ACTIONABLE INTELLIGENCE POLICIES (AIP) FOR WASTE MANAGEMENT IN THE EASTERN ECONOMIC CORRIDOR (EEC), THAILAND: CONCEPTS, CHALLENGES, AND OPPORTUNITIES

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ABSTRACT: The Eastern Economic Corridor (EEC) project in three Thailand's eastern provinces, namely, Chachoengsao, Chonburi and Rayong has been developed to be a hub of trade and investments of high technological manufacturing as well as a center for regional transportation and logistics. Since the project has been developed in 2017, increase in level of economic activities and social development has attracted more people to the area. With rapid population growth and urbanization, waste generation in the EEC is expected to increase. To reduce overwhelming amount of waste and strain on local waste management systems, formulating effective waste management policies is needed. Even though there is implementation of common strategies and policies of waste management in the area, typical pain points such as volumes of waste, inadequate waste collection, improper disposal, lack of usable or appropriate landfills still remain. As each area has its own specific waste problems, making policies and forming strategy bases on truly understanding area characteristics could lead to successful implementation. Actionable Intelligence Policy platform (AIP) is an integrated spatial big data platform allowing policy makers to better understand root causes of a problem through intelligence analytics and what if scenarios. Hence, public policies and management practices are properly formulated regarding priority, real community needs, and area characteristics. With its intelligence, AIP is aimed to be used as a main tool to deliver effective waste management policies and measures for transforming EEC into zero waste area. The development of the AIP begins with stakeholder engagements. At this stage, local organizations having an interest in the outcomes of the AIP in the EEC have engaged through providing their perspectives in waste management and their readiness level of cocreating and implementing the AIP. Although they are not ready for the AIP cocreation mainly due to human resources and technical skills, there is a willingness in providing useful information such as problems and requirements of waste management for the AIP conceptual design process. As waste volume is a major problem needed to be resolved in the area, three indicators related to waste volume management including waste volume, number of waste disposal sites, and condition of waste disposal site have been defined. Spatial and none-spatial data from several sources and analytical techniques based on 5M principles: measuring, monitoring, mapping, modelling, and managing are used to indicate level of those three indicators. For instance, population, number of tourists, number of bins, bin capacity, and waste density are used for mapping existing waste volume whist predicted population, tourist, land-use, and urban growth boundaries have been analyzed for mapping waste volume prediction in province to district scale. The waste volume maps are then used for policy and strategy formulation, and as such better waste volume management such as waste separation campaign, waste tax, increase in routing waste collection, and relevant service improvement. Additionally, the waste volume maps has been compared with the second indicator; number of waste disposal sites, extracted from satellite images showing both location and size of authorised and unauthorised dumpsites. The comparison aims to determine whether there is a shortage of dumpsite particularly in areas having high waste volume to formulate further policy and strategy for expanding proper new infrastructure. The information of waste disposal site is also able to support issuing rules and regulations to reduce unauthorised dumpsites. As for areas having enough number of dumpsites, condition of the waste disposal sites is assessed. The amount of leachate, gas, and odour emission from the waste sites are monitored through field sensors coupled with using satellite image analysis. In this regard, vegetation stress and land surface temperature changes surrounding waste sites are proxy for waste sites required high-maintenance. Poor and fair condition waste sites are then used to simulate impact of pollution scenarios on surrounding communities. The pollution scenarios will help authorities to consider issuing proper rules and regulations for infrastructure and service improvement as well as establish action plans to prevent and mitigate health and environmental impacts from polluted waste sites. This AIP conceptual design has been also reviewed and evaluated by stakeholders and ready to be transformed into a system for implementation which eventually could support policy formation and strategy making. Although the conceptual design has been accepted by stakeholders, the implementation stage is challenging. As the AIP needs variety of data, there should not be conflicts and barriers to data sharing and integration. For instance, copyright and license agreements of data for the AIP use need to be issued and permitted. Moreover, data structure needs to be organized and useable between different platform otherwise there will be unavoidable costs of sharing

data and time consuming for depositing data to the AIP system. However, there is a good opportunity for finding new techniques for data integration between complex platform. As the AIP platform is integration of technologies, unless having own all needed technologies defined in the AIP conceptual design, co-creation in implementation between stakeholders is required. Besides, there should be the same readiness level in knowledge, technology, and infrastructure among stakeholders so that those are shared and complemented to each stakeholder without any barrier which will foster creativity in the use of technologies further. However, there is an opportunity for those having limitation to learn and accept technologies from competent stakeholders and to move their readiness level to equivalence. In that case, an offer from technology recipient has to fulfill requirement of higher competent stakeholders. Additionally, clear communication among co-creating stakeholders about goals and process to reach achievement are required in order avoid misperception leading to failure of the implementation. Lastly, the degree of acceptance from users on the AIP platform relies on the usefulness, the ease of use, the cost and effectiveness. In summary, the development of the AIP conceptual design and implementation as well as the challenges and opportunities could provide a better understanding in the AIP concept and be a good guideline to support the development of an optimal and practical AIP for waste management in other areas further.

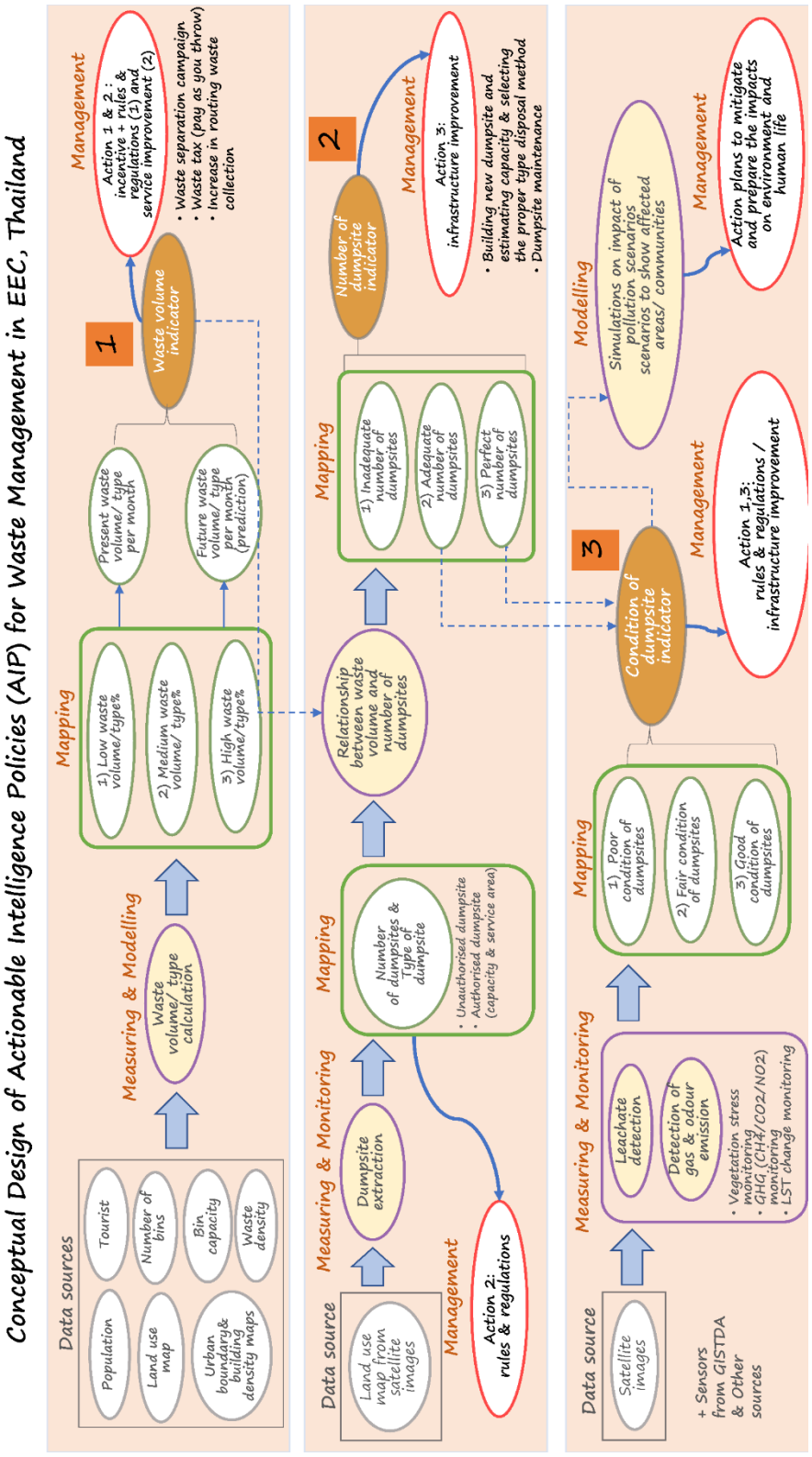

Figure 1: The conceptual design of the AIP waste management including three indicators and sample of management policies for each waste management indicator