

# **Flood risk management for industrial estates in lower Chao Phraya river basin**

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## **Abstract**

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### **Objective/Research Questions**

This paper intends to address the following research questions:

1. How did 2011 flood affect factories in IEs and how did they deal with the flood (before, during, after)?
2. What are proper flood management policies with respect to IEs? These policies might include (a) flood Management of surrounding areas (b) production risk management (b) distribution and logistics risk management (c) financial risk management.

### **Methodology**

- Factories Survey
- In-depth interviews with IE managements.
- Regression analysis (planned to do when more than 40 questionnaires are returned)
- Macroeconomic analysis, using both surveyed data and additional macro variables.

### **Findings**

Following findings are derived from initial tabulation of returned questionnaires (36 so far), and in-depth interview of 5 IE management.

#### **Affects from 2011 Floods**

- The level of damage and damage ratio (damage value as % of total assets) were larger when factories did not get proper warning, and thus did not prepare well. This observation applies well to big factories.

#### **Physical Adaptation to Future Flood Risks**

- Most IEs inundated during 2011 major flood invested significantly in flood prevention, to the point where the flood risks that would cause damages/losses at 2011 scale is perceived to be quite low. The preparation seems to be comprehensive: building wall at least 0.5 meter above the maximum level of 2011 flood (many IEs indeed built up to 0.8 meter higher), building of 'stop logs' that can be put in place quickly for complete prevention of water leaking into IEs. In addition, central and local governments invested in lifting road surface around most IEs, also to be higher than 2011 flood level, and that logistic will be not affected. All these mean, should major flood like 2011 occur again, production can continue, as well as distribution of goods and communication of workers and staffs.

### **On location choice**

- Most factories' choice of current location was due to road connectivity and utility consideration, followed by tax privilege. Proximity to port and airports were not as important. However, since many firms in studied IEs need to export (and import), not choosing areas closer to airports (in Bangkok) and ports (in East and Bangkok) may imply cheap land cost at the time of factory establishments.
- From in-depth interviews, the choice of future location (if any factories decide to move or find location for new plants) will be decided largely the same (road/logistics) and will not be much influence by flood risks. Together with perceived well preparation mentioned above, there was no major relocation away from the 7 inundated IEs. Most factories that moved out were small and 'knock-down' factories that could be easily relocated. Only one major relocation was a Toshiba factory in Bang Kradi IE, but was a result of pressure from Japanese shareholders in Tokyo demanding some location diversification as an adaptation, while all other Toshiba factories remain at Bang Kradi IE.

### **On Financial Management (Flood Insurance)**

- Before 2011 flood, about half of factories returning questionnaires did not buy insurance that covered flood damage. Those that bought flood insurance were mainly large factories (in term of total asset).
- After 2011 flood, some factories found difficulty in continuing buying flood insurance, due to refusal from the insurance companies.

### **On Warning System**

- Almost all of IE firms interviewed did not appreciate the warning system put in place during 2011 flood.
- The low level of trust persists to present days, where most IEs decide to spend their own resources into some level of self-warning system.

### **Policy Recommendation**

- There is no need, and perhaps impossible, for government to influence the relocation of factories outside the Lower Chao Phraya River Basin by means of avoiding future flood damage. What was done seem to be sufficient. The choice of location will continue to be determined by other factors (road, logistics and perhaps train).
- On important policy consideration is the need to improve warning system. This recommendation will be partially drawn from the study on institutional arrangement (also in this IDRI project), as effective warning system needs proper coordination of different level of organization structure.
- There should be proper long-term plan on flood insurance. The refusal of insurance companies could have caused further large damage if 2012-13 also suffered from big flood. There should be more concrete 'contractual arrangement' that take into account the more scientifically proved evidences of flood risk right after the occurrence of major floods.