental
- Response Measures can be:
 - **International** (in other jurisdictions or global)
 - **Domestic** (in the jurisdiction itself)

Background on response measures (3)

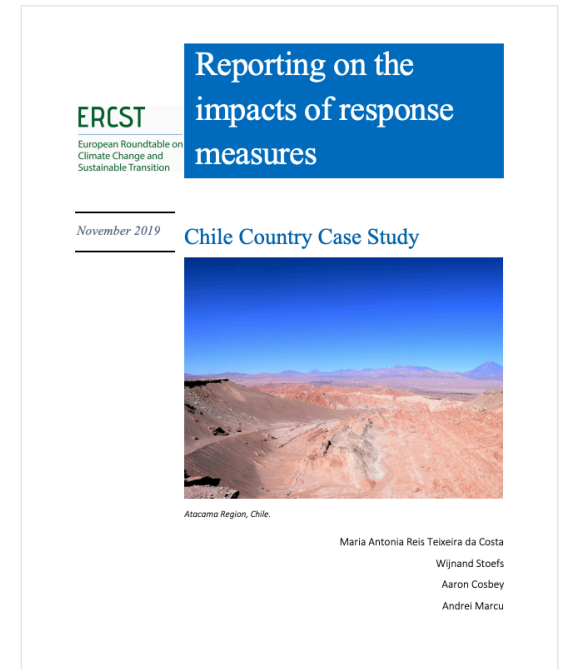
- There has already been considerable debate under the UNFCCC on trans-border impacts of climate change mitigation measures
- However, there continues to be:
 - **Limited of methodologies** on identification and quantification and **empirical studies** to provide more substance to the UNFCCC discussions

ERCST methodology for reporting on the impacts of response measures

- **Limited methodologies** on identification and quantification on the impacts of response measures
- In 2019, ERCST developed a methodology for reporting on the impacts of Response Measures that was used for the Chilean Country Case Study



ERCST,2019



ERCST,2019

Overview of ERCST Methodology

Step 1: Country description

Step 2: Identify the top 100 sectors in terms of value added

Step 3a: Filter list of sectors potentially vulnerable to international response measures

Step 3b: Filter list of sectors potentially vulnerable to domestic response measures

Step 4a: Identify sectors vulnerable to international response measures

Step 4b: Identify sectors vulnerable to domestic response measures

Step 5: Stakeholder input to identify anything which was missed in Step 4

**Identifying
the vulnerable
sectors**

Overview of ERCST Methodology (2)

Step 6a: Identify international response measures that might impact sectors from Step 4

- A. Identify main export partners of the vulnerable sectors
- B. Search national and international databases
- C. Filter the results

Step 6b: Identify domestic response measures response measures that might impact sectors from Step 4

- A. Search national and international databases
- B. Filter the results

(Country-level discretion whether to include positive as well as negative impacts)

**Identifying
response
measures**

Step 7: Stakeholder input to identify things missed in Step 6

Overview of ERCST Methodology (3)

Step 8a: Assess the impacts of international response measures on identified sectors

Step 8b: Assess the impacts of domestic response measures on identified sectors.

Step 9: Look at possible domestic and international tools and support which may be needed to address the impacts.

**Assessing
the impacts**



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Project Objective

- Contribute to **Activity 4 of the KCI Work Programme** by developing a **case study for the country of Ghana**
- Enhance, identify, measure, analyse, and understand the impacts of the implementation of response measures in the jurisdiction, as well as identify measures to address their impacts
- This project builds on the methodology developed by ERCST in 2019 - **Reporting on the impacts of Response Measures: Chile Country Case Study**
- Consider which other elements from the 11 activities of the **KCI Work Programme** does this project and informal dialogue contributes to
- This information from the Informal Dialogue will be shared with the KCI and the Forum

***KCI Activity 4:** “Enhance the capacity and understanding of Parties, through collaboration and input from stakeholders, on the assessment and analysis of the impacts of the implementation of response measures to facilitate the undertaking of economic diversification and transformation and just transition.”*

Methodology for Country Case Study: Ghana

STEP 1 Describe the country and its characteristics

STEP 2 Identifying important sectors to the Ghanaian economy

STEP 3 Identify sectors potentially vulnerable to international response measures

Identifying
Vulnerable
Sectors

STEP 4 Identify relevant response measures

Identifying
Response
Measures

STEP 5 Assess the impacts of international response measures

Assessing the
Impacts

STEP 6 Look at possible domestic and international tools and support which may be needed to address the impacts

Differences between the Ghanaian and Chilean Methodologies

In the process we had to adapt the methodology developed by ERCST in 2019 for the Chilean country case study to a different country, in this case Ghana, and consider different elements of the economy and information availability

Chile

- Intl' and domestic response measures
- **Step 2:**
 - Domestic Value Added data
 - Level of disaggregation of 111 sectors provided by the Bank of Chile
- **Step 3:**
 - Filtering method:
 - Method 1: Threshold Method
 - Method 2: Weighted Scoring Method

Ghana

- International response measures
- **Step 2:**
 - Gross Domestic Production (GDP) at current market prices
 - GDP level of disaggregation of 23 sectors initially and then 71 with GSS support
- **Step 3:**
 - Filtering method: Vulnerability Indicator based on EU ETS PH 4 Carbon Leakage Indic.



Step 1: description of the country and its characteristics

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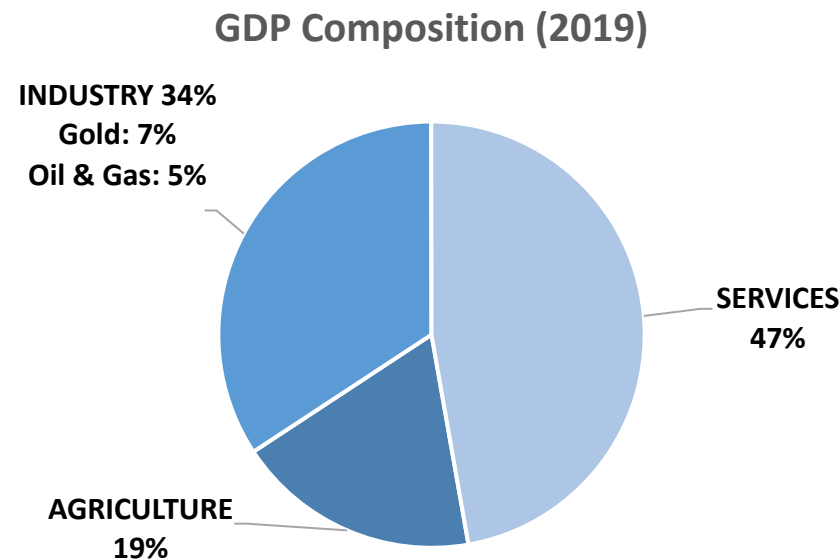
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Step 1 in practice

- Overview of Ghana's country characteristics, including, importantly, the main sectors of the economy and its economic performance
- This step has been carried out mainly through desk research and will be available in report

Includes:

- General geography
- Historical context
- Political system
- Main sectors of the economy
- Economic performance



Source: own elaboration based on GSS
2019 data



Source: World Atlas



Step 2: identifying important sectors to the Ghanaian economy

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Step 2 in practice: process

- To identify the main sectors of the economy, gross domestic production per sector has been taken as an indicator
- **Step 2.1: Collection of data**
 - Gross Domestic Product (GDP) at Current Market Prices (Gh¢) provided by the Ghana Statistical Service, year 2019
 - For the tourism sector the WTO Tourism Statistics Database 2018 (UNWTO, 2018) was used as the main source, includes: travel and expenditure by main purpose of trip
 - GDP data publicly available disaggregation level of 23 activities, with the collaboration of the GSS we got to 71 activities

Step 2 in practice: process (2)

Step 2.2: Correspondence of GDP activities to ISIC Rev.4

- Correspondence from Ghanaian GDP activities data to the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4
- **Why doing this?**
 - **GDP Data** is categorised in activities - International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4 codes
 - **Exports data** needed in the next steps, data provided is in products - HS 2007 stands for the Harmonized System (HS) used for the international classification of products

Example for Gold related activities

Sector	Gold
Section	B, Mining and Quarrying
Division	07, Mining of metal ores
Group	071, Mining of iron ores
Class	0729, Mining of other non-ferrous metal ores (this class includes gold)

Source: own
elaboration based
on ISIC Rev.4

} 2-digit level

} 4-digit level

Step 2 in practice: process (3)

- **Step 2.3: First filter from 71 to 56 activities**
 - **Service activities** (e.g. financial and insurance activities) were left out since they mostly don't have significant emissions compared to the other activities
 - **Domestic activities** (e.g. construction) with no exports were left out too since looking at international response measures
- **Step 2.4: Second filter to 20 activities**
 - Top 20 activities by GDP value were selected as a basis to identify the top vulnerable sectors to international response measures

Step 2 in practice: main challenges

1. **Domestic value added data not available**, used gross domestic production (GDP) at current market prices (Gh¢)
2. **GDP data publicly available** at a **low level of disaggregation**, 23 activities only. With aid of stakeholders from the GSS able to provide us a disaggregation level of 71 activities total. Most disaggregated category was for crops (cocoa, yam, cassava, cocoyam, etc.)
3. **Varying level of disaggregation** ISIC Rev 4 codes, some activities at 4-digit level and others at 2-digit level
4. **Tourism sector** ISIC classification system does not have one sole sector classification for the sector, rather products and activities are included in other sectors which could be seen as falling under tourism (e.g. transportation, accommodation and food service activities, etc.)

Step 2 results: important sectors to the Ghanaian economy

Sector Description		Gross Domestic Product (GDP) at Current Market Prices	
ISIC Rev 4 Code	Description	GDP 2019 (M Gh¢)	% of GDP
2420, 0729	Gold	23.282	7,1%
0610, 0620, 1920	Oil and gas	14.848	4,5%
0113	Yam	10.870	3,3%
05, 07 (- 0729), 08,09	Mining and quarrying without oil and gas and gold	10.402	3,2%
WTO 1.33 & 1.36	Tourism	8.491	2,6%
0127, 1073	Cocoa	8.050	2,5%
14	Livestock	7.945	2,4%
20	Manufacture of chemicals and chemical products	5.964	1,8%
0122	Plantain	4.857	1,5%
11,10 (-1073, -1020)	Manufacture of beverages and food products	4.575	1,4%
0113	Cassava	4.333	1,3%
02	Forestry and Logging	4.329	1,3%
0129, 0116, 0127	Other tree crops (coffee, rubber, cotton)	3.772	1,2%
22	Manufacture of rubber and plastics products	3.626	1,1%
0111	Groundnuts	3.283	1,0%
023	Manufacture of other non-metallic mineral products	3.110	1,0%
03, 1020	Fishing	3.035	0,9%
25	Manufacture of fabricated metal products, except mach. & equip.	2.782	0,9%
0126	Palm oil	1.926	0,6%
0119	Maize	1.810	0,6%

Source: Own elaboration based on GSS and UNWTO data



Step 3: identify sectors potentially vulnerable to international response measures

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Step 3 in practice: process

STEP 3.1: Collect and calculate trade and GHG intensity data

- To identify the sectors potentially vulnerable to international response measures, two indicators have been taken into account:
 - a) **Trade intensity:** to understand which sectors are most trade-exposed
 - b) **Emissions intensity:** to identify the sectors with low/no GHG emissions, as they will be less - or not at all - exposed to climate mitigation policies

STEP 3.2 : Filter from 20 to 12 activities

- Selected by taking the top 11 activities according to their trade intensity categories plus tourism even if there is no trade intensity data for this category
- The activities important for the economy but not highly exported, such as other tree crops (coffee, rubber, cotton), forestry and logging, plantain, maize, livestock, yam, groundnuts, cassava, were left out.

Step 3 in practice: process (2)

STEP 3.3: Rank 12 selected activities by Vulnerability Indicator

- The selection of the most vulnerable sectors was done by applying the **Vulnerability Indicator** which is an adapted methodology based on the EU ETS Phase 4 Carbon Leakage Indicator

Formula

$$\text{Vulnerability Indicator} = \underbrace{\left(\frac{\text{Export} + \text{Imports}}{\text{GDP sector} + \text{Imports}} \right)}_{\text{Trade Intensity}} \times \underbrace{\left(\frac{\text{GHG emissions}}{\text{GDP sector}} \right)}_{\text{Emissions Intensity}}$$

Step 3.1.a: trade intensity

Formula

$$\textit{Trade intensity} (\%) = \frac{\text{export} + \text{imports}}{\text{GDP sector} + \text{imports}}$$

Data: exports and imports data for 2019 for Ghana taken from
United Nations Comtrade Database - International Trade Statistics

Step 3.1.a: trade intensity (2)

Double concordance: ISIC Rev. 4 → ISIC Rev 3.1 → HS2007 Code

- Trade data refers to products (Harmonized System HS2007)
- GDP data refers to activities (ISIC Rev.4)
- Some ISIC Rev. 4 activities had more than 500 corresponding HS2007 export products

Double concordance example for chemicals and chemical products

ISIC Rev 4 Code		ISIC Rev 3.1 Code		HS 2007 Code	
ISIC Rev 4 Code	Description	ISIC Rev 3.1 Code	Description	HS 2007 Code	Description
20	Manufacture of chemicals and chemical products	24	Manufacture of chemicals and chemical products: manufacture of basic chemicals, plastics in primary forms, synthetic rubbers, man-made fibres, fertilizers, paints & varnishes, other chemical products, soap and detergents (excluded manufacture of pharmaceuticals, medicinal chemicals and botanical products)	1518,1520, 2707,28 (-284330), 2901-2934, 2942, 300670, 31-38, 3901-3914, 4002, 4402, 5402-5405, 5501-5504, 710410, 710420, 8523	All products under the described categories (e.g. polymers, silicones, soaps, washing preparations) of ISIC Rev 3 (subtracted 24330 Gold comps.)

Step 3.1.b: emissions intensity

Formula

$$\textit{Emissions intenisty (kg CO2 e/\$ GDP)} = \frac{\text{GHG emissions}}{\text{GDP sector}}$$

Data: primarily from the Fourth National GHG Inventory Report from Ghana(2016)

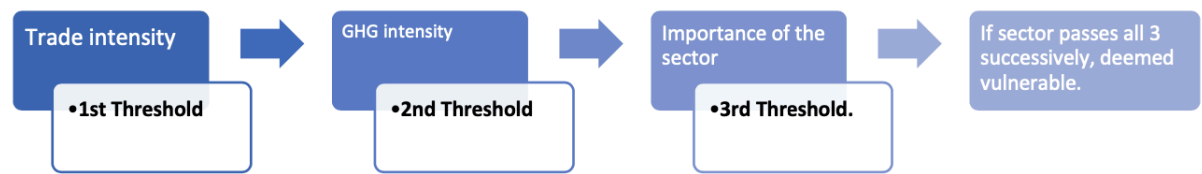
Sectors where GHG emissions data not available at 4-digit disaggregation level:

- **Gold:** GHG emissions from the operations of largest company of selected sector sourced from their Sustainability Reports, in this case Anglo Ashanti Gold (2019), multiplied by the production volume in tonnes of the gold sector in Ghana source World Gold Council (2019)
- **Crops:** total production volumes of the sector in Ghana taken from FAO (2019) for each crop, multiplied by the global average GHG intensity of product taken from WWF paper (2019). In the case of palm oil, the emissions from the operations of largest company of the selected sector were taken sourced from their Sustainability Reports, in this case Siat Group (2019)

Step 3: differences with Chilean Case Study methodology

- Ghana case study used Vulnerability Indicator instead of the two filtering methods that were used in the Chilean case study
 - Method 1: Threshold Method
 - Method 2: Weighted Scoring Method
- Simplicity reasons and due to the fact that Method 2 can become a subjective exercise when manipulating the different weighting scores

Threshold Method



Source: ERCST, 2019

Weighted Scoring Method for International Track

Trade intensity (trade intensity: exports/domestic production). Scored zero to 100, derived by multiplying number by 4, cap at 40.	
GHG intensity (grams of CO ₂ e/ USD value added). Scored zero to 40, using logarithmic scale that is capped at 40. Sectors with GHG intensity of 0,5 or higher score 40.	40%
National sectoral significance: value added relative to GDP. Scored zero to 100, derived by multiplying number by 2000, cap at 20.	20%

Source: ERCST, 2019

Step 3 in practice: main challenges

- **Non availability of some disaggregated GHG emissions data**
- **Reliability of GHG emissions data** from other sources, excluding the BUR/NIR
- **Double concordance labour intensive process** with some ISIC Rev.4 categories with more than 500 corresponding HS 2007 exports products
- **Tourism sector** no GHG emissions and trade intensity data as the sector does not report data in a manner comparable to other sectors, either through ISIC or HS Codes

Step 3 results

Scoring above 0,2 on the
Vulnerability Indicator

Sector Description		GDP at Current Market Prices Gh¢	Employment by econ. activity*	(1) GHG Intensity	(2) Trade Intensity	(3) Vulnerability Indicator
ISIC Rev 4 Code	Description	% of GDP	% of tot. workforce	kgCO2e/\$	Indicator	(1)*(2)
0127, 1073	Cocoa	1,35%	26,86%	2,624	1,70	4,449
0126	Palm oil	0,59%	26,86%	2,635	0,50	1,308
11, 10 (-1073, -1020)	Manufacture of beverages & food products	2,64%	7,95%	0,545	0,51	0,280
03,1020	Fishing	0,93%	0,09%	0,419	0,54	0,226
0610, 0620, 1920	Oil and gas	4,55%	0,03%	0,100	1,82	0,182
05, 07 (- gold of 0729), 08,09	Mining and quarrying without oil and gas and gold	3,19%	0,15%	0,356	0,33	0,118
23	Manufacture of other non-metallic mineral products	0,95%	0,21%	0,103	0,46	0,048
2420, 0729	Gold	7,13%	1,62%	0,027	1,44	0,039
25	Manufacture of fabricated metal products, except mach.and equip.	0,85%	0,52%	0,009	0,50	0,004
22	Manufacture of rubber and plastics products	1,11%	0,09%	0,005	0,54	0,003
20	Manufacture of chemicals and chemical products	2,43%	0,16%	0,005	0,48	0,003
WTO 1.33, 1.36	Tourism (travel, and expenditure by main purpose of trip)	2,77%	3,70%	-	-	-

Source: own elaboration based on GSS, ILOSTAT, BUR/NIR, UN Comtrade, UNWTO and other relevant sources for missing data points

*Data: ILOSTAT LFS (2017), employment by economic activity - ISIC level 2, Cocoa and palm oil under broad category ISIC 01 - Crop and animal production, hunting and related service activities

Step 3 results: more in detail

Major exports products from Ghana in 2019 for the most important economic activities

- **Manufacture of food products:**
 - 35% Fixed vegetable fats & oils (incl. jojoba oil)
- **Manufacture of chemicals and chemical products**
 - 9% Tanning or dyeing extracts
- **Manufacture of fabricated metal products, except machinery and equipment**
 - 34% Other articles of iron or steel
 - 20% Table, kitchen or other household articles and parts thereof, of aluminium
 - 15% Tools, implements, cutlery, spoons and forks, of base metal

Step 3 results: more in detail (2)

- **Manufacture of rubber and plastics products**
 - 40% Articles for the conveyance or packing of goods, of plastics; stoppers, lids, caps and other closures, of plastics
 - 30% Tubes, pipes and hoses of plastics
 - 20% Tableware, kitchenware, other household articles and hygienic or toilet articles, of plastics
- **Manufacture of other non-metallic mineral products**
 - 40% Quicklime, slaked lime and hydraulic lime
 - 44% Ceramic products
- **Mining and quarrying without oil and gas and gold**
 - 65% Manganese ores & concentrates
 - 7% Aluminium ores & concentrates

Step 3 results summarized

Filtering process summarized

- **Filter 1:** 71 sectors with the highest gross domestic production values were initially listed
- **Filter 2:** 56 sectors were selected by discarding service activities
- **Filter 3:** 20 sectors selected by highest gross production value
- **Filter 4:** 12 sectors by trade by highest trade intensity values
- **Ranking:** according to the Vulnerability Indicator

Top 12 sectors ranked by Vulnerability Indicator

ISIC Rev 4 Code	Description
0127, 1073	Cocoa
0126	Palm oil
11, 10 (-1073, -1020)	Manufacture of beverages & food products
03,1020	Fishing
0610, 0620, 1920	Oil and gas
05, 07 (- gold of 0729), 08,09	Mining and quarrying without oil and gas and gold
023	Manufacture of other non-metallic mineral products
2420, 0729	Gold
25	Manufacture of fabricated metal products, except mach.and equip.
22	Manufacture of rubber and plastics products
20	Manufacture of chemicals and chemical products
WTO 1.33, 1.36	Tourism (travel, and expenditure by main purpose of trip)

Questions, feedback and data needs for next steps

- **Next step, identifying international response measures**, focus on the top 4 sectors with score above *0,2 on the Vulnerability Indicator* or take into consideration any other/all the 12 sectors?
- Suggestions to **improve data or methodology**?
 - GHG emissions on oil and gas
 - GHG emissions intensity and employment for crop activities (cocoa and palm oil)

METHODOLOGY

INTRODUCTORY STEP: Explain the methodology that will be used to carry out the project

STEP 1: Describe the country and its characteristics

STEP 2: Identifying important sectors to the Ghanaian economy

STEP 3: Identify sectors potentially vulnerable to international response measures

STEP 4: Identify relevant response measures

STEP 5: Assess the impacts of international response measures

STEP 6: Possible domestic and international tools and support which may be needed to address the impacts

CONCLUDING STEP: Publish report, presentation via online webinar and information from the Informal Dialogue shared with the KCI and the Forum

WORKPLAN

Webinar 1

10 Dec 2020

Introductory step

Webinar 2

16 Feb 2021

Step 1, 2 and 3 of the methodology

Webinar 3

Mar/Apr 2021

Step 4 and 5 of the methodology

Webinar 4

May/Jun 2021

Step 6 of the methodology

Webinar 5

TBC 2021

Concluding step



Thank you!

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