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Abstract
This article analyzes the application of the Critical Path Method in a work integration social enterprise operating within the circular economy. Using the case of OilRight, a Romanian social business valorizing used cooking oil, the article examines how CPM-based resource mapping and reallocation improved production efficiency and reduced labor costs, while simultaneously enhancing team cohesion and employee satisfaction. The findings demonstrate that operational planning tools can stabilize inclusive circular business models, supporting both economic viability and social impact at the micro-production level.

Keywords
Circular economy; work integration social enterprise; critical path method; production planning; impact; Romania; used cooking oil; disability.

I. Introduction and literature review

The circular economy is no longer treated simply as a set of "green practices", but as a strategic framework that seeks to change the relationship between resources, production and consumption. At the European Union level, the New Circular Economy Action Plan has shifted the focus to interventions across the entire product life cycle [1].

In parallel, recent reports show a clear tension between ambition and reality: global circularity does not automatically increase with the popularity of the concept. The Circularity Gap Report 2024 notes that the share of secondary materials consumed by the global economy has decreased, suggesting that systemic progress is fragile and dependent on concrete economic and operational mechanisms [2]. In the same vein, the World Bank argues that decoupling economic growth from material consumption is possible, but requires coherent policies (fair prices, information, investments) and, at the micro level, real implementation capabilities in organizations and communities [3].

The specialized literature increasingly converges towards the idea that the circular economy is materialized, in practice, through circular business models. These are not limited to recycling, but include strategies such as life extension, reuse, repair, remanufacturing and material recovery – that is, redesigning the value stream, not just its end [4]. The extensive review by Geissdoerfer et al. shows two useful things for the article: (1) circular models are real levers for implementation, but (2) there are still conceptual ambiguities and the risk that "circular" will remain a label if not supported by processes, indicators and stable relationships with partners [4]. In addition, research is starting to be more direct about "side effects" such as rebound effects: situations where a circular solution, although locally efficient, can stimulate total consumption or shift the impact elsewhere. A review dedicated to rebound in circular models shows that these effects exist, are context-dependent and can be reduced only if the model is also thought of as sufficiency (not just efficiency), with realistic mitigation mechanisms and evaluations [15]. Basically, the message is that the circular economy is not judged only by what it reuses, but also by how it is organized and what behaviors it generates.

Another strong wave in the literature in recent years concerns the social dimension: the quality of work, inclusion, equity and distribution of benefits. Padilla-Rivera and colleagues show, in a systematic review, that although interest in the social component is growing, the measurement of social impact in the circular economy is still fragmented and inconsistent [5].

In practice, social enterprises are seen as accelerators of circularity, precisely because they can combine activities to close material loops (collection, sorting, reconditioning, upcycling) with goals of inclusion and community development. The Inclusive Loops report describes the typical roles through which social enterprises contribute to circularity and insists on the barriers to scaling: resource stability, infrastructure, financing, as well as the operational delivery capacity (timelines, quality, costs) [6].

This concern also appears in the very recent academic literature through the concept of social circular hubs, described as structures that connect administration, knowledge institutions, the private sector and civil society to accelerate circular solutions and make them more accessible to different groups [7]. In addition, an applied study on Work Integration Social Enterprises in the circular economy warns that job creation and social impact cannot be assumed, especially in specialized markets: organizations need realistic economic models, operational capabilities and ecosystems that support the transition [8]. A useful piece here is the report on "inclusive circularity", which directly discusses the link between circularity and decent jobs, emphasizing the need for a circular transition that is also socially just (skills, working conditions, complementary policies) [9].

Used cooking oil is increasingly treated as a circular resource, but the literature shows that its valorization critically depends on properties, collection and storage. A 2024 review highlights that degradation and contamination directly affect quality and subsequent uses; thus, collection and storage are already part of the technological process, not just logistics [10].

In parallel, research on collection infrastructure shows that system performance depends on point location, accessibility, costs, and compliance, especially when the main source is dispersed (households, multiple points) and volumes are small and variable [11].

The critical path method remains relevant for processes with interdependent activities precisely because it forces the explicitation of sequences, durations and dependencies. In micro-production, the critical path method has an advantage: it transforms a typical flow into a verifiable route, where you can see where delays propagate and which activities determine the final deadline. However, recent research highlights uncertainty: real-time varies due to human factors, interruptions, and a lack of materials. Hazır and Ulusoy show that the literature has often modeled the uncertainty of durations, but has treated less other sources (resources, external disturbances, supply), although in practice these can be decisive [12].

In this context, approaches such as the critical path method are proposed as ways to realistically treat estimated durations, especially in environments where there are no long data series or where activities are sensitive to variability [13]. Along the same lines, Critical Chain Project Management becomes relevant when the main constraint is the shared resource (people/equipment) and when multitasking consumes capacity without being visible in the plan. A recent systematic review on Critical Chain Project Management synthesizes applications and trends (including integrations with lean approaches and digital tools) and emphasizes the role of buffers as a protection mechanism in conditions of variability [14]. For a local circular model, this literature supports a pragmatic idea: if the input is variable, production planning must be all the more disciplined, otherwise bottlenecks and losses appear (waiting times, lack of material or capacity, overstock) [15].

Taken together, these directions tell a coherent story: the circular economy needs business models and infrastructure, the social dimension requires decent jobs and community benefits, and waste oil as a secondary resource brings real potential, but also variability (quality, collection, flow). What is less often seen in the state-of-the-art literature is the explicit link between these paradigms and concrete operational tools applied in micro-production units that work with recovered input and also pursue social objectives. A study that deals with the critical path between jobs, together with the logic of variability and the management of constraints, can fill this gap with an applied contribution: it shows how to stabilize a circular model with social impact at the execution level (times, dependencies, bottlenecks, deadlines) and how to avoid the situation where the mission is strong, but the operational remains fragile.

II. OilRight – a local work integration circular economy social enterprise

A. Legal and operational framework

The social economy, as defined in European and Romanian policy frameworks, represents a distinct way of organizing economic activities: one in which the prevalence of social purpose over profit maximization is organizationally embedded. Unlike traditional CSR-oriented businesses, social economy enterprises integrate social (and/or environmental) objectives directly into ownership, governance, and profit distribution mechanisms.

In Romania, Law no. 219/2015 provides a clear legal structure for social enterprises, emphasizing priority to social objectives, democratic governance, limited profit distribution, and asset lock provisions. These criteria move social impact from intention to legal obligation.

OilRight, created in 2020, is explicitly incorporated as a work integration social enterprise, as the constitutive act embeds social economy principles at multiple levels:

- Declared social purpose: social inclusion of vulnerable groups, environmental protection, and sustainability education;
- Profit reinvestment: minimum 90% of profit allocated to social objectives and statutory reserves;
- Wage equity: maximum 1:8 salary ratio;
- Democratic control: equal voting rights per share, transparent decision-making;
- Asset lock: transfer of remaining assets upon liquidation to other social enterprises.

Moreover, the composition of the founding team reflects the commitments to inclusion and the vision for long term partnerships, values-based growth and impact. The five co-founders (one majority, owning 52%, the other four - 12% each), with diverse backgrounds (including one person with intellectual disability, from an ethnic minority) and strong connections with each other decided to create a social business that would have to comply with two main criteria: create jobs for persons with disabilities and contribute in a positive way to the environment.

B. Business model and operationalization

OilRight operates on a circular economy model centered on used cooking oil (UCO), a highly polluting household and hotels, restaurants, and cafés/catering (HoReCa) waste.

Improper disposal of UCO, in general via household sinks or sewage systems, represents a disproportionate environmental burden. UCO contributes to:

- Severe water pollution due to oxygen reduction
- Clogging and corrosion of sewage infrastructure
- Increased energy demand and chemical use in wastewater treatment plants.

It is widely accepted in environmental engineering that 1 liter of improperly disposed UCO can contaminate up to 1,000,000 liters of freshwater [16]. OilRight's model follows a simple logic:

- Collection of UCO from households and HoReCa partners;
- Transformation, based on the circular economy principles, into raw material for biodiesel and upcycled products;
- Reinvestment of revenues into employment, education, development and awareness activities and financial donations to a charity supporting community living for adults with disabilities;
- Education aimed at behavioral change leading to increased UCO collection volumes and a more inclusive mindset.

OilRight provides a combination of services and products that build on one another for sustained social, environmental, and economic impact. The services are centered around education, as a driver to challenge the two core problems identified by the founding team, prior to the launch of the business:

- Information and awareness deficit
    - Most individuals were unaware of the environmental harm caused by improper UCO disposal (sewage blockages, water contamination, increased water treatment costs for local water management companies).
    - UCO was not perceived as a distinct waste category demanding special handling.
- Lack of accessible UCO collection options
    - Even when individuals were aware of the problem, they lacked practical, at-hand solutions.
    - Absence of nearby collection points discouraged consistent behavior change.

As a result, OilRight systematically invested in education and infrastructure, treating them as complementary components of a single mechanism, core to its business model. The services provided are:

i. Household activation: information campaigns and direct engagement to transform households into active waste collectors;

ii. Educational workshops for children: hands-on learning about waste, circularity and responsibility;
iii. Corporate workshops: ESG-oriented sessions combining awareness, team-building and practical sustainability actions.

Fig. 1. Information

Fig. 2. Educational and corporate workshopscampaign

OilRight developed three product lines for the UCO, based on circular economy principles. Each has its own production flow:

i. Raw material for biodiesel: sold to specialized processors, contributing to renewable energy chains;
ii. Eco candles: produced from recycled cooking oil, marketed as low-impact alternatives to paraffin candles;
iii. DIY candle kits: combining product sales with environmental education.

Fig.3. Products: UCO for biodiesel, ecological candle, DIY kit

In the coming section, the article will assess in detail the first two products, using the critical path method, in order to understand the flow of activities for each, their interdependencies, and make practical suggestions on how to properly allocate the limited organizational resources. The social enterprises employs persons with intellectual, psychosocial and visual disabilities, a team that, despite various challenges, has the ability to synchronize itself in complex situations, even when the flows of activities are not always clear and structures. The paper helps the operational team to make the overall production flow more efficient. For this goal, the authors identified the activities, configurated the network of operations and adjusted it in order to ensure optimal resources allocation.

III. Methodology

Methodologically, this article extends the application domain of CPM to micro-production systems with high variability and social objectives, an area rarely addressed in project management research. In practice, the results suggest that even small circular social enterprises can benefit from classical operations management tools, provided they are adapted to human diversity and resource constraints. The methodological framework used for this article follows three logical steps:

A. Conceptualization

OilRight operates an integrated waste valorization model targeting UCO, combining two complementary product lanes:

1) Authorized UCO collection and aggregation, supplying secondary raw materials for biodiesel production and ecological candle manufacturing.
2) A Do-It-Yourself (DIY) home upcycling kit, enabling decentralized, household-level transformation of UCO into a new product, eliminating the collection efforts and preventing pollution at source.

This dual system allows OilRight to have an impact at multiple points of the UCO lifecycle, addressing both systemic waste management failures and behavioral drivers of pollution.

The article focuses on the first lane and assesses the two resulting products. The first, generating UCO for biodiesel production means, for OilRight, transferring the UCO from individual household or restaurants recipients into Intermediate Bulk Containers (IBCs), in order to consolidate distributed small volumes into logistics-efficient units. The next steps are to store it in designated facilities, manage the waste generated by household recipients, and sell the UCO to biodiesel producers. All these, in a documented way, are compliant with national and European traceability. The later product, the ecological candle, results after upcycling, based on quality assessments, a portion of the collected UCO. The UCO is mixed with a certified non-toxic wax. The candle is designed and produced in accordance with green chemistry principles, prioritizing renewable and waste-based raw materials, reducing toxicity during combustion, lower embodied energy relative to paraffin candles and fragrances avoiding essential oils whose production is associated with high land use, pesticide application, and energy-intensive transport.

The two products share the upstream supply chain, as follows:

- UCO pick-up from households (small volumes, high frequency) and HoReCa (large volumes, lower frequency);
- Transportation to OilRight’s premises;
- Physical reception and storage;

- Documentation and reception registers (per point of origin);
- UCO assessment: separation into UCO for biodiesel and UCO for candles.

From this activity onwards, the UCO follows two distinct flow chains. The UCO for biodiesel is transferred into large barrels, stored, and then sold, while the waste generated by this activity is properly managed.

The ecological candles production implies: centrifugal filtration (removal of solids, other residues, water and salts), heating, formulating and mixing with the wax (dosing wax powder, as per the recipe and the fragrance required by the clients, mixing at a controlled temperature), jars preparation (which include jar cleaning / inspection and jar labeling with the type of cent to be poured), pouring (manual activity, with level control), wick positioning, cooling time, taking away the wick holder and trimming the wick, cleaning and quality control, placing the cork lids, labelling (with the same scent as the jars) and stamping the date of the production on the boxes), boxing the candles, shelves storing and sales.

The list of activities is presented in Table 1, providing information on the duration of each activity, its predecessors and the needed resources, as required by the critical path method. Based on this information, the production flows will be modeled, in order to improve the management of this project, considering its interdependent activities and the limited resources the company has (four operators, three of them with disabilities, only one working full time).

Table 1. List of activities

Activities		Used cooing oil (UCO) for biodiesel (BD)				Eco candles (EC)		
ID	***Task name***	***Duration (hr)***	***New hr***	***Predecessors***	***Operators***	***Duration (hr)***	***Predecessors***	***Operators***
A	UCO pick-up from households and restaurants	2	1	-	O1, O2, O3, O4	2	-	O1, O2, O3, O4
B	Transportation	0.5		A	O1	0.5	A	O1
C	Physical reception	0.4	0.16	B	O2	0.4	B	O2
D	Documentation	0.16		C	O1	0.16	C	O1
E	UCO assessment	0.35	0.33	D	O2	0.35	D	O2
F	UCO for BD in big barrels	0.5		E	O1, O2			
G	UCO for EC in big barrels					0.2	E	O3, O4
H	Small barrels / waste receipients management	0.5		E	O1	0.5	E	O1
I	Storage UCO for BD	0.5	0.33	F	O2, O4			
J	Sales UCO for BD	0.5		I	O1, O4			
K	Centrifugal filtration					1	G	O1, O2
L	Heating					0.5	K	O2
M	Formulation&mixing with wax					1.5	L	O2
N	Jars preparation					1.25	-	O3
O	Pouring					1.67	M, N	O2
P	Wick positionning					0.5	O	O3
Q	Cooling time					1	P	idle time
R	Taking away the wick holder and trimming the wick					0.5	Q	O3
S	Cleaning and quality control					0.83	R	O4
T	Placing cork lid					0.5	S	O2
U	Labelling and stamping the date of the production on the boxes					2.5	-	O4
V	Boxing					0.16	T, U	O2
X	Shelves storing					0.16	V	O3, O4
Y	Sales of EC					0.16	X	O1

B. Configuration

Using the critical path method, the authors configured the logical network for the main production flows, using the precedence relationships between the different activities. Based on this network, the planning and resource allocation can be improved.

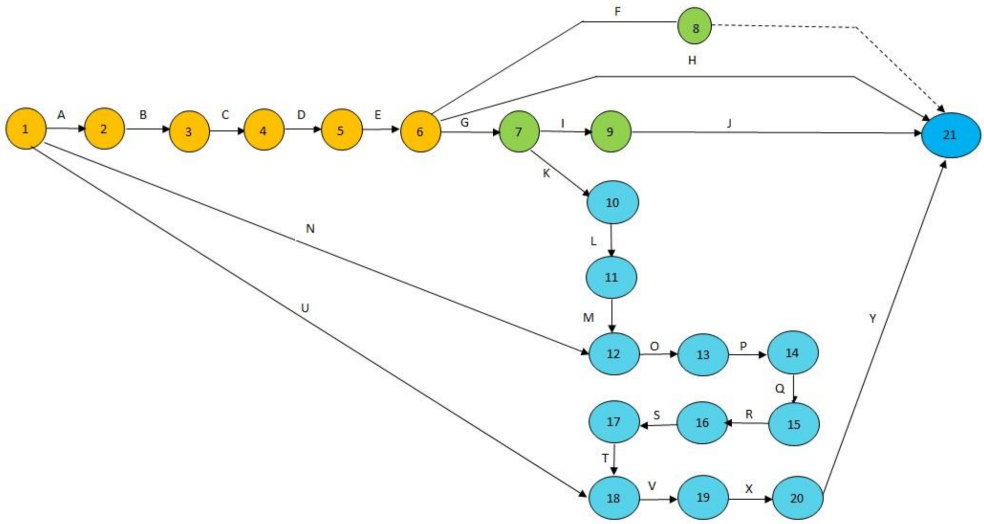

Fig. 4. Biodiesel and candles production network

As a next step, the authors evaluated, in detail, the allocation of two out of the four operators: O2, a full-time employee with psycho-social disabilities, and O3, working part time, employee with visual disabilities. Based on the initial input data from the entrepreneur, the workload per operator is the following:

	O2	**9.08 hrs**	Work	8.42h	0.67h
	A - UCO pick-up from households and restaurants	*2 hrs*	Work	2h	
	C - Physical reception	*0.4 hrs*	Work	0.4h	
	E - UCO assessment	*0.35 hrs*	Work	0.35h	
	F - UCO for BD in big barrels	*0.5 hrs*	Work	0.5h	
	I - Storage UCO for BD	*0.5 hrs*	Work	0.5h	
	K - Centrifugal filtration UCO for EC	*1 hr*	Work	1h	
	L - Heating	*0.5 hrs*	Work	0.5h	
	M - Formulation and mixing with wax	*1.5 hrs*	Work	1.5h	
	O - Puring	*1.67 hrs*	Work	1.67h	
	T - Placing cork lid	*0.5 hrs*	Work		0.5h
	V - Boxing	*0.17 hrs*	Work		0.17h

Fig. 5. Initial workload for operator 2

	O3	**4.53 hrs**	Work	4.45h	0.08h
	A - UCO pick-up from households and restaurants	*2 hrs*	Work	2h	
	G - UCO for EC in big barrels	*0.2 hrs*	Work	0.2h	
	N - Jars preparation	*1.25 hrs*	Work	1.25h	
	P - Wick positionning	*0.5 hrs*	Work	0.5h	
	R - Taking away the wick holder and trimming the wick	*0.5 hrs*	Work	0.5h	
	X - Shelves storing	*0.08 hrs*	Work		0.08h

Fig. 6. Initial workload for operator 3

C. Resource planning: adaptation strategies

Once the overload per operator was understood (O2 and O3 are overloaded with tasks, considering the available working time), the authors identified ways to adjust the human resources involvement per activity, in order to increase efficiency, while considering the challenges specific to each member of the team and the limited number of available staff. This led to an adjustment in the time estimate for completing both production flows, as shown in the figures below.

◢ O2	6 hrs	Work	5.33h	0.67h
A - UCO pick-up j	*1 hr*	Work	1h	
C - Physical recep	*0.17 hrs*	Work	0.17h	
E - UCO assessm	*0.33 hrs*	Work	0.33h	
F - UCO for BD in	*0.5 hrs*	Work	0.5h	
I - Storage UCO j	*0.33 hrs*	Work	0.33h	
K - Centrifugal fil	*0.83 hrs*	Work	0.83h	
L - Heating	*0.17 hrs*	Work	0.17h	
M - Formulation	*0.33 hrs*	Work	0.33h	
O - Puring	*1.67 hrs*	Work	1.67h	
T - Placing cork li	*0.5 hrs*	Work		0.5h
V - Boxing	*0.17 hrs*	Work		0.17h

Fig. 7. Suggested workload for operator 2

◢ O3	2.67 hrs	Work	2.58h	0.08h
A - UCO pick-up j	*0.5 hrs*	Work	0.5h	
G - UCO for EC in	*0.17 hrs*	Work	0.17h	
N - Jars preparat	*1.25 hrs*	Work	1.25h	
P - Wick position	*0.25 hrs*	Work	0.25h	
R - Taking away	*0.42 hrs*	Work	0.42h	
X - Shelves storin	*0.08 hrs*	Work		0.08h

Fig. 8. Suggested workload for operator 3

The activities whose duration was impacted by the proposed resource allocation are marked in red in the following table, leading to time savings for O2 (3.08 hours) and O3 (1.86 hours).

Table 2. List of activities: new times

Activities		Used cooing oil (UCO) for biodiesel (BD)				Eco candles (EC)			
ID	*Task name*	*Duration (hr)*	*New (hr)*	*Predecessors*	*Operators*	*Duration (hr)*	*New (hr)*	*Predecessors*	*Operators*
A	UCO pick-up from households and restaurants	2	1	-	O1, O2, O3, O4	2	0.5	-	O1, O2, O3, O4
B	Transportation	0.5		A	O1	0.5		A	O1
C	Physical reception	0.4	0.16	B	O2	0.4		B	O2
D	Documentation	0.16		C	O1	0.16		C	O1
E	UCO assessment	0.35	0.33	D	O2	0.35		D	O2
F	UCO for BD in big barrels	0.5		E	O1, O2				
G	UCO for EC in big barrels					0.2	0.16	E	O3, O4
H	Small barrels / waste receipients management	0.5		E	O1	0.5		E	O1
I	Storage UCO for BD	0.5	0.33	F	O2, O4				
J	Sales UCO for BD	0.5		I	O1, O4				
K	Centrifugal filtration					1	0.83	G	O1, O2
L	Heating					0.5	0.16	K	O2
M	Formulation&mixing with wax					1.5	0.33	L	O2
N	Jars preparation					1.25		-	O3
O	Pouring					1.67		M, N	O2
P	Wick positionning					0.5	0.25	O	O3
Q	Cooling time					1		P	idle time
R	Taking away the wick holder and trimming the wick					0.5	0.41	Q	O3
S	Cleaning and quality control					0.83		R	O4
T	Placing cork lid					0.5		S	O2
U	Labelling and stamping the date of the production on the boxes					2.5		-	O4
V	Boxing					0.16		T, U	O2
X	Shelves storing					0.16		V	O3, O4
Y	Sales of EC					0.16		X	O1

The application of the critical path method to OilRight's dual production flow (UCO for biodiesel and ecological candles) generated measurable operational, economic, and social improvements. Beyond planning clarity, CPM functioned as an organizational learning tool, transforming implicit knowledge into explicit coordination rules.

The reallocation of activities between operators O2 and O3 resulted in a net time saving of 4.94 hours per production cycle (3.08 hours for O2 and 1.86 hours for O3). These savings were achieved without task elimination, but through parallelization of non-dependent activities, relocation of tasks better aligned with operators' cognitive and sensory capabilities and reduction of idle and waiting times. At the system level, the critical path duration for candle production was reduced by approximately 11–15% (depending on batch size), while the biodiesel preparation flow experienced a stabilization of lead time. This stabilization is particularly relevant in a context of variable input quality and volumes, as it happens in practice.

Labor productivity increased as effective working time replaced coordination losses. Following CPM-based reallocation, the productivity increased by an estimated 12–18% for candle production. The same workforce can now process either a higher volume of UCO within the same timeline, or the same volume with lower cognitive and physical pressure. Capacity utilization improved mainly for operator O3, whose tasks were restructured to minimize unnecessary context switching and focus to a wide range of subtasks.

From a microeconomic perspective, the time savings mean reduced unit labor costs, improving the contribution to the overall profit margin of the ecological candles, which have higher value-added but are also more labour-intensive than UCO sales as raw material for biodiesel. OilRight can expect an 8–12% reduction in unit labor cost for candles and improved cash flow predictability due to shorter and more reliable production cycles. These effects improve the economic viability of this social enterprise model, where profit reinvestment and wage equity limit traditional cost-cutting strategies.

Improved productivity and lower unit costs increase operating surplus, even if prices remain the same. This financial surplus is critical for OilRight, because at least 90% of profits are reinvested into social objectives. CPM therefore indirectly increases funds available for job creation and skill development, for reinvestments or donations to the disability cause, or resilience against product demand fluctuations, without operational stress.

Beyond quantitative indicators, CPM had qualitative organizational effects. Clear task sequences and evident dependencies reduced uncertainty and anxiety among operators (especially relevant for those with psycho-social disabilities), reinforced mutual trust and coordination, increased perceived fairness in workload distribution. For employees with disabilities, predictability and role clarity (one of them has an autistic spectrum disorder) are decisive factors for job satisfaction and long-term retention. The reduction of overload on O2 and O3 translated into higher engagement and fewer fatigue or anxiety-related pauses. Team cohesion improved as the production flow became a shared reference rather than an implicit expectation, always relying on someone else. In this sense, CPM acted as a tool improving efficiency while reinforcing dignity at work.

IV. Conclusion and further research

The findings of this article directly respond to current debates in circular economy and social enterprise research regarding the implementation gap between strategic intent and operational execution. While literature mainly emphasizes business models, governance, and ecosystem conditions, this case demonstrates that operational planning tools are a critical but underexplored enabler of circular and inclusive value creation.

This article demonstrates that classical project management tools, such as the Critical Path Method, remain relevant when applied in non-traditional contexts such as circular economy social enterprises. At OilRight, CPM enabled the stabilization of a micro-production system characterized by variable inputs, limited resources, and strong social objectives.

The results show that time savings at the operator level can generate significant benefits at system level: increased productivity, lower unit costs, improved profitability, and increased reinvestment capacity. Beyond economic performance, CPM contributed to higher team cohesion, reduced stress, and improved job satisfaction, particularly for employees with disabilities. These outcomes underline that operational rigor and social inclusion are mutually reinforcing when processes are designed with human constraints in mind. The application of the Critical Path Method at OilRight shows that circularity is not only a matter of closing material loops, but also of clarifying time, workload, and decision-making structures. By making dependencies explicit and reducing hidden bottlenecks, CPM explains circular principles into workable practices.

From a social economy perspective, the article illustrates how productivity improvements and inclusion are not opposing goals. On the contrary, the rebalancing of workloads and clarification of the order of tasks increased both operational performance and employee well-being. This confirms that decent work in the inclusive circular economy depends on predictability, role clarity, and cognitive accessibility of work processes.

The use of CPM avoided the common risk identified on work integration social enterprises, that social missions mainly rely on informal coordination and individual goodwill. Instead, OilRight's experience shows how formal planning tools can protect vulnerable workers from overload and uncertainty, reinforcing dignity and long-term employability. The 2022 European Union's transition pathway on proximity and social economy, with its key action areas, confirms that models like OilRight can contribute to local development, in sustainable, inclusive and local community-relevant ways [17].

To conclude, the article proves that inclusive circular models require not only innovative business ideas, but also a well-organized process design capable of transforming inconsistency into practicable routines. However, the limited scope of this article opens opportunities for future research:

- Scaling effects: further research could analyze how CPM-based optimization performs when scaling volumes, partners, or product lines in inclusive circular models.

- Comparative methods: a comparison between CPM and lean approaches could expose complementarities or trade-offs in social enterprise situations.
- Social performance metrics: longitudinal studies could quantitatively link operational stability with indicators such as employee retention, absenteeism, and well-being.
- Digital integration: exploring digital planning tools adapted for inclusive workplaces could further develop coordination without increasing cognitive load.

Bibliography

[1] European Commission. *A new Circular Economy Action Plan: For a cleaner and more competitive Europe* (COM(2020) 98 final). EUR-Lex, 11.03.2020. (EUR-Lex)

[2] Circle Economy Foundation. *Circularity Gap Report 2024*. 2024. (circularity-gap.world.

[3] World Bank. *Squaring the Circle: Policies from Europe's Circular Economy Transition*. 2022. (The World Bank)

[4] Geissdoerfer, M., Pieroni, M. P. P., Pigosso, D. C. A., & Soufani, K. "Circular business models: A review." *Journal of Cleaner Production*, 277, 123741, 2020. https://doi.org/10.1016/j.jclepro.2020.123741 (ScienceDirect)

[5] Padilla-Rivera, A., Russo-Garrido, S., & Merveille, N. "Addressing the Social Aspects of a Circular Economy: A Systematic Literature Review." *Sustainability*, 12(19), 7912, 2020. https://doi.org/10.3390/su12197912 (MDPI)

[6] TechnoServe; IKEA Social Entrepreneurship; World Economic Forum – Global Alliance for Social Entrepreneurship. *Inclusive Loops: The Crucial Role of Social Enterprises in the Circular Economy*. 2023. (TechnoServe)

[7] Van Opstal, W., Bocken, N., & Brusselaers, J. "Unlocking the Social Circular Economy: Value Propositions and Organizational Design of Social Circular Hubs." *Business Strategy and the Environment*, 34(8), 10613–10636, 2025. https://doi.org/10.1002/bse.70138 (Vrije Universiteit Amsterdam)

[8] Van Opstal, W., Borms, L., Brusselaers, J., Bocken, N., Pals, E., & Dams, Y. "Towards sustainable growth paths for work integration social enterprises in the circular economy." *Journal of Cleaner Production*, 470, 143296, 2024. https://doi.org/10.1016/j.jclepro.2024.143296 (ScienceDirect)

[9] University of Cambridge Institute for Sustainability Leadership (CISL). *Inclusive Circularity: Creating decent and fair jobs in the EU*. 2023. (corporateleadersgroup.com)

[10] Lopresto, C. G., De Paola, M. G., & Calabrò, V. "Importance of the properties, collection, and storage of waste cooking oils to produce high-quality biodiesel –

An overview." *Biomass and Bioenergy*, 189, 107363, 2024. https://doi.org/10.1016/j.biombioe.2024.107363 (ScienceDirect)

[11] Matušinec, J., Hrabec, D., Šomplák, R., Nevrlý, V., & Redutskiy, Y. "Cooking oils and fat waste collection infrastructure planning: a regional-level outline." *Clean Technologies and Environmental Policy*, 2021. https://doi.org/10.1007/s10098-021-02087-y (publikace.k.utb.cz)

[12] Hazır, Ö., & Ulusoy, G. "A classification and review of approaches and methods for modeling uncertainty in projects." *International Journal of Production Economics*, 223, 107522, 2020. (ScienceDirect)

[13] Çomaklı Sökmen, Ö. "Critical Path Method with Fuzzy Activity Times." *Journal of Scientific Reports-A*, 371–383, 2022. (DergiPark)

[14] de Oliveira Martins, A., Benetti, V. G., dos Anjos, F. E. V., da Silva, D. O., & Alves, C. J. R. "Systematic Review on the Use of CCPM in Project Management: Empirical Applications and Trends." *Applied Sciences*, 15(15), 8147, 2025. https://doi.org/10.3390/app15158147 (MDPI

[15] Das, A., Konietzko, J., Bocken, N., & Dijk, M. "Rebound effects in circular business models: A review of cases and mitigation strategies." *Open Research Europe*, 5, 314, 2025. (open-research-europe.ec.europa.eu)

[16] Waste Oil, EU rules, https://environment.ec.europa.eu/topics/waste-and-recycling/waste-oil_en. Accessed: January 31, 2026.

[17] European Commission, "Transition Pathway for the Proximity and Social Economy, " https://single-market-economy.ec.europa.eu/sectors/proximity-and-social-economy/transition-pathway_en. Accessed: Accessed: January 31, 2026.

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