

Business cases in waste management

Paving tiles of low-grade plastic waste



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Young people in Mali often lack decent employment opportunities, leading to high levels of unemployment. Funded by the European Union, a consortium of ICCO, WASTE, APEJ, led by SNV, is implementing the Value Chain Development and Youth Employment in Mali (EJOM) project. The project takes place in the four regions of Kayes, Koulikoro, Gao and the district of Bamako, all areas where young Mali people face systemic employment challenges.

WASTE's interventions in the project focusses on setting up small businesses in solid waste management and improving existing ones to help them to grow and create employment. Participants of the EJOM training programs are asked to prepare a business plan. To assist the development of these business plans, WASTE developed a series of 4 illustrative business cases in solid waste management to serve as inspiration:

1. Primary collection of household waste
2. Primary collection of household waste and sales of recyclables
3. Grinding of hard plastics to produce flakes
4. Paving tiles out of low-grade plastics

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1. Pavers out of plastic waste

1.1 Key characteristics

Waste input type:	Mixed plastic waste (multi-layer plastic, laminates, PS, bags, etc.). Certain percentage of contamination is allowed. The business will recycle large amounts of plastic waste dumped/littered in the streets and in gutters that otherwise generates problems for the environment and has negative effects on the health of citizens
Product:	Paving tiles for road construction or construction of squares, paths etc.
Value offer:	Providing a solution to low-grade plastics
Organisation:	Business, Public Privat Partnership (PPP)
Scale of business:	Small- to medium scale (500 kg/day up to 3 tons per day)
Investment needed:	6,000 Euro up to 27,000 Euro
Market:	Road construction (Ministry responsible for infrastructure) but also municipalities, businesses, churches and households can be potential clients.
Examples implementation:	Ghana: Nelplast (www.nelplastgh.com), India: Shayna EcoUnified (www.shaynaecounified.com)
Risks/challenges:	Price of tiles need to compete with price of cement tiles, important to conduct a market study and know what the competitive products are in the market and what the price is of these products. The extruder needs a constant supply of electricity. Know what licences and permits are necessary to run this business. Deterioration of tiles (research is needed)
Key success factors:	Local or national governments are willing to buy the tiles for road construction and promote the product. No power cuts and favourable electricity tariffs.
Social impact:	The business will create income and jobs for waste pickers by giving value to otherwise worthless and polluting plastic waste. In addition, neighbourhoods will become cleaner as plastic waste litter will be cleaned up from the area.
Environmental impact:	Paving tiles can provide a solution to plastic littering by giving this hard to recycle plastic waste a value.
Economic impact:	The business will generate a substantial number of jobs: indirect jobs in the collection of the plastic waste and direct jobs in the processing site itself.

1.2 Place in the value chain

In waste management systems we identify two important chains that are interlinked: the service chain and the value chain (see figure 1).

The **service chain** is about providing services to remove waste from their point of generation to a (dump) site where they are burned, buried or stored. These services are traditionally a **public sector** activity; and removal and disposal of waste are considered a public responsibility but can be outsourced to private service providers.

The **value chain** of solid waste (organic and inorganic waste) involves activities that add value to waste in such a way that, as a result, products can be sold to customers. To start a business in waste management it is important to know where your business is situated in the waste management system. *Who are your suppliers? Who are your clients?*

In the case of producing paving tiles out of plastic waste the place in the value chain is in the recycling step. Suppliers of plastic waste are waste pickers or sorting centres; clients are the users of paving tiles.

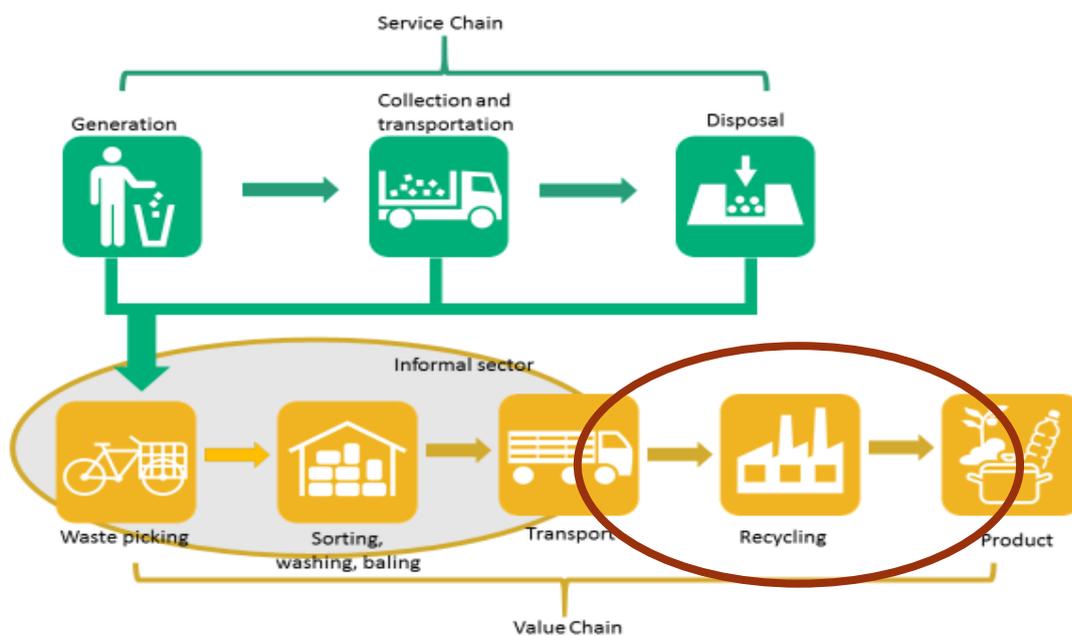


Figure 1: Schematic overview of service chain and value chain in solid waste management

2. Analysis of the profitability of the production of tiles (april 2019)

Raw materials: Low grade plastic waste (laminates / multilayer packaging) and river sand (60% plastic / 40% sand)		Market: construction sector		Products: paving tiles Weight: 1.2 kg / tile				
Investment (CAPEX)								
	Grinder (50 kg output/5.5 kW) (650,000 CFA)		Extruder (50 kg/hour - 20 kW) (3,000,000 CFA)		Mould (32,500-65,000 CFA)		Press (325,000 CFA)	
Total investment: 8.684.469 CFA (17.360 euros) – Including Agglomerator, mixer (see proposal METRO Groups) and transport from India								
Business plan								
profit-loss						Per month (CFA)		
	Sales							
	Production and sales of 7,333 tiles/month (333 tiles per day) 278 CFA/tile					2,038,666		
	Expenses							
<ul style="list-style-type: none"> • Raw materials (plastic waste (50 CFA/kg) and sand (10 CFA/kg)) • Salaries (1 qualified operator and 1 assistant) • Electricity (total 32.8 kW, 8 hors/day, 153 CFA/kWh) • Other (rent, telephone, transport, maintenance, etc.) • Depreciation (Life time of 5 years) 					264,000 + 35,200			
Total expenses					1,639,104			
Result per month					399,562			

2.1 Profit and Loss statement and break even point

The table below shows the profit and loss statement of the plastic paving tile process. This profit and loss statement is based on the actual data in Bamako, July 2019 (see assumptions below). The payback period is the length of time an investment reaches a breakeven point. In this case the break even point will be reached after **3 years and 8 months** supposed that all produced tiles can be sold for the indicated price of 278 CFA per tile. A thorough market assessment is vital before starting this enterprise: how many tiles can you sell for what price?

Business plan 5 ans	Year 1	Year 2	Year 3	Year 4	Year 5
Profit and Loss					
Revenues	17,123,966	20,548,759	24,464,000	24,464,000	24,464,000
Operating Costs					
Payroll <i>% of revenues</i>	1,080,000 6%	1,134,000 6%	1,406,160 6%	1,406,160 6%	1,406,160 6%
Raw materials <i>% of revenues</i>	2,513,165 15%	3,051,700 15%	3,590,237 15%	3,590,237 15%	3,590,237 15%
General (rent, telephone, transport, maintenance, etc.) and depreciation <i>% of revenues</i>	4,946,894 26%	4,946,894 24%	4,946,894 20%	4,946,894 24%	4,946,894 20%
Water and Electricity <i>% of revenues</i>	7,419,202 43%	9,009,032 44%	10,599,856 43%	10,599,856 43%	10,599,856 43%
Total Operating Costs <i>% of revenues</i>	15,959,261 93%	17,141,626 88%	20,543,147 84%	20,543,147 84%	20,543,147 84%
EBIT	1,164,705	2,407,133	3,920,853	3,920,853	3,920,853
Accumulated cash flow	1,164,705	3,571,838	7,492,691	11,413,544	15,334,397
Repayment of investment of 8.7 mIn FCFA	1,164,705	3,571,838	7,49,691	8,684,469	
Profit (after 3.8 ans)				2,729.075	3.920.853

Assumptions

- 22 working days per month, 8 hours per day
- Capacity year 1: 70%, capacity year 2: 85%
- All products are sold
- Price of paving stone is based on: <http://www.stonesml.com/index.php/nos-articles/paves/pave-carre/pave-carre-jaune-detail>
Verified in Mali: price is 6,000-8,000 CFA/m² (depending on thickness of tiles)
- Price of electricity is based on grilles sur les tarifs de EDM 2019: Tranche 2 above 200 kWh par mois: 153 CFA/kW (including 18% TVA).