

5.20. TC 20 – Fruit, Bananas, Precision irrigation, Spain

GENERAL INFORMATION	
Test Case Leader	ANYSOLUTION SL (AnySol)
TC sector	Fruit
Crop/ Animal	Bananas
Biogeographical Region	Macaronesia
Country	(Spain, Canary Islands)
Total number of parcels	2 (1 with DATS and 1 without DATS)
Total size of these parcels	2.46 ha (2.24 ha with DATS and 0.22 ha without DATS)

DATS INFORMATION	
DATS(s) commercial name	NADIA
DATS(s)	Precision Irrigation
DATS(s) description	NADIA is a platform that brings together a set of applications for the integration of the Internet of Things (IoT). It receives information from all connected sensors in real time . It stores and analyses this information and allows interaction with these sensors.
DATS(s) costs	<ul style="list-style-type: none"> • Initial investment: 15,000 € • Annual fee: 0 € • Maintenance costs: 0 €/year

NADIA - MAIN IMPACTS

Highlights

The DATS is a digital platform integrating Internet of Things (IoT) sensors for real-time monitoring of environmental and crop conditions and irrigation scheduling. The system collects and analyses data on soil humidity, temperature, and other agronomic parameters, providing farmers with real-time insights. The main impact is the optimization of irrigation management, with possible effects also on the productivity of the crop and increase yields stability over time. The remote monitoring allows less field visits and saves time for farmers.

Water

The primary and most significant benefit of the NADIA platform lies in its impact on water management. By enabling real-time monitoring of soil humidity and environmental conditions through IoT sensors, the system allows for more precise and timely irrigation decisions. As a result, **the cost of water decreased by 105 €/ha, accompanied by a 2% reduction in total water use**. While modest in percentage terms, this reduction becomes more meaningful when considering long-term sustainability and cost efficiency in water-scarce regions like the Canary Islands.

Inputs

The technology showed no direct influence on fertilization strategies, as fertigation quantities were applied uniformly across both DATS and non-DATS plots. Decisions regarding fertilization remained centralized and independent from the suggestions produced by the digital system. However, pesticide use increased by **46.9%**, which corresponds to a **120 €/ha** increase in pesticide costs. This impact is considered indirect and could reflect variations in pest pressure or treatment strategies rather than a result of the irrigation system itself.

Energy



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Although energy usage was not directly quantified from the data available, the system's design—primarily sensor-based and not reliant on automated actuators—suggests a limited or negligible increase in energy consumption. Farmers retained control over irrigation activation, preferring to use the system as a decision-support tool rather than enabling full automation. This hybrid approach ensures improved accuracy without significantly increasing operational energy requirements.

Labour

Labour efficiency improved due to a reduction in the number of field visits required to check soil and crop conditions. Thanks to remote access to real-time data, farmers could avoid unnecessary trips to distant plots, saving both time and effort. This is especially valuable in settings where parcels may be dispersed or far from the cooperative's central facilities. Although this benefit was not monetized, it was emphasized as a meaningful operational gain.

Productivity

The yield increased by 3% on DATS-managed parcels. Although structural differences between the plots exist, the improved water scheduling and timely decision-making supported by the NADIA system likely contributed to more stable and efficient crop performance. Farmers can be assisted by the DATS for more responsive crop management, especially under varying climatic conditions. While the difference in yield is moderate, its significance lies in the consistency and predictability it brings to production.

Financially, the implementation of NADIA led to a net benefit of +580 €/ha, driven by combined water savings and increased revenues (+1,589 €/ha). While pesticide use increased, the overall economic performance remains favourable, demonstrating that even partial digitization of irrigation can yield tangible financial returns in the short term.

COST-BENEFIT ANALYSIS: MONETARY IMPACTS

The cost-benefit analysis (CBA) is conducted by comparing farms that use DATSs with those without DATSs in order to assess the monetary impact of DATSs implementation. Only the monetary costs and benefits on which DATSs are estimated to have a direct impact have been included in the cost-benefit analysis. Where the effects are only indirect or where it is not possible to attribute any type of impact to the DATSs, the costs and benefits have been excluded from the cost-benefit analysis.

Figure 56 presents a summary of the cost-benefit analysis of the DATSs implemented in the TC. The Net Benefit, expressed in euros per production unit, is calculated as the difference between the DATSs impact on farm operating costs and revenues and the DATSs running costs (annual fees and maintenance costs). The Payback Period, expressed in years, is calculated by dividing the initial investment in DATSs by the farm's cash flow, which corresponds to the calculated Net Benefit.



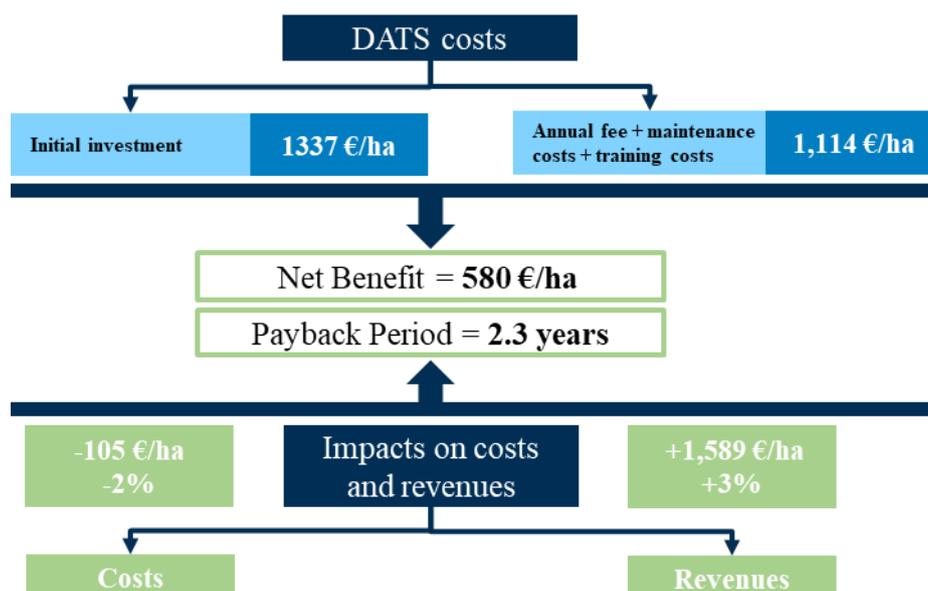


Figure 56: An overview of the cost-benefit analysis of DATSs for TC20

Table 76 presents the individual monetary KPIs that make up the cost-benefit analysis, showing all the monetary impacts observed in the comparison between the farm using DATSs and the one not using DATSs. For each KPI, it is indicated whether the impact of the DATSs is direct (and thus included in the CBA), indirect, or if the DATSs do not have any influence (not affected). Direct impacts are green if they are positive and orange if they are negative.

To estimate the impact that the DATSs may have at the societal level, a monetary value has been assigned to some of the sustainability impact KPIs of Table 77 through a TCA approach. Only the most relevant KPIs, for which more robust and transparent monetisation methodologies exist, have been included in this monetary estimate. These monetised KPIs were not included in the cost-benefit analysis.

CATEGORY	KPI	RESULT	IMPACT	IMPACT DESCRIPTION	Level
Water	Cost of water	-105 €/ha	direct	The main impact attributed to the DATS is improved irrigation management, leading to water and cost savings	Farm
Inputs	Cost of pesticides	+120 €/ha	indirect	The impacts on pesticides use can be considered indirect	Farm
Output	Revenues	+1589 €/ha	direct	Although the two production systems are quite different and this can impact on the productivity levels, the technology adoption, with the consequent better water management, could explain the higher yields	Farm
CBA	Net Benefit	580 €/ha	direct	The water saving and the increase in revenues generate a positive net benefit	Farm



CATEGORY	KPI	RESULT	IMPACT	IMPACT DESCRIPTION	Level
Sustainability KPIs monetization	Water stress	+156 €/ha	direct	Positive impact	Society

Table 76: Cost-benefit analysis description at farm and society level for TC20

SUSTAINABILITY IMPACTS

Table 77 shows all the sustainability impacts observed in the comparison between the production system using DATSs and the one not using DATSs. For each KPI, it is indicated whether the impact of the DATSs is direct, indirect, or if the DATSs do not have any influence (not affected). Direct impacts are green if they are positive and orange if they are negative.

DIMENSION	KPI	RESULT	IMPACT	IMPACT DESCRIPTION
Productivity	Yield (t/ha)	+3%	direct	Although the two production systems are quite different and this can impact on the productivity levels, the technology adoption, with the consequent better water management, could explain the higher yields
Inputs	Pesticides applied (kg/ha)	+46.9%	indirect	The impacts on pesticides use can be considered indirect
Water	Water use (m³/ha)	-2%	direct	The main impact attributed to the DATS is improved irrigation management, leading to water and cost savings

Table 77: Sustainability impact KPIs for TC20

The bar chart in Figure 57 shows the performance of the DATSs system (the bars) compared to the baseline of the NO DATSs system (the orange line) for the main impact dimensions on a scale from -100 to +100. Each impact dimension represents, in the case of multiple KPIs affected by DATS in that impact dimension, the aggregation of those KPIs. The percentage deviation from the baseline should therefore be interpreted as a measure of the improvement or deterioration of the system using DATSs. Positive performance is achieved when the DATSs are above the baseline (green bars), while negative performance is indicated by a value below the baseline (orange bars).



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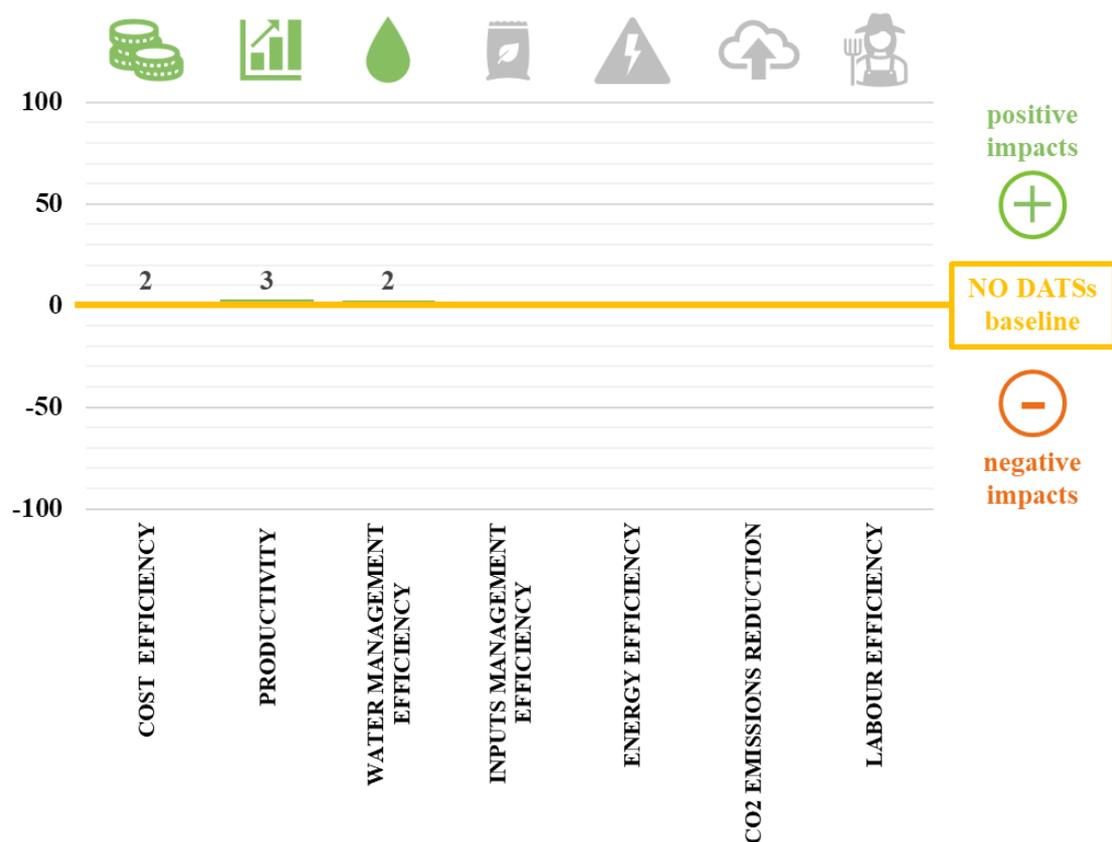


Figure 57: Improvements in the different impact areas between the system adopting DATS and the one without DATS for TC20

DISCUSSION & COMPARISON BETWEEN YEARS

A comparison between 2023 and 2024 reveals a substantial drop in both water costs and net benefit. In 2023, the net benefit was exceptionally high (+20,570 €/ha) and water costs were positive (+989 €/ha), likely due to weather conditions and higher irrigation to align with crop water requirements. In contrast, 2024 shows a more reduced water use (-2%) and a modest but still positive financial return. This shift suggests a reliable and stable integration of the technology over time, reinforcing its role as a practical tool for smarter, more sustainable irrigation in fruit production

DIMENSION	KPI	RESULT '23	RESULT '24
Water	Cost of water	+989 €/ha	-105 €/ha
CBA	Net Benefit	+20,570 €/ha	+580 €/ha
	Payback Period	0.3 years	2.3 years
Water	Water use	+10.5%	-2%

Table 78: The comparison between the years 2023 and 2024 in the KPIs impacted by DATS for TC20

