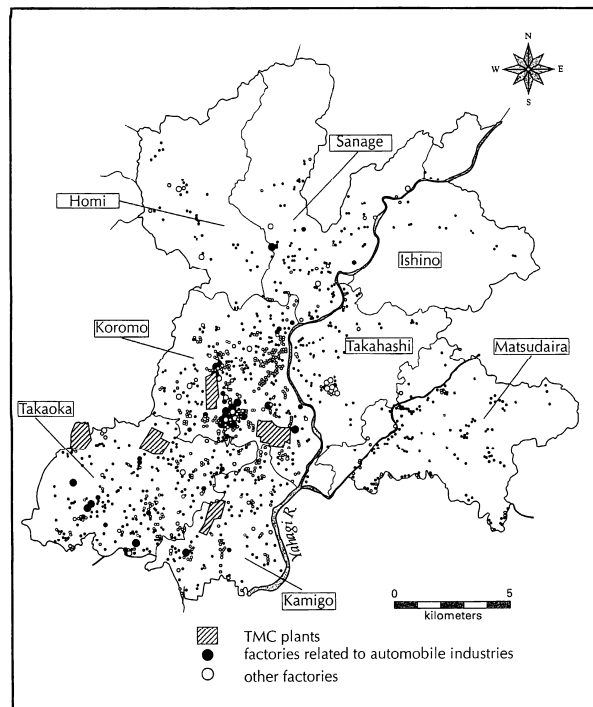


## EEW for Tokai industrial region - application to the manufacturing industry and these effects

Yuichiro Nishimura<sup>1/2</sup>, Mikio Komatsu<sup>2</sup>, Hiromitsu Ochiai<sup>3</sup>, Kazuaki Masaki<sup>1/2</sup>

1. Disaster Prevention Research Center, Aichi Institute of Technology, Toyota 470-0392, Japan
2. Ai System Service Co., Ltd., Toyota 470-0392, Japan
3. Falcon Co., Ltd., Nagoya 460-0008, Japan

Tokai region (Aichi, Mie, Gifu and Shizuoka Pref.) has the large industrial complex and is characterized by automobile industrial cluster. The huge automobile companies such as Toyota, Honda, Suzuki have very great influence on the region by their production systems. The automobile production system is consisted by large number of parts suppliers. And there is an efficient method to control parts production and delivery called Just-in-Time (JIT) system originally introduced by Toyota. This system brought spatial agglomeration of subcontractors in this region (Figure 1), and it is characterized as a unique than



other automobile manufacturer in Japan (Mair, 1992)

Fig.1 factories in Toyota city in 1982  
(Nishimura and Okamoto 2001)

The region also has high possibility of big earthquakes like next Tokai and Tonankai earthquakes (magnitude 8 to 8.2, and the possibility is 60-70% in the next 30 years (The headquarters for earthquake research promotion, 2008)) and the companies located in the region have great fear that these earthquakes will damage the industrial complex in the region.

Recently, the automobile manufacturer and parts supplier take the anti-earthquake measure as a part of Business Continuing Planning (BCP). Most of the decision-maker of these companies think that no injury of the factory workers and low damage of facility and equipment from the huge earthquake is the key element for the business continuity of the region. The EEW is now introduced

to such companies, for the business continuing purpose.

The application of EEW faces some problems as below.

(1) Accuracy of estimated intensity and arriving time in Tokai region

Some company uses EEW information for the emergency stop of raw material like the explosives and combustibles. The low accuracy of estimated intensity will lead the use of misinformation and the risk for the waste of work-in-progress.

Using EEW to Tonankai earthquake in Tokai region will occur the underestimation of intensity. It will be the deep damage especially who work at the dangerous section.

EEW need estimation time about (ave.) 4-5 seconds and the announcement of EEW the arrival of the main tremors is very short especially for the company near the hypocenter of next Tokai earthquake and Tonankai earthquake.

(2) Cost-efficiency and sharing information among vertical supply chain

The final assembler is now introducing expensive, high-spec EEW system (like using satellite communication). Most of 1st or 2nd tier suppliers cannot introduce such expensive system for the reason of the cost, and use another systems using Internet. Much of 3rd or 4th suppliers use the system for home use (low accuracy) or cannot use any systems.

From the aspect of BCP, unless the entire suppliers use such system, the total production system has the high vulnerability for the earthquakes. The cost-efficiency and the development the new methods for sharing EEW information by all the supply chain will be the effective for the earthquake disaster prevention for the entire industrial sector.