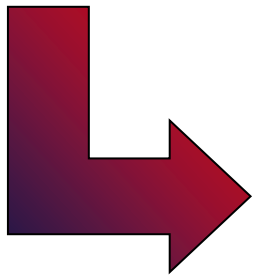# Advice to Refugee Hosting Communities in Waste Management- ADHOC

Evaluation of key figures for waste collection as a planning and control tool for routing optimizations in Irbid, Mafraq and Karak
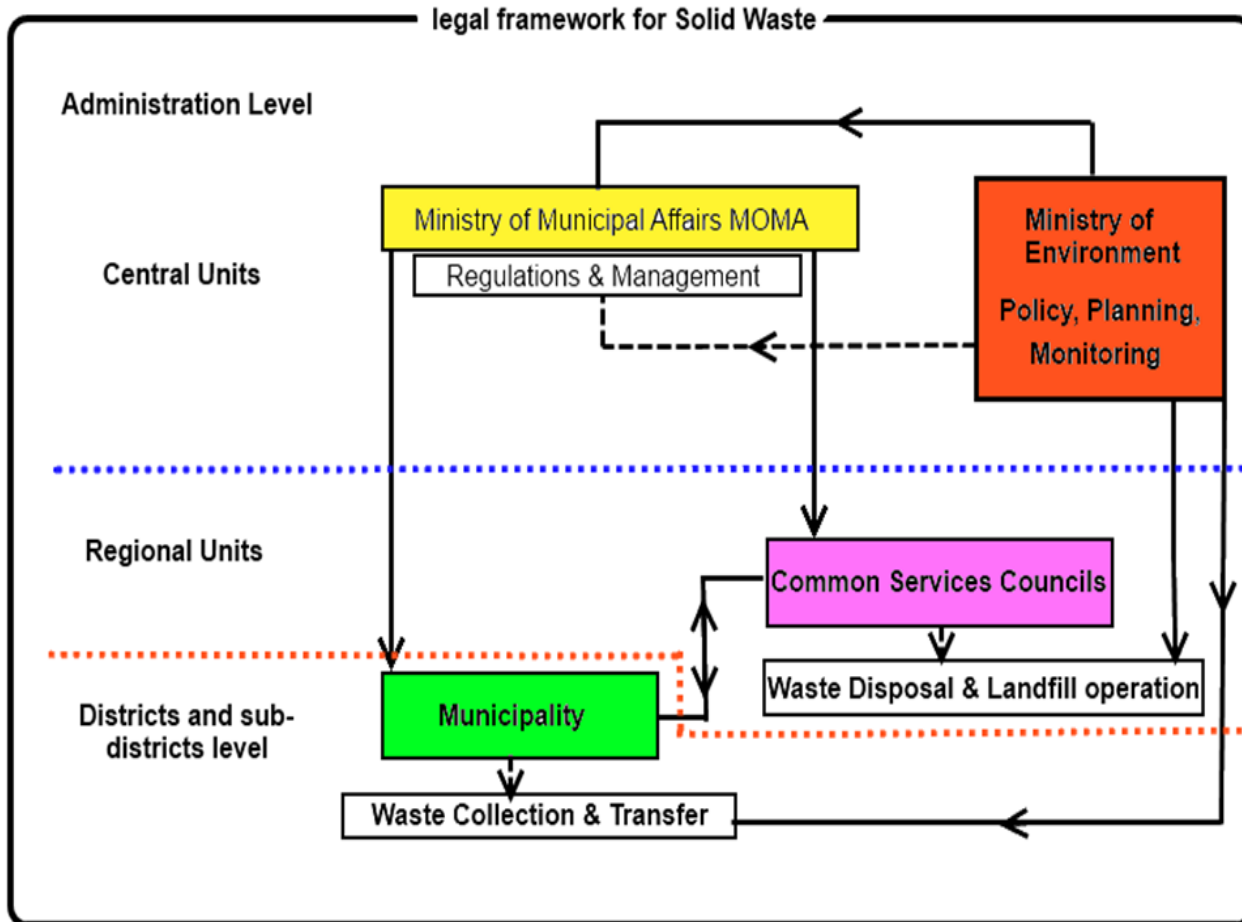
1. Starting Point

- Grown disposal structures in many municipalities

- Route planning on the basis of experience

- No structured key data oriented route planning

- No / hardly any adjustments to changes

- Lacking reporting and documentation

- Inefficient and expensive waste collection

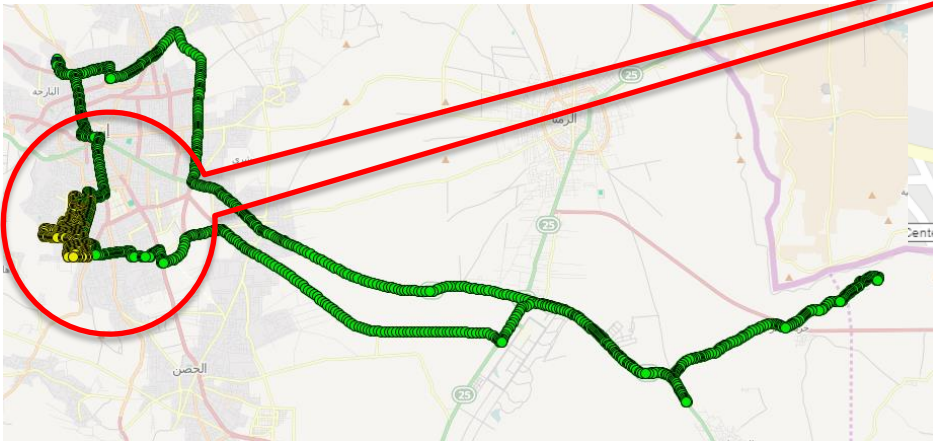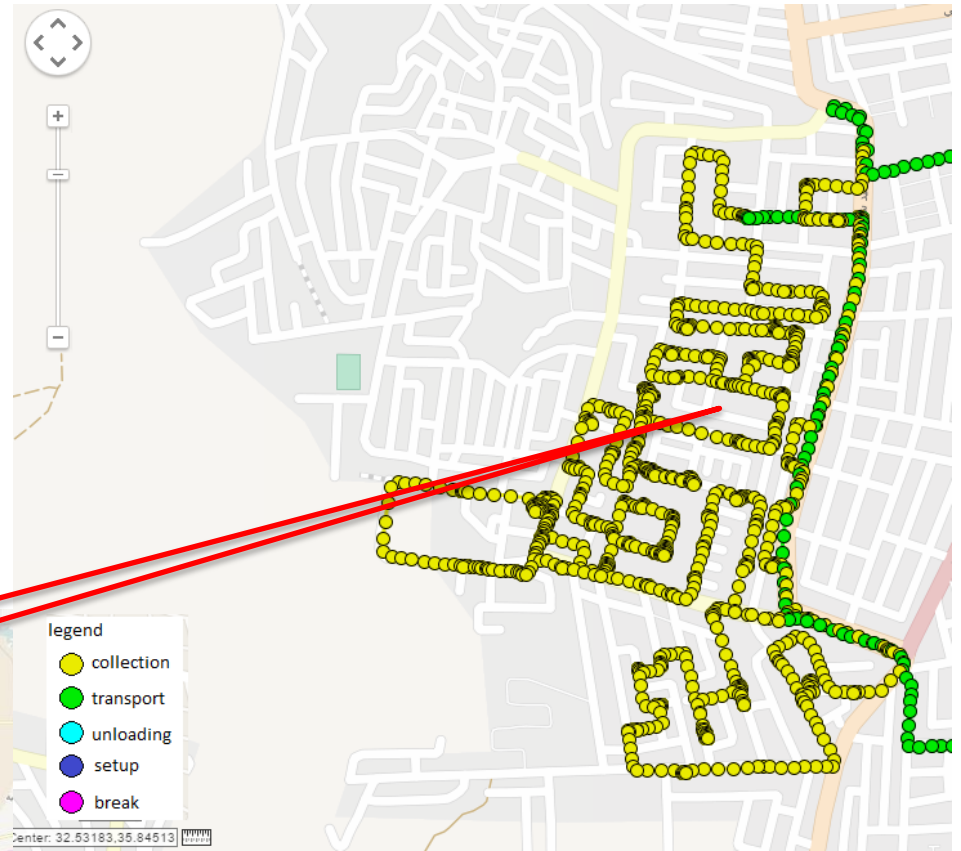**Decision-making and actionable key figures are missing!**

2. Institutional setting

legal framework for Solid Waste

Administration Level

Central Units

Ministry of Municipal Affairs MOMA
Regulations & Management

Ministry of Environment
Policy, Planning, Monitoring

Regional Units

Common Services Councils

Waste Disposal & Landfill operation

Districts and sub-districts level

Municipality
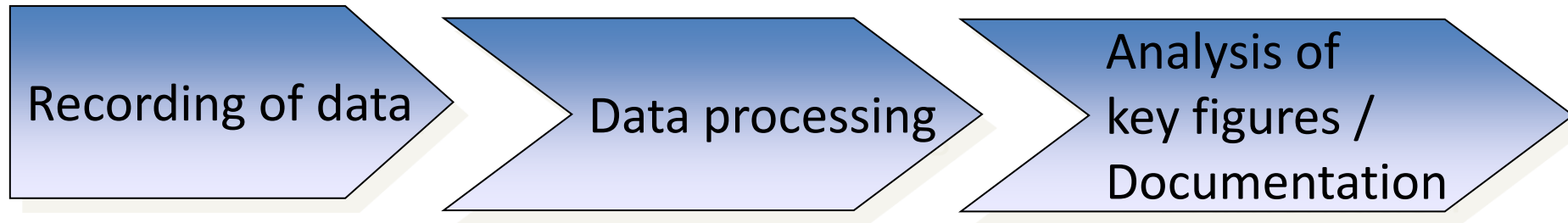
Waste Collection & Transfer

- Unsafe and unregulated landfills
- Limited role of private sector
- Absence of proper practices
- (No) material recovery
- Inefficient, no cost recovery
- Large influx of refugees

3. Approach

- Key data collection with GIS sytem

- Record of all routes in the municipalities

legend
- collection
- transport
- unloading
- setup
- break

Center: 32.53183,35.84513

3. Approach

Recording of data → Data processing → Analysis of key figures / Documentation

Collection
> Amount, Logistical cost[t / (veh. * d)] [JOD / cont. empty.]

Fleet
> Repair/Fuel costs [JOD/ (veh. * a)] [JOD/ a]

Maintenance
> Maintenance cost [JOD / (veh. * h)]
> Productivity of operational staff [%]

Personal data
> Staff cost [JOD/ mon.]
> Sick days [d/(p.*a)] overtime [h/m]
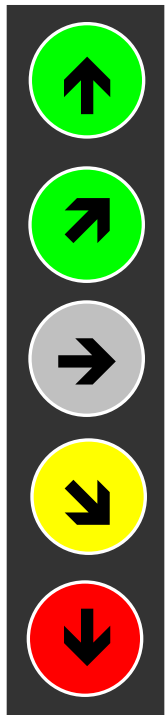
4. Outputs

Daily work time utilization [h/d]
- Comparison of three municipalities -
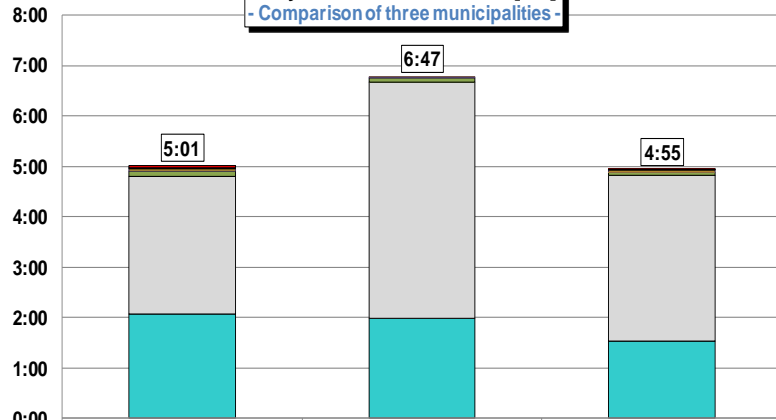
	Irbid	Kerak	Mafraq
Actual working time	5:01	6:47	4:55
Standstill	0:03	0:00	0:00
Break	0:00	0:00	0:00
Set up time	0:02	0:02	0:02
Unloading	0:06	0:05	0:04
Collection	2:43	4:40	3:18
Transport	2:04	1:58	1:31

Specific costs [JD/ton] for container collection
- comparison of verhicle types (initial situation) -
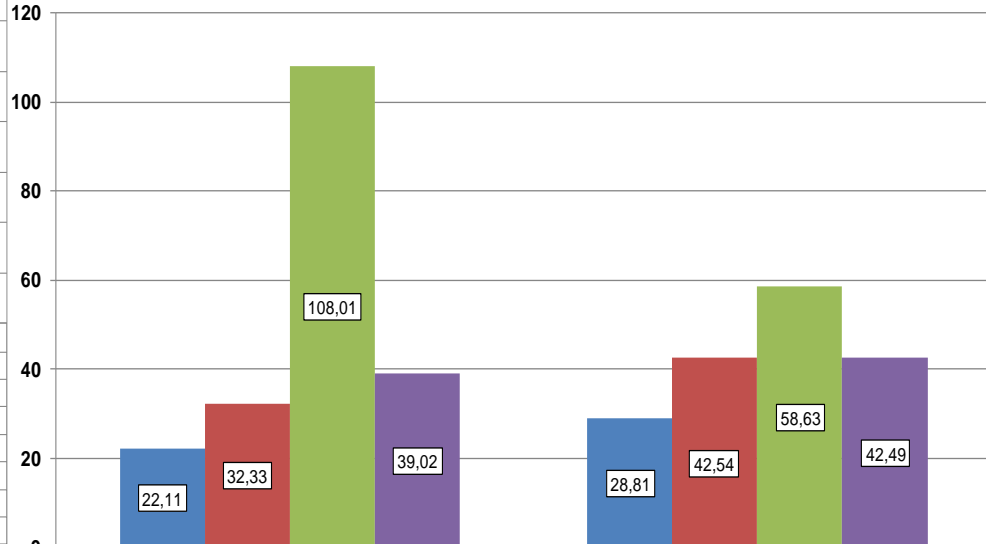
	Irbid	Kerak
3-Axis	22,11	28,81
2-Axis	32,33	42,54
Small vehicle*	108,01	58,63
Total	39,02	42,49

* incl. transfer station vehicle costs

Record of all routes and different vehicles/daily work time/no. of containers per route/utilization of containers/collection time/ amount collected per route/ utilization per vehicle/ distance per route/ cost analysis

4. Outputs

Total costs [million JD/a] for container collection in Irbid
- comparison of 3 optimization scenarios -

	Initial situation	Scenario 1	Scenario 2	Scenario 3
Total	6.180.640 JD/a	5.243.232 JD/a	5.386.379 JD/a	4.787.484 JD/a
Personnel	4.352.325 JD/a	3.661.030 JD/a	3.486.005 JD/a	3.013.548 JD/a
Vehicle	1.648.783 JD/a	1.402.670 JD/a	1.720.842 JD/a	1.594.405 JD/a
Container	179.531 JD/a	179.531 JD/a	179.531 JD/a	179.531 JD/a
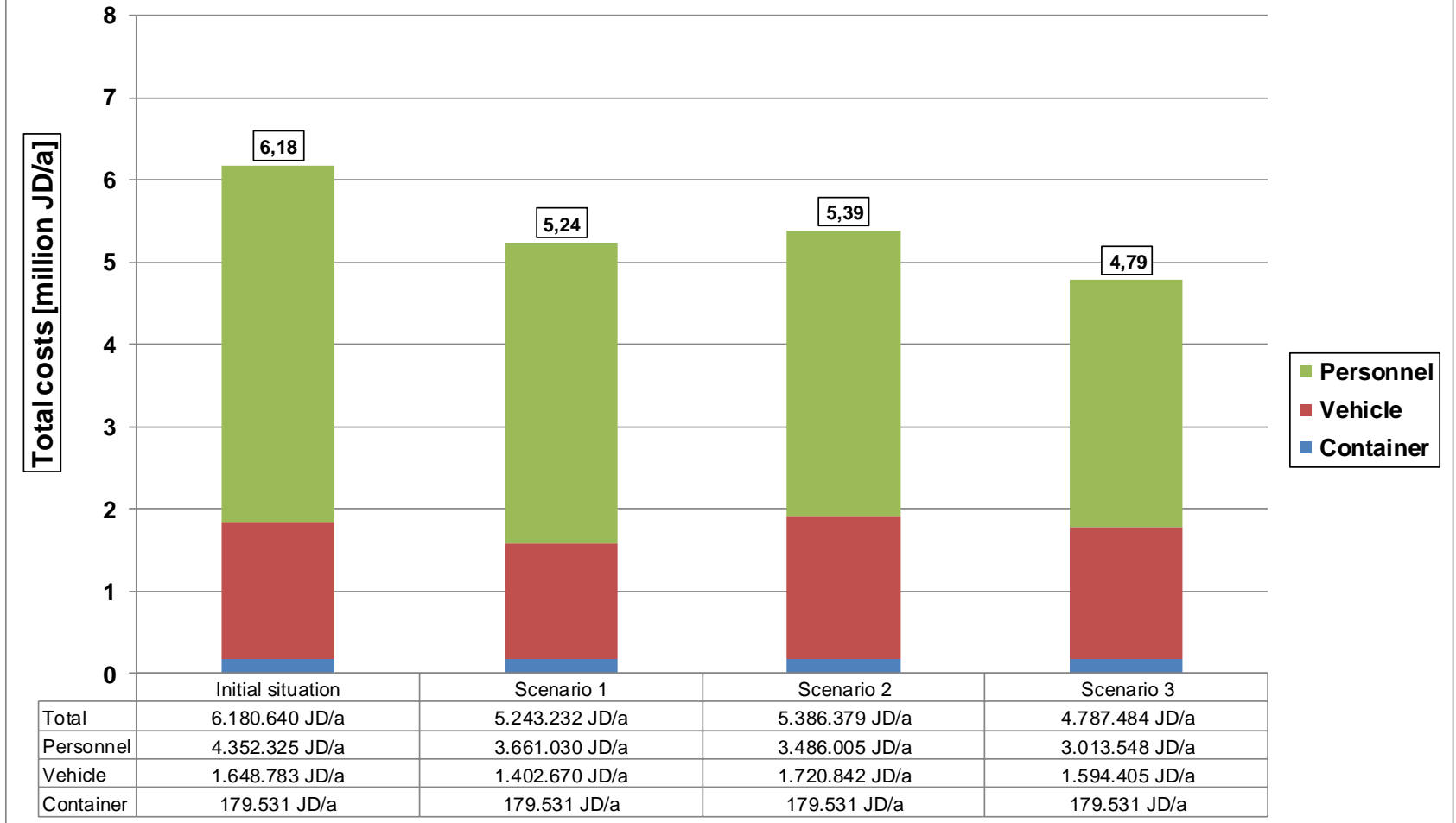
5. Lessons

I. **Key data available, comparison of performance in municipalities**
II. **Scenarios for optimization are developed**
III. **Decision from municipalities needed**

➢ working time models / -utilization

➢ reduce collection time
(usage of more containers especially in Kerak)

➢ Partially or completely route optimization
(small vehicle routes in Irbid)

➢ utilization balance utilization of collecting routes
(working time/container units per route/ t per route)

➢ reduce transport time
(Transferstation in Irbid /usage of 3-axis vehicles)