

- Smart City supported by Japan ASEAN Mutual Partnership -
Smart JAMP

APPLICATION FORM for Smart City Project Formulation Study

1. Project digest

(1) Project Title:

Study for Application of Smart Technology for Solid Waste Management in Battambang

(2) Name of the city: Battambang, Cambodia

(3) Category of the study: A and C

**Choose one (or more, if item D and/or E included) from below*

A) Masterplan (M/P) study

To formulate a masterplan for an entire smart city or a partial area of the target city, including the direction, comprehensive plan, and individual projects.

C) Feasibility study

To examine the feasibility or concrete details of an individual project composing the smart city project.

(4) Justification of the Project **Provide detailed information of the project regarding the items below.*

- Present condition of the smart city project in the target city:

Present Condition of the City

The Battambang Municipality is the second-largest city of Cambodia, with a total population of 152,032 and 115.44 km² area. Agriculture is the main economic activity of Battambang; approx. 74% of the municipal territory (85.6 km²) is agricultural production. The population of Battambang generates about 126 t/day (tones per day) of solid waste. This includes waste from households, institutes, businesses and markets, tourism, and agro activities. As Battambang undergoes (like the whole of Cambodia) economic development and faces a related increase in consumption and consumer behavior, the waste generation will increase over the next years. The average waste collection is estimated to approximately 80 t/day. This waste is mainly collected from households, businesses, and markets and is disposed at the landfill of Battambang. About 15 t/day are collected by scavengers and recycled by junk shops. About 30 t/day remain uncollected and are disposed of in an uncontrolled and hazardous manner. In

Battambang, two waste collection companies are operating, CINTRI and Leap Lim Company.

The landfill of Battambang is the main place for the disposal of solid waste in Battambang. Analysis of the waste composition found out that the waste comprises a high share of organic waste (about 70%). The remainder is mainly composed of plastic waste (15-20%), paper, and glass. In particular, the waste collected at local markets is composed of high amounts of organic waste.¹

Current Issues

The current landfill is operated as open dumpsites causing severe environmental damages and health risks. Any waste, including hazardous, medical, and animal waste, is disposed at the dumping site, which creates ecological risks for the population. The waste leachate is not collected and forms a severe environmental hazard due to surface and groundwater pollution. Toxic waste components are neither disposed separately nor treated and like ways contaminate water bodies. The produced methane is not collected, releasing greenhouse gas and being a significant risk of landfill fires. The surrounding environment is being littered due to windblown plastic material. In addition to these severe environmental impacts, the open disposal of waste provides significant health risks for nearby populations, workers, and waste pickers. The disposal of waste without compaction and at steep slopes puts workers and waste pickers at an additional safety risk.

The environmental and health hazards caused by the current landfills, combined with already limited capacities and rapidly increasing waste volumes, require urgent investments in landfill rehabilitation, new landfills, and waste treatment. Existing dumpsites are reaching their capacity limit. This situation will further intensify in the near future, mainly due to rapidly rising waste volumes. What is not transported to the landfills is being uncollected, openly disposed in the environment, or otherwise burnt. The currently low landfill capacities, inadequate sanitary standards, and predicted increase in waste volumes make investments into waste treatment and disposal an urgent necessity.

- Sectorial development policy of the local government/municipality on the smart city project in the target city:

¹ Konrad-Adenauer-Stiftung, Cambodia (2017). *DIEKA ON SOLID WASTE MANAGEMENT (SWM) BATTAMBANG: A Case of Participatory Legislative Drafting at Commune Level*

To reduce the negative impact on the environment, the potential of significant health risk, and the rapid rise of waste volumes, the city of Battambang has set "Solid and Liquid Waste Management" as one of the priority sectors to introduce the smart city concept to resolve the issues. Development of drainage, sewerage system, and wastewater treatment plant has been ongoing to improve the city's liquid waste management with assistance from the Asian Development Bank. On the other hand, with the existing landfill reaching its full capacity in a few years, Battambang City is preparing a Master Plan for Solid Waste Management to collect the necessary data to plan the new landfill's technical aspect and minimize the waste amount.

- Outline of the Study:

With the existing landfill close to full capacity and the development of the new landfill becoming imminent, the development of a Master Plan has become essential for Battambang to strategically realize an environmentally friendly and sustainable city. A team has been organized to formulate a Master Plan by Battambang city but, their experience in preparing a Master Plan is limited. Therefore, a credible International Consultant will review the Master Plan, prioritize the necessary tasks, and show a road map to implement smart technology in the Solid Waste Management sector. In the whole waste cycle, namely, waste generation, storage and discharge, collection and transportation, and disposal/recycling, the Master Plan will touch on smart technology in each stage.

Waste Generation:

Self-sorting recycling bins may be introduced to reduce the speed of the landfill from filling up and increase the rate of recycling. The bin uses AI technology, combined with cameras and weight sensors, to identify what material each discarded item is made from, disposing of it in the appropriate manner to maximize recycling opportunities.

Storage and Discharge:

There is ultimately no personal reward for disposing of items correctly. However, by compensating people for returning empty drink bottles with blockchain technology to secure deposit returns from companies to consumers, this may change. Consumers scan the barcode on their bottle and place it in a smart bin, with the transaction being logged on a smartphone app. Brands can then either choose to offer a small financial sum for returning the bottle or give consumers points that can be saved up for larger rewards.

Collection and Transportation:

The collection of waste is fundamental to improve the service to the citizen and on the environmental side and the objective of obtaining an economic saving for the administration.

By introducing waste bins with the latest technology, sensors in the bin would measure how full the bins are, and report the fill-level back to a centralized system. The centralized system then enables the operator to plan an effective route that ensures only the bins that need emptying are emptied, avoiding unnecessary trips, thereby cutting the carbon footprint.

Disposal/Recycling:

The garbage truck's unsorted garbage can be sorted using a belt conveyor with an AI recognition system. The AI has a learning function that optimizes the sorting process over time and will efficiently collect all kinds of information such as the type of garbage, non-recyclable waste, the brand name on the package, etc.,

Along with the review of the Master Plan, pre-feasibility study for the newly planned landfill will be carried out to determine, analyze, and select the best scenarios. The pre-feasibility study will be a valuable instrument to support the City's decision-making process for project investments.

- Purpose (short-term objective) of the Study:

**A path to improving urban services through digital solutions like robotics, IoT, AI, or big data, is expected.*

- To review and formulate a Solid Waste Management Master Plan in Battambang City
- To propose an action plan to realize the Master Plan by introducing a smart technology
- To prepare a pre-feasibility study for new landfill to support the decision making process of the City.

- Goal (long-term objective) of the Study or entire project:

**The applicant may choose from two layers of the goal of the Study, including a) an entire urban development goal with a nexus of concrete construction, transport, and infrastructure projects with ICT solutions, or b) a specific goal with a certain solution or*

technology in a particular field such as public health, disaster risk reduction, urban safety, and security, mobility service (e.g., MaaS), energy solution, circular economy, advanced administrative services like public facility management or tourism promotion, as well as other fields like education, agriculture or supply chain management.

- Achieve sustainable solid waste management in terms of cost and environment by implementing smart technology
- To promote public awareness and understanding about the role of SWM for a clean and healthy environment

- Other relevant projects, if any.