4.A.1 & 4.B.1 Value Chain Analysis

Smart Supply Chain

2023

4.A.1. & 4.B.1 Smart Supply Chain
Value Chain Analysis
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1. Introduction

ICT Group aspires to achieve level 5 of the CO_2-Performance ladder. This report contains the results of the chain analysis required to comply with requirement 4.A.1 from the Manual CO_2-Performance Ladder 3.1[1]:

"The organization has demonstrable insight into the most material emissions from scope 3, and can submit at least 2 analyzes of GHG-generating (chains of) activities from these scope 3 emissions.*

And to requirement 4.B.1:
"The organization has formulated CO_2 reduction targets for scope 3, based on 2 analyses from 4.A.1. Or the organization has formulated CO_2 reduction targets for scope 3, based on 2 material GHG-generating (chains of) activities. An accompanying action plan has been drawn up, including the measures to be taken. Objectives are expressed in absolute numbers or percentages in relation to a reference year and within a specified time frame.*

This report contains the qualitative and quantitative chain analysis of Smart Supply Chain (chapter 2). CO_2-reduction targets are formulated on the basis of the analysis (Chapter 3).

1.1. Topic of this analysis: Smart Supply Chain

Smart Supply Chain was selected as the topic of analysis for the following reasons:

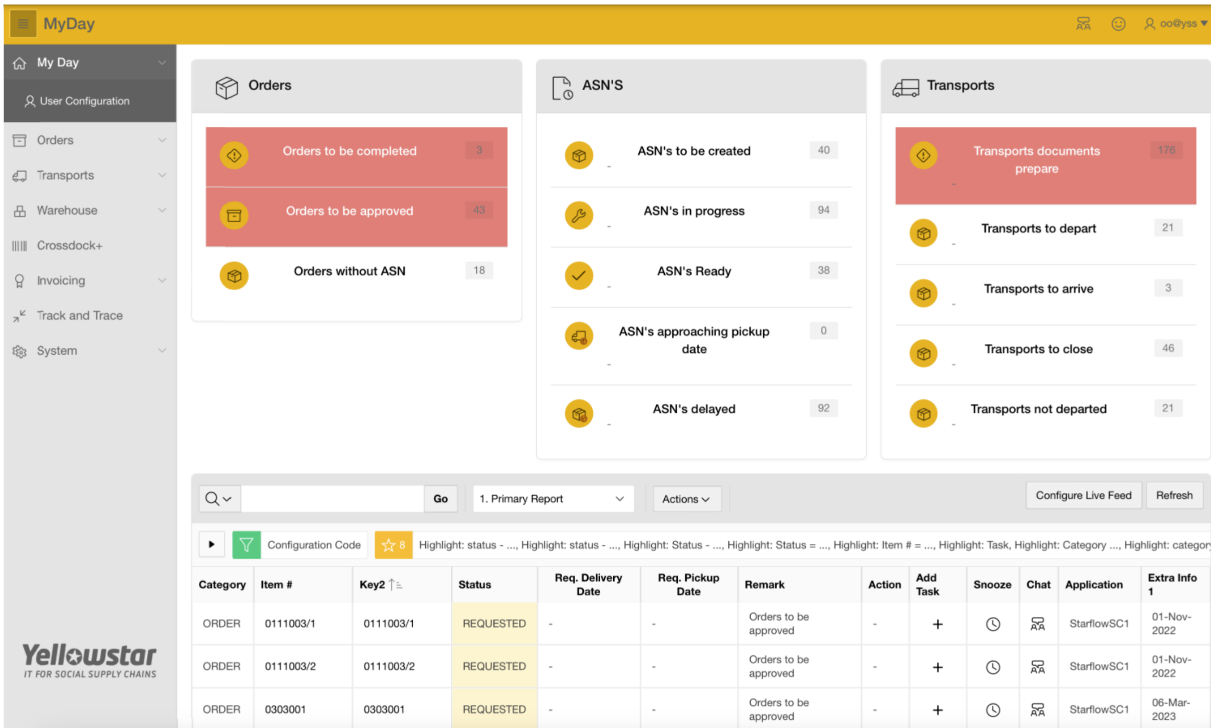
- Smart Supply Chain is a topic that can be assigned to both the Product Market Combination (PMC) 'Industrial Automation' as well as 'Industry Specific (proprietary) Software Solutions'. Industrial Automation is ranked among the largest PMCs in the materiality table (see report '4.A.1 most material scope 3 emissions'). By choosing this product, we comply with the requirement that at least one of the value chain analyses should be chosen from the two most material emissions.
- Smart Supply Chain was also chosen due to the notion that supply chain logistics has long term viability within ICT Group and therefore it has high potential to be nurtured and improved over time for the sake of reduction in CO_2 emissions.
- Smart Supply Chain was chosen due to the potential of supply chains to reduce CO_2 emissions by selecting the most sustainable forms of transport and manage the logistics process to enhance efficiency. The software system that was chosen for this analysis allows users to select the most environmentally friendly forms of transportation, which makes it an innovative tool to green up supply chains.

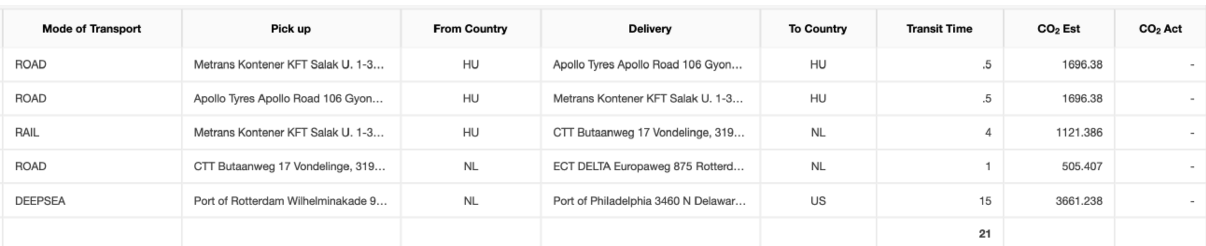
Star Flow Supply Chain

The global logistics market was valued at USD 261.5 Billion in 2022 and is projected to reach a value of USD 570.9 Billion by 2030[2]. Within a growing logistics sector, its players are bound to operate in a dynamic environment with the need to respond better and faster to changing customer demands, new supply chain structures and market conditions. Furthermore, the Paris Climate Agreement has determined clear global targets to reduce climate emissions until 2030 and 2050. This has resulted in a growing demand for sustainable logistics measures. ICT solutions play a vital role in the deployment of smart and green supply chain management and design.

Star Flow Supply Chain (SFSC) is a value chain collaboration product. By providing 24/7 insight into the process from order management up until delivery, the supply chain becomes transparent and predictable; allowing for efficient management and rapid handling of incidents. By connecting value chain parties, SFSC aims to provide faster, cheaper and more sustainable logistics solutions.

One of SFSCs key features was developed to provide optimal transparency in environmental footprints of logistic processes. Different transportation scenarios are evaluated and measured on the bases of speed, costs and their respective carbon footprints. This functionality allows users to select a transportation scenario with desirable characteristics, depending on their needs. A low carbon logistics process can easily be identified and selected. Due to its transparent nature, this feature has the potential to reduce significant amounts of CO_2 in the value chains of SFSC users.





Mode of Transport	Pick up	From Country	Delivery	To Country	Transit Time	CO_2 Est	CO_2 Act
ROAD	Metrans Kontener KFT Salak U. 1-3...	HU	Apollo Tyres Apollo Road 106 Gyon...	HU	.5	1696.38	-
ROAD	Apollo Tyres Apollo Road 106 Gyon...	HU	Metrans Kontener KFT Salak U. 1-3...	HU	.5	1696.38	-
RAIL	Metrans Kontener KFT Salak U. 1-3...	HU	CTT Butaanweg 17 Vondelinge, 319...	NL	4	1121.386	-
ROAD	CTT Butaanweg 17 Vondelinge, 319...	NL	ECT DELTA Europaweg 875 Rotterd...	NL	1	505.407	-
DEEPSEA	Port of Rotterdam Wilhelminakade 9...	NL	Port of Philadelphia 3460 N Delawar...	US	15	3661.238	-
					21		

Figure 1 & 2: Screenshots of the Star Flow Supply Chain interface

1.2. Value chain analysis approach

The approach as described in the SKAO manual version 3.1; requirement 4.A.1. was followed to arrive at the value chain analysis of emissions.

1.2.1. Data collection

The handbook 3.1 says the following about data collection:

"For a chain analysis it is not necessary to immediately request extensive data from all kinds of suppliers. It usually has clear added value to request some crucial data from one or a few suppliers, so selectively. That is often sufficient for a good first version of a chain analysis."

Data was collected through interviews with Yellowstar representative. Furthermore, data about logistics processes were provided by Yellowstar to perform the analysis on potential CO_2 reductions in logistics. Data were collected for the year 2022, whenever this applied. Since the CO_2 calculator is a new feature, there are relatively little users working with it yet. Therefore a theoretical case has been built, based on real data, that represents the year 2022.

1.2.2. Emission factors

For this analysis, the CO_2 emission factors of CO2emissiefactoren.nl are used, as indicated in SKAO manual version 3.1.

Emission factors input used in CO_2 calculator are compliant with:

- GLEC
- ISAE 3000
- EN-16258
- NL-CO2 Emissiefactoren
- UK Defra

2. Value Chain Analysis – Smart Supply Chain

As indicated in Handbook 3.1 of the CO_2 Performance Ladder, the chain analysis follows the structure described in chapter 4 of "A Corporate Accounting and Reporting Standard" (WBCSD, 2004)[3]. The analysis consists of the following parts:

- Describe the value chain (section 2.1);
- Determine which scope 3 categories are relevant (section 2.2);
- Identify partners along the value chain (section 2.3);
- Quantify scope 3 emissions (section 2.4).

2.1. Description of the value chain

To start the analysis, a general description of the value chain is provided. We start by identifying the system boundaries. Then we describe the value chain and the process map (figure 3).

System boundaries

The system boundaries determine which processes and activities are included in the overall analysis. This to define where to stop tracking energy and material uses of processes; otherwise, the analysis would be infinite. This analysis focusses on the application of the Star Flow Supply Chain software and specifically the functioning of the CO_2 calculator in logistic supply chains. The following system boundaries are set:

- For this analysis, the full life cycle of software provided by ICT Group is considered, with an emphasis on the application (use phase) of the software in logistics supply chains because it is estimated that this part of the life cycle represents the biggest CO_2 impact.
- For this analysis, the life cycles of other technologies needed to make supply chains function, such as packaging, trucks, trains, ships and infrastructure for transportation are outside the scope of this analysis. The digital infrastructure of logistics partners are also outside the scope. They are an essential part of the functioning of the logistics supply chain, but ICT Group has little influence over the development and deployment of these technologies.

Value chain

Star Flow Supply Chain was developed by Yellowstar (ICT Group) and launched in 2018. Since its launch manufacturers, trading companies and retailers have been managing their supply chains with the logistics software.

The life cycle of SFSC is shown in simplified form in Figure 3. At each step, energy, materials and labor are added and emissions to the air, soil and water are released. Potentially, transport takes place between the steps. To describe the chain, the names of the life cycle phases have been used as defined in “Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard” (WRI & WBCSD, 2011). For the analysis only CO_2 equivalent (CO_2e) emissions are considered, in accordance with the requirements of the CO_2 Performance Ladder.

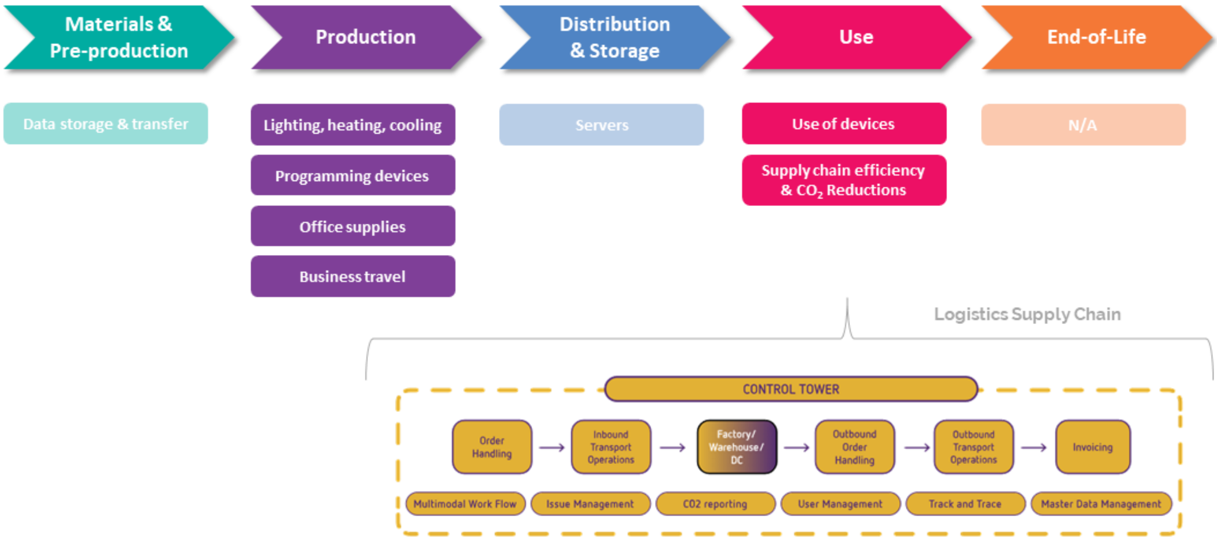


Figure 3: Simplified version of the Star Flow Supply Chain life cycle and a logistics supply chain

2.1.1. Materials acquisition & Pre-processing

Star Flow Supply Chain software requires data from users and their logistics partners for optimal performance. This is seen as the main form of input, since the product is digital and therefore lacks the necessity for physical raw materials and pre-production. Potentially relevant impact types can be found in energy usage for data storage and transfer. However, due to the immaterial nature of software, the material acquisition and pre-processing stage is excluded from quantitative analysis.

2.1.2. Production

Star Flow Supply Chain software was developed by Yellowstar over the course of 3 years. The CO_2 calculator was developed at a later stage in collaboration with BigMile. The software development and testing process requires developers and business representatives to come together to design and create the digital product. Therefore, the most relevant impact categories have been identified in:

(1) energy consumed for office lighting, heating and cooling;
(2) energy consumed by devices during development and testing;
(3) use of office supplies (e.g. paper, cups etc.);
(4) business travel related to the development and testing process.

2.1.3. Distribution & Storage

Star Flow Supply Chain software is accessed through a web portal and does not have to be downloaded to gain access. Therefore, the distribution and storage phase becomes largely irrelevant. The main impact categories that were identified can be found in energy consumed by storage and hosting software from its servers, potentially including mirror servers. However, due to the lack of activities that are required for distributing the software, the distribution and storage stage is excluded from quantitative analysis.

2.1.4. Use

Star Flow Supply Chain can be used by any manufacturer, trading company or retailer that operates in a logistics supply chain. By facilitating value chain collaboration, SFSC has the potential to make the logistics process more efficient in terms of time, costs and/or carbon footprint. Transparency about the CO_2 impact of different transportation scenarios allows users to make more sustainable choices. The main impact categories that have been identified are:

(1) **CO_2 Cost**
Energy consumed by the use of devices (desktops) to access the software.

(2) **CO_2 Saving**
Efficiency and reductions in fuel- and energy related activities through use of the CO_2 calculator.

The logistics supply chain can be viewed as an additional supply chain within the life cycle of the Star Flow Supply Chain software. These supply chains are hardly ever the same, as different transportation methods may be applied by each user. Variation within similar logistics processes can occur based on temporary user preferences for either speed, cost efficiency or sustainability. Therefore, multiple representative value chains are analyzed to identify the impact of the SFSC software on carbon emissions in the logistics supply chain.

Transportation routes, and their sustainable alternatives, show a significant difference between continental and intercontinental logistics processes. Continental transportation is mainly carried out by road (trucks), while more sustainable alternatives can be found by rail (train) and river (barge). Whereas, intercontinental transportation can happen by air (aircraft) when the logistics process requires speed or, when cost savings or a low carbon footprint are preferred, by deep sea (ship).

2.1.5. End-of-Life

Star Flow Supply Chain software is a digital product and therefore, it does not require any end-of-life treatment other than deleting it from the servers. Therefore, the end-of-life stage is excluded from quantitative analysis.

2.2. Relevant scope 3 categories

Table 1 lists the relevant scope 3 categories per step in the chain, in accordance with the GHG Protocol (WRI & WBCSD, 2011). GHG Protocol develops guidelines to provide clarity on how specific industries can apply GHG Protocol standards. We used GHG Protocol, ICT sector guidance (2017) to determine which scope 3 categories are relevant and what we should include in this.

Table 1: Relevant scope 3 categories

Life Cycle Stage	Relevant scope 3 categories	Relevant
1. Material acquisition & Pre-production	1. Purchased goods and services	No
2. Production	1. Purchased goods and services 2. Capital goods 6. Business travel 7. Employee commuting	Yes
3. Distribution & Storage	9. Downstream transportation and distribution	No
4. Use	3. Fuel- and energy related activities 11. Use of sold products	Yes
5. End-of-life	12. End-of-life treatment of sold products	No

2.3. Identification of value chain partners

In Table 2 the most relevant value chain partners are listed.

Table 2: Value chain partners Smart Supply Chain

Life Cycle Stage	Partners
1. Material acquisition & Pre-production	Data provider(s)
2. Production	Yellowstar BigMile (CO_2-calculator)
3. Distribution & Storage	Yellowstar Server provider(s)

4. Use	Clients Users Logistics partners Network provider(s)
5. End-of-Life	N/A

2.4. Quantification of scope 3 emissions

The analysis of Star Flow Supply Chain is detailed in table 3. A calculation sheet is also available in Excel, which can be requested for additional information.

Results

The CO_2 calculator is a relatively new feature within Star Flow Supply Chain. Because of this, concrete results on changes in SFSCs logistic processes are missing (4b. Use – effect on transportation). This is why conservative estimates were made about the changes in transportation to low carbon options (an estimated 1% of logistics processes is altered due to the transparency provided by the CO_2 calculator). Even though the CO_2 calculator could have a greater effect, the CO_2 savings from switching to low carbon transportation modes outweigh the CO_2 impact of making and using Star Flow Supply Chain.

Table 3: CO_2e emissions of Star Flow Supply Chain

Life Cycle Stage	Ton CO_2e
2. Production	18,7
4a. Use – Use of devices (2022)	0,37
4b. Use – Effect on transportation (2022)	-29,66

The greatest CO_2 saving can be found in changing transportation routes (4b). Even within a timeframe of only one year it is estimated to outweigh the total carbon emissions that were generated in creating and accessing the software. The net carbon footprint of the Star Flow Supply Chain's life cycle is -10,59 ton CO_2e (a carbon reduction).

3. Reduction targets (4.B.1)

For requirement 4.B.1 we have drawn up the following reduction targets. The requirements for this are as follows:

“The organization has formulated CO_2 reduction targets for scope 3 on the basis of 2 analyses from 4.A.1. Or the organization has formulated CO_2 reduction targets for scope 3, based on 2 material GHG-generating (chains of) activities. An associated action plan has been drawn up, including the measures to be taken. Objectives are expressed in absolute numbers or percentages in relation to a reference year and within a defined period.” (CO2 performance ladder manual 3.1)

3.1. Targets

Three targets are identified that would realize significant CO_2 reductions in the chain by 2030. Findings are supported by a worksheet that contains the calculations and assumptions made.

1. **Increase (10%) of total amount of users & routes | -2,93 ton CO_2e**
   With a negative net carbon footprint (SFSC’s CO_2 calculator reduces more carbon than is emitted in the rest of the life cycle) it becomes evident that the carbon footprint can be lowered even further with more SFSC users that carry out more logistics processes. Basically, this would increase the potential amount of routes that can be nudged in an environmentally friendly direction. A relative growth of the user base with 10% would yield an additional reduction of -2,93 ton CO_2e when realized. Although the user base grows in this scenario, still it is estimated that only 1% of the total transportation routes are changed to a low carbon option.

2. **Increase (10%) of routes that have a low carbon option available | -59,32 ton CO_2e**
   Still a relatively low percentage (estimated 5%) of all transportation routes offer a low carbon alternative. This is due to the fact that the CO_2 calculating feature is relatively new and not yet extensively used among SFSC users. Furthermore, alternative routes need to be inserted manually into the system after which the carbon footprint is calculated. A 10% increase (from 5% to 15%) in routes that actually present a low carbon alternative would yield a significant additional reduction of -59,32 ton CO_2e per year when realized. This target would lift the total percentage of routes changed to a low carbon option from 1% (base scenario) to 3% (scenario of 10% increase in routes with low carbon option available). In order to maximize the impact of the CO_2 calculator in the future, where possible, all routes should have a low carbon alternative available.

3. **Increase (10%) in selection of low carbon option | -7,42 ton CO_2e**

The availability of a low carbon option doesn't mean that this alternative is always selected. It is estimated that in 40% of the cases, the low carbon option is, when available, actually selected. A 10% increase (from 40 to 50%) would yield an additional reduction of -7,42 ton CO_2e when realized. This target would lift the total percentage of routes that changed to a low carbon option from 1% (base scenario) to 1,25% (scenario of 10% increase in selection of the low carbon option).

3.2. Measures

These measures help ICT Group to reach their targets.

Measure 1	Upscaling (SFSC users)
Measure 2	Upscaling (CO_2 calculator users)
Measure 2A	Support investigation of alternative routes
Measure 2B	Automation of generating alternative routes
Measure 3	Easy communication
Measure 4	Integration in broader sustainability framework

Measure 1: Upscaling (SFSC users)
Yellowstar is still improving the Star Flow Supply Chain software package, with the CO_2 calculator as being one of its latest examples. The results of this supply chain analysis can strengthen the business case towards clients that want to decrease their logistics emissions. Acquiring new SFSC users is a solid measure to ensure more logistics parties get a chance to work with the CO_2 calculator and therefore, potentially reducing emissions in their value chains.

Measure 2: Upscaling (CO_2 calculator users)
The CO_2 calculator was tested in 2022 and officially introduced in January 2023. Therefore, not many SFSC users are familiar or maybe even aware of the new feature. Provided data shows that only 5% of the logistics processes contain an alternative (low carbon) route. There is a lot of potential in increasing the utilization of the CO_2 calculator among existing users. This can be done through more extensive communication about the CO_2 calculator and its benefits. Potentially the use of this feature can be connected to a reward system. Three options for boosting the use of the CO_2 calculator among existing users are mentioned below.

Measure 2A: Support investigation of alternative routes
In mapping out the logistics workflow, SFSC users could be stimulated to investigate low carbon alternatives for their initial route. This can be done, for example, by introducing automatically generated pop-up texts that nudge the user to look for alternatives when the process contains certain (high carbon) means of transportation or locations.

Measure 2B: Automation of generating alternative routes

Currently SFSC users need to insert an alternative route manually, after which the CO_2 calculator displays its carbon footprint. Automating the process of suggesting alternative (low carbon) routes would require immense amounts of data input and is therefore is not realistic to expect within the near future. However, it could be a future goal to increase transparency in the options that users have to organize their processes more environmentally friendly. Automation will increase the amount of routes that have a low carbon alternative resulting in more users selecting the low carbon option.

Measure 3: Easy communication
Communication is key, especially with a complex topic such as impact on climate change. Simple communication, like visual stimulation, can work very well when trying to nudge people's behavior. Therefore, an idea is to extend the CO_2 calculator with the ability to display the level of sustainability in different colors, ranging from green (sustainable) to red (unsustainable). The colors provide a neural incentive to opt for the most sustainable alternative. This will make it even more likely that SFSC users will choose the most sustainable option, even for those without a passion for sustainability.

Measure 4: Integration in broader sustainability framework
On a more general note, Yellowstar has ambitions to make sustainability an integral part of Star Flow Supply Chain. For example by providing users with the ability to share their CSR certificates with value chain partners and keep track of carbon footprint performance in a personalized dashboard over time. Integration of sustainability with the everyday workflow will make it more likely that users will consider the impact of their logistics processes and as a result make more sustainable choices in transportation.

3.3. Approach

ICT Group can improve the value chain analysis and realize CO_2 reduction when engaging in the following activities

- Tracking CO_2 performance of users will provide more accurate data to conduct analyses and draw conclusions on the contributions of Star Flow Supply Chain and the CO_2 calculator. Not only within transportation scenarios, but also in how the software is used and what other implications it has on the efficiency within logistics processes.
- After accurate data is acquired, new targets can be re-evaluated for 2030.
- Engage in conversation with SFSC users to create a broader understanding of their needs and obstacles when it comes to utilizing the CO_2 calculator. Such a survey could be combined with a promotional campaign with the aim to increase awareness around the existence and benefits of the CO_2 calculator among SFSC users.
- Continue the development process of the CO_2 calculator and strategically plan out new updates based on the conclusions of this value chain analysis and additional research that is expected to yield the best results for Yellowstar, its clients and their climate impact.

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