The Economic Returns of Sanitation Interventions in Indonesia

August 2011

INTRODUCTION

The Economics of Sanitation Initiative (ESI) is a multi-country study launched in 2007 as a response by the World Bank's Water and Sanitation Program to address major gaps in evidence among developing countries on the economic aspects of sanitation. Its objective is to provide economic evidence to increase the volume and efficiency of public and private spending on sanitation. This research brief summarizes the key findings of Study Phase II—cost-benefit analysis of alternative sanitation options—from Indonesia.[i]

PROBLEM STATEMENT

While Indonesia is on a path to becoming a middle-income country thanks to stable economic growth rates in recent years, access to and the quality of public services are closer to that of comparable low-income countries, with Indonesia scoring low marks in several health and infrastructure indicators. Compared to other countries in the region at similar levels of development--such as the Philippines and Vietnam--access to sanitation facilities in Indonesia continues to be under par, at only 52 percent,[ii] with large gaps between urban (69 percent) and rural areas (34 percent) as well as across the 33 provinces (30 to 80 percent). At the current pace of progress, Indonesia is unlikely to reach the MDG target of 63 percent. Open defecation is still practiced by about 60 million Indonesians, the second highest number of people worldwide, with the share of urban open defecation increasing due to migration of poor rural people into urban slums. Only 2 percent of urban areas in the country as a whole have sewerage coverage, and the collection, transport and disposal of septage from septic tanks is seriously inadequate, causing health risks and widespread pollution of water resources.

Phase I of the ESI study estimated the overall economic costs of poor sanitation in Indonesia to be US$6.3 billion (IDR56 trillion) per year at 2005 prices, equivalent to 2.3 percent of gross domestic product (GDP).[iii]

Economic analysis measures the broader **welfare** benefits of products and services on populations, such as value of life, time use, environmental and social benefits, as opposed to **financial analysis**, which measures the financial gains only (e.g., changes in income or cash situation).

Key messages

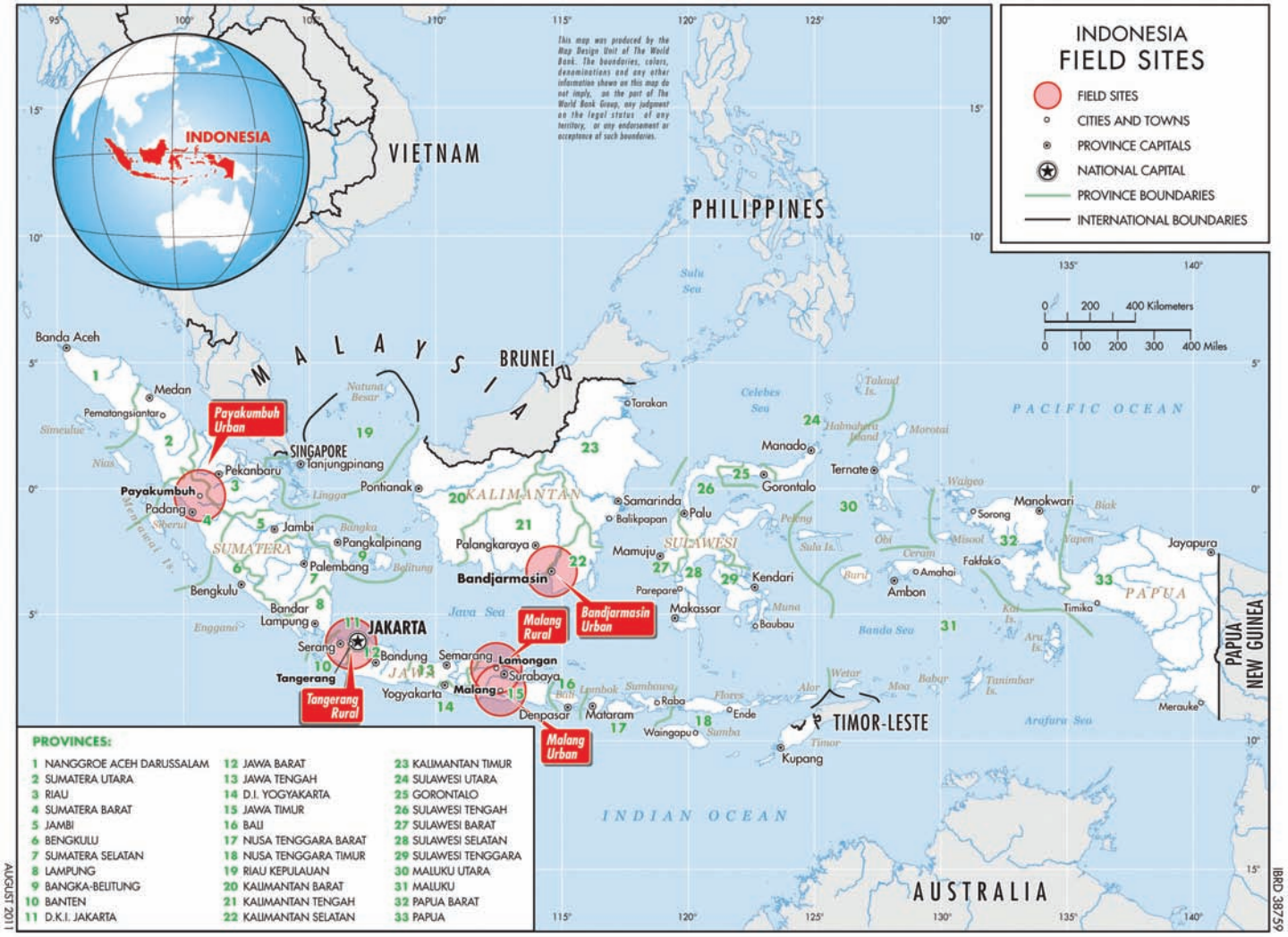
- **Improved sanitation has been proven in the study to be a socially profitable investment in Indonesia**. In rural areas the economic benefits of pit latrines exceed costs by at least seven times, and in urban areas the economic benefits of improved wastewater management exceed the costs by almost two times. Net benefits from low-cost sanitation options are high, offering an affordable option to poor households.

- **Better "packaging" of and access to information on costs and benefits of sanitation options is key to rapidly increasing uptake in Indonesia.** Decision makers—both households and government—need to be further sensitized to the health, economic and social benefits associated with improved sanitation, and the available choice of latrine designs, models, and sanitary options.

- **Sanitation options that protect the environment are more costly to provide,** but while the environmental benefits are difficult to quantify in economic terms, they are essential to national economic development, and the **benefits are highly valued by households, tourists, and businesses.**

wsp water and sanitation program

Figure 1. ESI Field Sites in Indonesia



STUDY AIMS AND METHODS

The purpose of Phase II of the ESI study is to provide sanitation decision makers with improved evidence on the costs and benefits of alternative sanitation options in different contexts in Indonesia. The study focuses on human excreta management, and includes data from five selected field sites in addition to national surveys.

Surveys were conducted in two rural and three urban sites that have recently been the focus of sanitation programs or projects (see Figure 1), involving 1,500 household questionnaires, focus group discussions, physical investigations, water quality assessments, market surveys and health facility surveys conducted in each site. Primary data were supplemented with data from other national and local surveys.

Sanitation interventions evaluated varied by rural and urban location, comparing open defecation with the range of sanitation facilities currently used by the Indonesian population: shared and public latrines, dry pit latrines, wet pit latrines (pour-flush), toilets with septic tank including septage management, and toilets with sewerage connection and decentralized treatment.

Conventional techniques of economic analysis were utilized to generate outputs such as benefit-cost ratio, cost-effectiveness ratio, net present value, internal rate of the return, and payback period of sanitation options.

Economic benefits quantified include impacts on health, drinking water and sanitation access time. Environmental and

social impacts of poor sanitation were not fully captured in the monetary estimates of benefits. Qualitative analyses were conducted on selected social and broader economic benefits.

Full investment and recurrent costs were measured for each sanitation option.

STUDY RESULTS

Rural Areas: Substantial Economic Returns on Pit Latrines

Benefit-cost ratios (economic return per dollar invested) and annualized costs per household were compiled for the two rural sites in Figure 2 and Figure 3. Among the various sanitation options, the most favorable economic performance was for dry and wet pit latrines, both with benefit-cost ratios greater than 7.0. The annual economic rate of return was more than 100 percent, requiring less than one year to recover the economic value of the initial investment costs.

Due to higher investment and operational costs per household, community toilets[iv] did not perform as well in rural areas as private pit latrines, with a benefit-cost ratio of 3.0 for public toilets and 4.6 for shared toilets due to the time taken to access them. Septic tanks with wastewater management (WWM) have a benefit cost ratio of 3.8. Septic tanks without WWM had lower costs but also less health benefits, and therefore have the same benefit-cost ratio. However, this does not fully value the environmental benefits of WWM.

The major contributor to economic benefits is health care cost savings. These savings—which are largely financial savings to households—are expected to pay back the investment more than two times over for public toilets, rising to almost four times for private dry pit latrines. The second most important contributor for private latrines is access time savings. Furthermore, productivity savings are an important benefit for all options analyzed.

The findings suggest that simple technologies, particularly improved pit latrines, are the most economic, yielding considerable benefits with a low unit cost of around US$30 per household per year (includes investment and operation and maintenance costs). Septic tanks are significantly more expensive at US$70 per year, despite their longer assumed lifespan. Public toilets are also relatively expensive, at an investment cost of US$400 per household, or US$50 per year per household.

Figure 2. Benefit-Cost Ratios in Rural Sites (economic return per unit of currency spent)

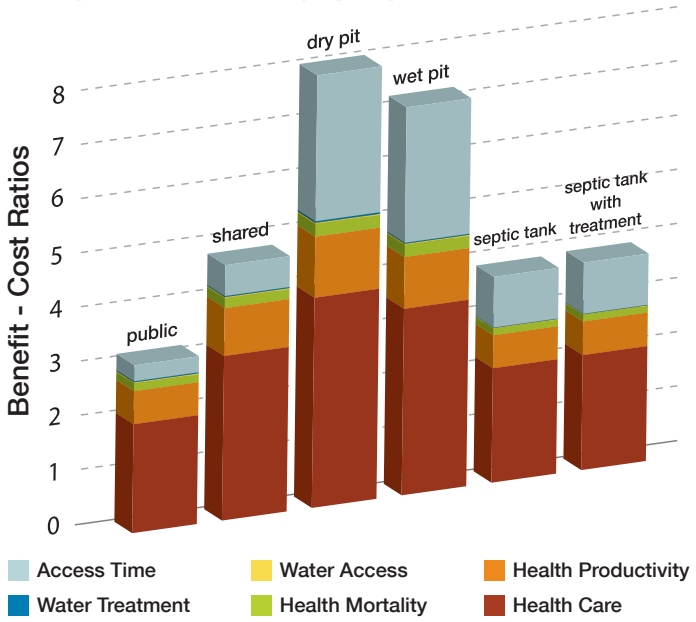
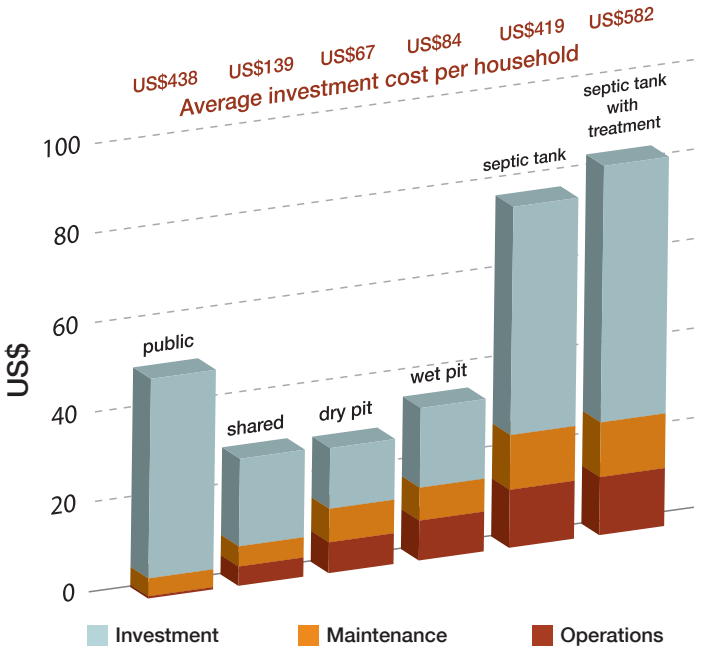


Figure 3. Annual Costs per Household in Rural Sites (2009 prices, using average exchange rate with US$)



Under actual program conditions, there is a decline in performance for all sanitation options. This is due to non-use by some households or household members of the facilities. For

example, the benefit-cost ratio of dry pit latrines declines from an economic return per currency unit spent of 7.9 to 6.3 and for wet pit latrines it declines from 7.1 to 5.6.

Urban Areas: Off-Site Treatment Options Deliver High Economic Returns

Benefit-cost ratios and annualized costs per household were compiled for the three urban sites in Figure 4 and Figure 5. While technology prices are not very different to rural areas, the benefit-cost ratios are less favorable than rural sites due to better baseline health statistics and less access time in urban sites. The most favorable economic performance was found for wet pit latrines, with a benefit-cost ratio of 3.2. The annual return was more than 100 percent, requiring less than one year to recover the economic value of the initial investment cost. All other sanitation options have benefit-cost ratios of more than one—shared toilets 2.3, septic tanks 1.9, sewerage with treatment 1.7 and public toilets 1.4—thus suggesting favorable economic performance and justifying investment.

However, pit latrines are not a technically feasible sanitation option in many of Indonesia's densely-populated cities, nor its fast growing peri-urban areas, due to lack of space. While access to household toilets in urban areas is high—at over 70 percent according to the latest socio-economic survey in 2007 (SUSENAS)—the majority of urban households have septic tanks with limited or no septage management. Hence safe septage management is badly needed in Indonesia. The decentralized wastewater treatment system was found to have benefit-cost ratio of 1.7, and cost under US$100 per household per year (including investment costs converted to annual equivalent values as well as operations and maintenance). Septic tanks with collection and treatment cost less, at under US$70 per household per year. However, the environmental benefits of septage management and wastewater treatment were not fully reflected in this study. Hence, the real economic performance of sanitation options that treat waste before disposal or release to the environment will be better than the figures suggest.

On an annualized cost basis (including both investment and recurrent costs), community and shared toilets cost less than private options. Yet, due to less time savings, their overall economic performance is less favorable than wet pit latrines.

Figure 4. Benefit-Cost Ratios in Urban Sites (economic return per unit of currency spent)

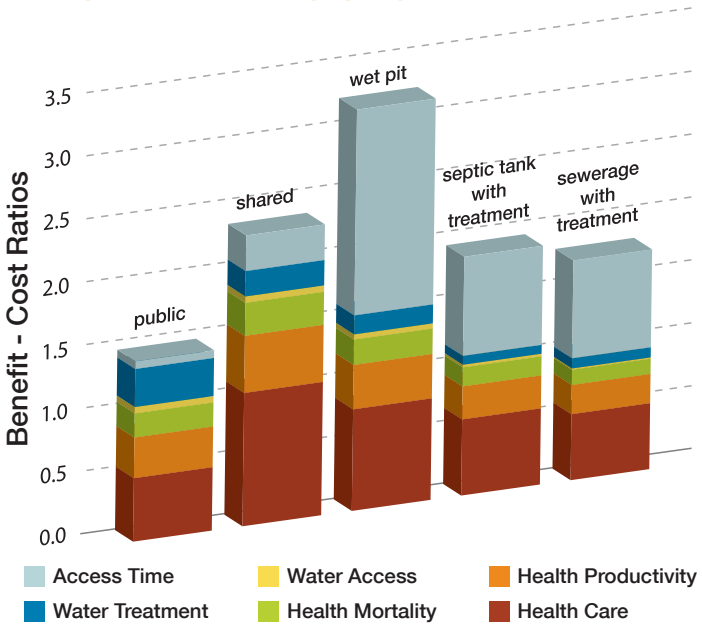
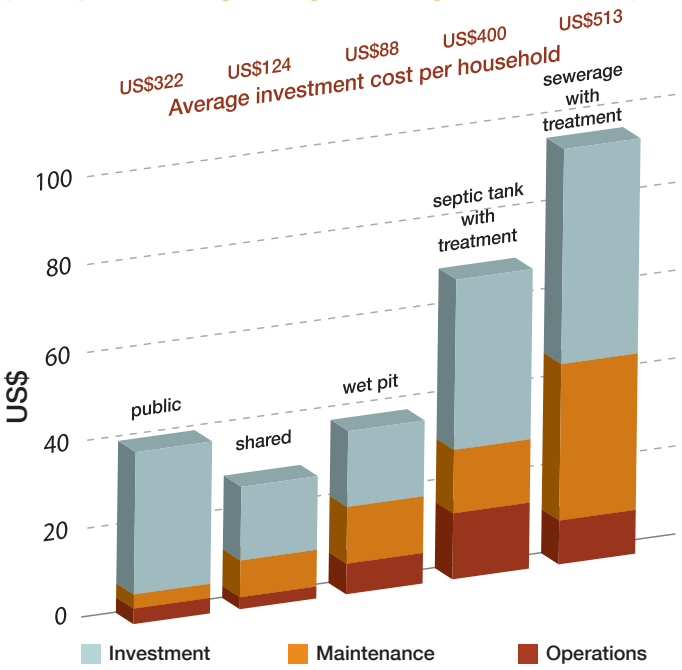


Figure 5. Annual Costs per Household in Urban Sites (2009 prices, using average exchange rate with US$)



Private options are also preferred by households in terms of privacy, security, convenience, and hygienic condition.

Under actual program conditions, the economic performance of all urban sanitation options is lower. The benefit-cost ratio of sewerage declines from 1.7 to 1.1, septic tanks with collection and treatment reduces from 1.9 to 1.4 and wet pit

latrine from 3.2 to 2.4. The benefit-cost ratio of public toilets was reduced to 0.85, i.e., below unity where costs exceed benefits. This is due not only to non-use by some households or household members of the facilities, but also off-site treatment facilities being utilized at well below their engineered capacity. This finding further emphasizes how important it is for an effective service delivery to focus on permanently changing behavior to ensure a sustained use of the sanitation facilities, that demand assessments are undertaken and that the facilities can be adapted if circumstances change (e.g., piped water becomes available in the neighborhood). For community-level facilities, it also emphasizes the importance of designing appropriate size/volume of the collection and treatment facilities to ensure there is no significant overcapacity in the long run.

Sanitation Links to Tourism and Economic Development

The key results of a tourism survey of 254 holiday and business visitors are reported in Box 1.

A separate business survey was also conducted with ten firms mostly operating around Jakarta and Bandung, including four restaurants, two hotels, two garment producers, one food producer and one convention center. The business interviewees consider clean air and environment as the most important factors for companies in locating their businesses, especially food processing and restaurants. They were concerned about the quality of the environment, especially low river water quality, poor drainage, poor management of industrial solid waste, lack of toilets in public places, and poor air quality from solid waste.

KEY FINDINGS AND RECOMMENDATIONS

This study finds that all sanitation interventions have benefits that exceed costs, when compared with "no sanitation facility." The high net benefits from low-cost sanitation options, such as pit latrines, suggests these technologies should be centerpiece to increasing access for rural households. However, in densely populated areas, pit latrines have limited feasibility, and to improve quality of life in increasingly populous cities, decision makers need to take into account the economic benefits from improved conveyance and treatment options. If funding is available, populations prefer options that transport waste off-site. Appropriate treatment and/or isolation of waste is key to the future sustainable development of Indonesia. Based on these findings, three key recommendations for decision makers are proposed here:

1. Intensify efforts to improve access for the entire Indonesian population to improved basic sanitation. Indonesia approved a sound community-based sanitation strategy in 2008 that needs to be implemented, and enough evidence is available to show that establishing a viable sanitation market—where demand by all income levels meets affordable and good quality supply—is feasible. For policy makers and local governments, this requires special attention to ensure demand is triggered, health benefits are captured, and coverage is sustained (i.e., avoiding re-

BOX 1. KEY RESULTS OF TOURISM SURVEY

General sanitation conditions in Indonesia are perceived to be very poor, scoring 2.5 out of maximum of 5.0. Open water such as rivers and beaches score the lowest at 2.3, with raw sewerage leaking into these.

The perception of toilet quality varied by location, scoring from 2.0 (in bus stations and city centers), to 3.0 (airports, restaurants) to 3.5 (hotels).

When asked about the most serious hygienic concerns, interviewees responded that food hygiene, availability of drinking water, and use of sanitary toilets are top concerns.

Close to one-third of the respondents (31 percent) said they had gastro-intestinal problems during their stay, incapacitating the tourist for an average of two days. The amount they could have spent during those days of illness represents foregone earnings for the tourism industry.

Despite many negative comments about environmental sanitation in Indonesia, 85 percent of visitors expressed an intention to return to the country and 74 percent said they would recommend the country as a tourist destination to friends. Of those reluctant to return, 40 percent of respondents listed sanitation as the main reason.

turning to open defecation). Sanitation providers, from wholesalers to community-based masons, need to improve on affordable, upgradable latrine structures and design to ensure widespread uptake. Information on sanitation options and models for households everywhere in Indonesia is another key element for rapidly accelerating and sustaining coverage.

2. Go beyond basic sanitation provision, where the population demands it and the funding is available. In densely populated urban areas, only basic sanitation provision is no longer feasible due to the higher expectations of populations, space constraints and risks of groundwater pollution. Decision makers should therefore be aware of the full range of conveyance and treatment options, and their related costs and benefits, in order to avoid investing in expensive technologies that are difficult and costly to sustain. In municipalities where funding is sufficient to permit more sustained and quality services, these will better capture the full environmental and health benefits and respond to the population's wish for a clean, livable environment.

3. Promote evidence-based sanitation decision-making. Variations in economic performance of options suggests that careful consideration of site conditions and local demand and preferences is needed to select the most appropriate sanitation option and delivery approach. Decisions should take into account not only the measurable economic costs and benefits, but also other key factors for a decision, including intangible impacts and socio-cultural issues that influence demand and behavior change, availability of suppliers and private financing, and actual household willingness and ability to pay for services.

[i] Economic assessment of sanitation interventions in Indonesia. Winara, A., Oktarinda, PE., Hadiwardoyo, K., Merdykasari, I., Nurmadi, T., Bruinsma, B., Gunawan, D., Fadilah, D., Albrecht, M., Hutton, G. World Bank, Water and Sanitation Program. 2011.

[ii] WHO-Unicef Joint Monitoring Programme in Indonesia. 2010. *Progress on Sanitation and Drinking Water: 2010 Update.*

[iii] Economic impacts of sanitation in Indonesia. Napitupulu, L., Hutton, G. World Bank, Water and Sanitation Program. 2008. Available for download at www.wsp.org.

[iv] Community toilets are termed SANIMAS—Sanitasi Berbasis Masyarakat—translating as Community-based Sanitation. While a range of technologies are on offer for SANIMAS projects, the one at Tangerang involved a public building with four latrines, underground piping, a sludge treatment unit using Decentralized Wastewater Treatment System (DEWATS), an effluent pipe and a bio-digester.

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About us

The Water and Sanitation Program (WSP) is a multi-donor partnership created in 1978 and administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. WSP provides technical assistance, facilitates knowledge exchange, and promotes evidence-based advancements in sector dialogue. WSP has offices in 24 countries across Africa, East Asia and the Pacific, Latin America and the Caribbean, South Asia, and in Washington, DC. WSP's donors include Australia, Austria, Canada, Denmark, Finland, France, the Bill and Melinda Gates Foundation, Ireland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States, and the World Bank.

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