TOSHIBA
Technical Review

Toshiba Electronic Devices & Storage Corporation's Disaster Countermeasures
– Continuous Improvement Activities Leveraging Past Experience of Earthquakes –

1. Objectives

This paper aims to underline the importance of highly effective Business Continuity Planning (BCP) in the semiconductor industry and to help companies to strengthen their preparedness and response capabilities for disasters they may face. Companies in the industry, such as Renesas Semiconductor Manufacturing Co., Ltd. and Sony Semiconductor Manufacturing Corporation, have experienced significant disasters and have shared lessons learned in various ways: Renesas Semiconductor Manufacturing Co., Ltd. suffered major damage in the Great East Japan Earthquake, and by disclosing its recovery process and BCP improvements it contributed to the industry's collective knowledge[(1)]; Sony Semiconductor Manufacturing Corp. implemented measures for rapid recovery and business continuity during the Kumamoto Earthquake, and shared its experience with other companies[(2)].

Toshiba Electronic Devices & Storage Corporation ("Toshiba") also learned much from these companies, and by resolutely facing the challenges and reflecting on the outcomes of our own experiences of disaster, and by implementing appropriate measures, we have worked to strengthen our post-disaster recovery capabilities. By sharing these experiences and insights, we hope that the semiconductor industry will acquire more effective business continuity capabilities, ensuring the stability of its entire supply chain in readiness for major earthquakes, and ultimately enhance the resilience of social infrastructure as a whole.

2. Characteristics of the Semiconductor Supply Chain Requiring Business Continuity

Semiconductors are essential components in many industries, and disruptions to their supply have widespread impacts. The Great East Japan Earthquake of 2011 damaged semiconductor factories, which affected electronics manufacturers worldwide. The semiconductor shortage around 2021, which led to production halts and cutbacks in the automotive industry, is still fresh in memory. If electricity, gas and water are the "lifelines of daily life," semiconductors can be called the "lifeline of industry." In the immediate aftermath of a disaster, in effort for a swift transition from ensuring public safety to the early restoration of daily life, the semiconductor industry must promptly resume production activities and maintain product supply volumes and service levels required by stakeholders. Delays in business recovery can result in loss of customer trust and decreased competitiveness, posing significant risks to business continuity for individual companies.

On top of this, the semiconductor supply chain is extensive and closely interconnected from upstream to downstream, requiring not only individual companies to take measures but also close collaboration with stakeholders across the supply chain. During disasters, it is particularly important to establish an environment for cross-industry cooperation that minimizes confusion, facilitates mutual aid and advances early recovery through rapid gathering and appropriate sharing of information.

3. Toshiba's Disaster Response Experiences

3.1 The Great East Japan Earthquake

3.1.1 Damage Situation

The Great East Japan Earthquake of March 11, 2011 was a massive event. It had a magnitude of 9.0 and a seismic intensity of 7, the largest in Japanese history. It also caused the largest tsunami ever recorded in Japan, with a maximum run-up height of 40.5 meters at Miyako City, Iwate Prefecture. There was a great loss of life, and extensive damage to homes and lifelines (electricity, gas, water, sewage, communications, etc.). Iwate Toshiba Electronics Co., Ltd., one of our group companies (now Japan Semiconductor Corporation's Iwate Plant, Kitakami City, Iwate Prefecture), experienced a seismic intensity of lower 6 (maximum on-site acceleration: 827 Gal) that damaged the building: it displaced steel roof frames, broke local exhaust ducts connected to hazardous material treatment equipment, and collapsed system ceilings and walls. Severe damage was done to manufacturing equipment, including breakage of quartz components used in heat treatment equipment, damage to the positioning unit of precision exposure equipment, and breakage of insulators in ion implantation equipment (see **Figure 1**). The scale forced us to abandon restoration of the plant's old small-diameter wafer production line and to focus on restoring the relatively newer production line. Fortunately, all employees quickly took safety measures, resulting in no injuries. After two days of power outage and industrial water suspension, restoration work began 2.5 days after the earthquake.

3.1.2 Period Required for Recovery

Power was restored two days after the outage, and infrastructure restoration began for wastewater treatment, steam, air conditioning, and gas supply, all handled sequentially. The damage to the local exhaust ducts was particularly severe, and their repair and inspection took a great deal of time. The same was true for the repair, adjustment and confirmation of soundness of manufacturing equipment. In all, it took 80 days to return to pre-disaster operating rates, causing significant inconvenience and concern to many stakeholders.

3.1.3 Issues and Countermeasures

Our facility in Taishi Town, Hyogo Prefecture (now Himeji Semiconductor Plant), was affected by the 1995 Great Hanshin-Awaji Earthquake. Fortunately, it escaped major damage and quickly restored its production line. However, this experience led to "normalcy bias," the psychological tendency to underestimate the risk of disasters; until the Great East Japan Earthquake, our awareness of earthquake disaster risks was insufficient. BCP activities were limited to evacuation drills and seismic anchoring of manufacturing equipment and product shelves. This led to significant damage to buildings, infrastructure, and manufacturing equipment during the Great East Japan Earthquake that prompted a major rethink.

Following the rude awakening of 2011, we heightened our awareness of internal crisis management and, in cooperation with experts in electricity and gas supply and machinery, significantly revised our guidelines for responding to large-scale disasters. In addition to the

(a) Ceiling Collapse (b) Wall Collapse (c) Damage to Local Exhaust Duct

Figure 1. Examples of Damage

regulations in place before the Great East Japan Earthquake, we incorporated more specific methods and strengthened mitigation measures in preparation for major earthquakes. Local exhaust ducts sustained significant damage, with frequent failures observed at stress concentration zones induced by steel beam displacement. We established technical guidelines for structure-specific support reinforcement and duct branching configurations.

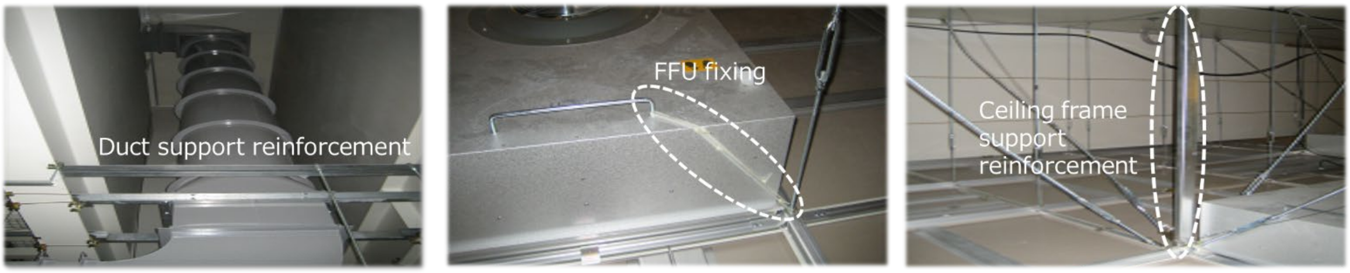
The collapse of system ceilings and the fall of fan filter units (FFUs) in clean rooms posed a risk of obstructing evacuation routes for workers, so we reinforced frame supports in ceiling chambers (by changing the steel frame supports and increasing the number used) and optimized FFU fixing methods (see **Figure 2**). For manufacturing equipment, although conventional seismic anchoring minimized equipment displacement, many components, such as quartz component used in heat treatment equipment were damaged, so we installed seismic isolation platforms to absorb earthquake vibrations and minimize impacts on equipment. Space constraints around equipment make it difficult to install these platforms on all equipment, but we are responding as much as we can. The precision control units of exposure equipment can suffer severe damage from shaking while in operation, so we built a system to quickly detect P-waves (initial tremors) and bring the equipment to a stable stop before the arrival of S-waves (main tremors; see **Figure 3**). This system also supports emergency shutoff of hazardous gases, making it much faster than before and reducing risk of gas leaks.

These efforts have taken us a major step forward in reducing the probability of severe damage during large earthquakes, and our disaster response capabilities are now stronger than prior to the Great East Japan Earthquake.

3.2 Oita Earthquake (Hyuganada Earthquake)

3.2.1 Damage Situation

The Hyuganada Earthquake occurred on January 22, 2022, about 11 years after the Great East Japan Earthquake. It had a magnitude of 6.6 and a maximum seismic intensity of upper 5. Our group company, Japan Semiconductor Oita Plant in Oita City, Oita Prefecture, observed a seismic intensity of upper 5 (maximum on-site acceleration: 304 Gal), and manufacturing



(a) Duct Support Reinforcement (b) FFU fixing (c) Ceiling Frame Support Reinforcement

Figure 2. Earthquake Countermeasures

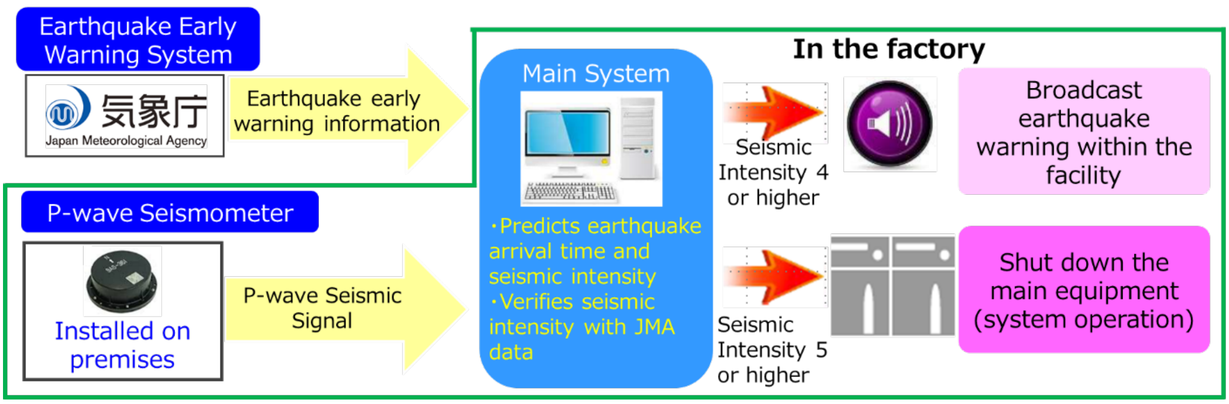


Figure 3. Equipment Safety Shutdown System

equipment was damaged. Preemptive measures derived from the experience of the Great East Japan Earthquake functioned effectively, resulting in no significant damage to buildings or infrastructure. Measures to secure local exhaust ducts, such as support reinforcement and branching methods, were successful, enabling rapid recovery. However, in heat treatment equipment where seismic isolation platforms had not yet been installed, quartz components and other parts suffered significant damage (see **Figure 4**), leading to delays in product shipments.

3.2.2 Period Required for Recovery

As already indicated, infrastructure facilities escaped significant damage and were restored within a day of the disaster. Most manufacturing equipment was restored in about two weeks, but it took 36 days to return to pre-disaster operating rates, due to the time required to procure replacement parts for severely damaged components such as quartz (see **Figure 5**).

3.2.3 Lessons from Experience

The impact on buildings and infrastructure was limited to minor damage to industrial water and cooling water pipes and a few local exhaust ducts, thanks to the effective preemptive measures. There was nothing severe enough to significantly hinder the start of restoration activities.

We attribute this to the effective functioning of the large-scale disaster response guidelines that were fundamentally revised after the Great East Japan Earthquake. The revisions included securing pipes and ducts, reinforcing supports, optimizing branching methods, strengthening system ceilings, and implementing measures to prevent mechanical damage to individual equipment.

For manufacturing equipment, although there was some misalignment in exposure and ion implantation equipment, the strengthening of seismic anchoring and the effectiveness of the equipment safety shutdown system linked to earthquake early warnings prevented major damage. However, quartz components and other parts of heat treatment equipment without seismic isolation platforms were severely damaged, as in the Great East Japan Earthquake, which significantly hindered recovery measures. This reconfirmed the bottleneck in recovering semiconductor manufacturing and the effectiveness of seismic isolation platforms, prompting accelerated measures to install required isolation equipment.

3.2.4 Further Issues and Countermeasures

The main issue that emerged following the earthquake was the insufficiency of measures to handle breakage of quartz components in heat treatment equipment, as in the Great East Japan Earthquake. Space constraints around some equipment made it difficult to install seismic isolation platforms, clarifying the need to further expand BCP inventory (spare parts inventory)

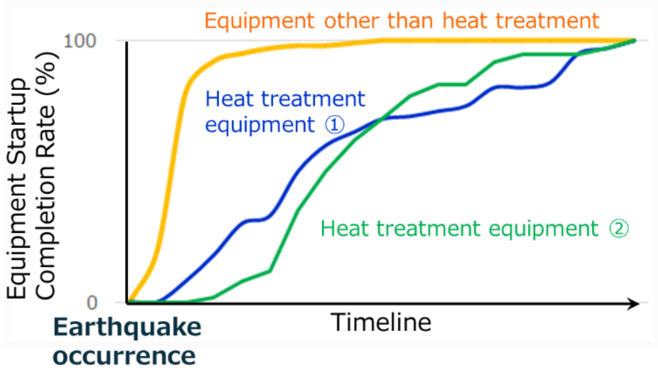


Figure 5. Timeline for Restoration of Manufacturing Equipment

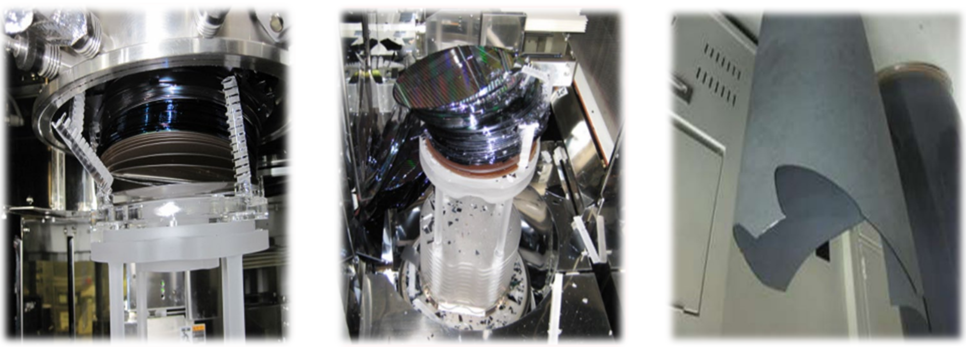


Figure 4. Damage to Quartz Components and Others

for components such as quartz, on the assumption that they would break. Although many parts were supplied from unaffected production sites, significant time was spent verifying detailed specifications and management numbers for each part, highlighting the importance of this issue.

This experience led us to decide to secure sufficient BCP inventory for similar equipment at all production sites, and we are prioritizing procurement from the perspective of overall optimization. To facilitate smoother inter-site parts supply, we built a database for centralized management of detailed specifications and management numbers and real-time visualization of inventory status at each production site. This has also greatly contributed to the efficiency of parts management at normal times.

We are also aware that there were delays in disseminating information to stakeholders, due to deficiencies in the operation and coordination of the disaster response headquarters that slowed information collection and sharing. It became a major point of reflection. We addressed this by reviewing the disaster response headquarters' timeline, strengthening internal coordination, resetting target times for information collection and dissemination, and are now conducting training to prepare for the next disaster.

Since the scale of the Hyuganada Earthquake was limited, its impact on the supply chain outside Toshiba was minor compared to the Great East Japan Earthquake, making the delay in our recovery more prominent and requiring even faster recovery. Having said that, the limited scale of damage created an environment where support activities from other companies, including customers, functioned effectively, and we received support from multiple companies that speeded up recovery work. Smooth acceptance of support during recovery work is also an important issue and, conversely, we felt the need to strengthen our ability to and system for supporting other companies, and so contributing to the early recovery of the entire supply chain.

3.3 Noto Peninsula Earthquake

3.3.1 Damage Situation

The Noto Peninsula Earthquake occurred on January 1, 2024, just two years after the Hyuganada Earthquake. It had a magnitude of 7.6 and a maximum seismic intensity of 7. There was widespread loss of life, and extensive damage to homes and to infrastructure for electricity, gas, water supply and sewage systems (including water outages) and communications, severely impacting the local community.

At our group company, Kaga Toshiba Electronics Corporation in Nomi City, Ishikawa Prefecture, a seismic intensity of upper 5 (maximum on-site acceleration: 341 Gal) was observed. Although there were no power or water outages, the amplitude and duration of the shaking were greater than in the Hyuganada Earthquake two years earlier, resulting in widespread damage to local exhaust ducts (see **Figure 6**). As in past earthquakes, there was damage to quartz components and other parts of heat treatment equipment in environments where it is difficult to install seismic isolation platforms.

3.3.2 Period Required for Recovery

It took 21 days to repair the earthquake damage to local exhaust ducts. Due to the need to repair, adjust and confirm the soundness of manufacturing equipment, and to procure damaged quartz components for heat treatment equipment, it took 35 days to recover pre-disaster operating rates.

Figure 6. Duct Damage (Cracks, Breaks)

3.3.3 Lessons from Experience

In the Noto Peninsula Earthquake, most damage to local exhaust ducts was limited to cracks and breaks, and there were only a few cases of large-scale damage like that in the Great East Japan Earthquake. This is attributed to revised large-scale disaster response guidelines implemented after the Great East Japan Earthquake, which minimized damage and enabled early recovery. In addition, facility engineers with experience of responding to earthquakes were quickly dispatched by contractors and business partners, as well as from our own unaffected production sites, to support damage assessment and to plan repairs and safety measures. All of this contributed to a shorter recovery period. As in past earthquakes, quartz components of heat treatment equipment without seismic isolation platforms were damaged, but the stockpiling of BCP inventory and the centralized management system for detailed specifications and parts management numbers between production sites, as well as significant support from other companies and equipment manufacturers, greatly shortened the time required to secure necessary parts.

In addition, delays in providing stakeholders with information on damage status and recovery plans, an issue in the Hyuganada Earthquake, were shortened by enhancing the operation and information sharing system of the disaster response headquarters, bringing it closer to the target time.

3.3.4 Further Issues and Countermeasures

When a major earthquake occurs at a semiconductor production site, damage to local exhaust ducts is unavoidable, but in this earthquake, preemptive measures based on the large-scale disaster response guidelines limited large-scale damage to a few cases and shortened the recovery time. However, the earthquake occurred on New Year’s Day during a long holiday, and it was difficult to secure workers to repair infrastructure such as ducts. This, plus multiple other factors, such as cramped work environments, a lack of scaffolding and lighting, all overlapped (see **Figure 7**), resulting in time-consuming preparations for temporary construction. In the end, it took 21 days to start equipment recovery work, which became the biggest bottleneck.

In response to this experience, we are working to establish a system for securing personnel during long holidays, preparing work environments in advance, and securing spare materials for duct repairs. In addition, following analysis of the damage to local exhaust ducts from the earthquake, we are considering more optimal reinforcement methods for branch and elbow sections to further reduce the risk of damage and shorten the recovery time.

Figure 7. Work Environments for Duct Repairs

4. Insights Gained from Disaster Experience

4.1 The Importance of Process Management (Visualize Bottlenecks and Take Proactive Measures Through Recovery Planning)

Semiconductor manufacturing plants operate numerous high-precision manufacturing devices that deliver the extremely fine control needed to produce semiconductor products. These devices are directly affected by the physical forces unleashed by earthquakes and other disasters. While physical damage can be mitigated through preemptive measures, large-scale earthquakes with a seismic intensity of over 6 inevitably cause widespread damage.

As these devices operate in tightly integrated processes, the stoppage of even one piece of equipment can significantly impact the entire production line. With earthquake damage, it is essential to quickly get a grasp of the overall damage and estimate the time required to resume production. However, even similar damage can require vastly different recovery times depending on the equipment, and it is crucial to visualize the recovery process and identify bottlenecks that hinder recovery.

Toshiba has drawn on experience of past disasters to establish a recovery process management method that considers damage to each piece of equipment caused by an earthquake. It includes recovery plans that cover required materials, personnel, coordination with external specialists and suppliers, specific recovery procedures, work sequences, and time estimates. By monitoring progress, we can clarify priorities and achieve faster and more effective recovery than ever before.

4.2 Factors Delaying Recovery and Countermeasures

4.2.1 Bottlenecks Identified Through Visualization of the Recovery Process (such as equipment, piping, and areas prone to damage)

In post-disaster recovery activities, errors in prioritizing tasks or allocating resources can significantly delay the entire recovery process. Failure to prioritize repairs to critical infrastructure or manufacturing equipment, or misallocating resources, can severely impact the timing of resumed production.

With this in mind, it is essential to constantly identify bottlenecks during the recovery process, pinpoint major obstacles or constraints, and efficiently allocate resources and personnel. For example, even if damage to critical manufacturing equipment is identified, recovery cannot proceed unless necessary piping repairs are completed. This requires securing skilled workers and scaffolding for high-altitude work. Visualizing the actual recovery process often reveals unexpected bottlenecks.

Additionally, bottlenecks may change as recovery

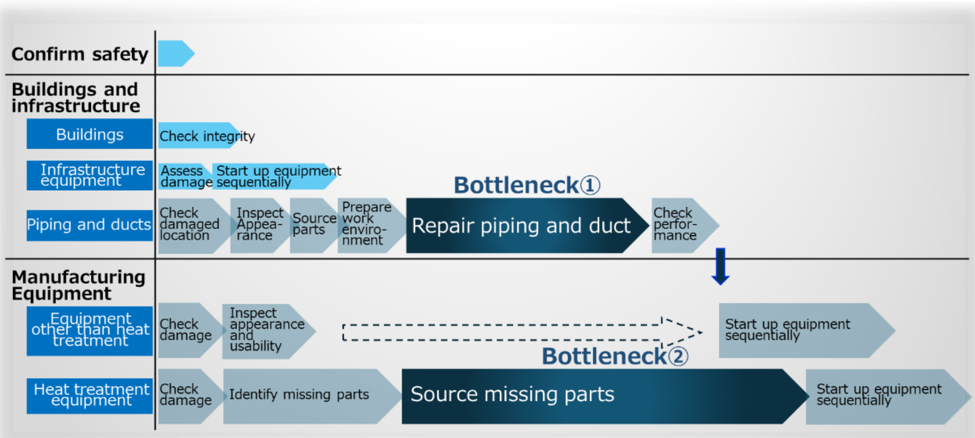


Figure 8. Bottlenecks Identified in the Course of the Recovery Process

progresses. Constant monitoring and appropriate analysis of recovery progress are linked to shortening recovery times (see **Figure 8**).

4.2.2 Examples of Bottleneck Countermeasures (Focusing on Faster Recovery Rather Than Preventing Damage)

Preemptively addressing bottlenecks identified through experience and regular training is a key factor in securing an early recovery. While priority must be given to seismic reinforcement and anchoring to prevent injury to people, it is also important to assume unexpected damage during disasters.

In other words, no matter how much seismic reinforcement is done, it is essential to prepare for damage and implement measures that facilitate easy repair. In our experience, damage to local exhaust ducts is unavoidable during major earthquakes at semiconductor production sites. This damage significantly hinders the recovery of manufacturing equipment, becoming a major bottleneck. We addressed this by taking measures that assume failure, such as designing the structure so that parts that are easy to repair will fail, or providing support and reinforcement so that the structure will fail in a way that makes it easy to repair. By taking these "damage-accepting countermeasures", we were able to accelerate the recovery process. Thus, not only "damage prevention" but also "preparedness for damage" is essential for rapid recovery from disasters.

5. Necessary Future Initiatives

5.1 Ensuring the Succession of Leadership able to Respond to Emergencies

5.1.1 How to Pass Down Acquired Know-How (Training Over Manuals)

Creating manuals that outline preemptive measures and behavioral standards based on assumed disaster scenarios is a fundamental step in preventing damage escalation, and is therefore extremely important. However, no matter how meticulously plans are made, unforeseen events are inevitable—especially in natural disasters, where unexpected developments often hinder early recovery. This calls for flexible responsiveness, able to go beyond established measures and standards to make swift and appropriate judgments and initiate action based on the actual situation at the disaster site.

It is often said that experiencing a disaster improves responsiveness. Toshiba has gone through the major disasters of the Great Hanshin-Awaji Earthquake, the Great East Japan Earthquake, the Hyuganada Earthquake, and the Noto Peninsula Earthquake, and we believe that doing so helped us accumulate practical knowledge and skills that cannot be gained through theory alone. Facing a disaster forces individuals to seriously consider the actions they must take. Even if the response during a particular disaster was unsuccessful, the experience naturally remains in one's mind, leading to better preparedness for future events. That said, we cannot wait for disasters to occur regularly. Instead, it is necessary to acquire the required responsiveness through appropriate training. The goal of training is not simply to complete the program smoothly, but to simulate actual disasters, imagine what might happen, what could possibly occur, and what responses should be taken—so as to be able to act with a strong sense of urgency and broad perspective. The ability to do this helps in identifying challenges and developing countermeasures for future disasters. By regularly conducting training that assumes various disaster scenarios, we aim to improve and pass down responsiveness.

5.1.2 Enhancing Organizational Responsiveness Through Training

Organizational actions in disaster response consist of two main functions:

1)Direct response at the site level

2)Decision-making and site support at the disaster response headquarters

The environment in a disaster differs significantly from normal times. and makes organizational decision-making and instructions difficult. That means that swift judgment and initiation of action centered on the site are required. Based on experience, Toshiba has delegated significant authority to the site during disasters, and we continue to conduct different kinds of site-led training (evacuation guidance, first aid, damage assessment, recovery drills, etc.).

Within this approach, the role and challenges of the disaster response headquarters, including management, remained somewhat ambiguous. While site-led response is the basic approach during disasters, for anticipated large-scale disasters, such as an earthquake in the Nankai Trough or inland of Tokyo, it is essential to strengthen minimum necessary functions, such as appropriate information dissemination to stakeholders and critical decision-making.

These functions require rapid sharing of information on damage and impacts. In a rapidly changing environment with a flood of information, proper triage, judgment, and crisis communications are essential. To address this, we introduced a dedicated communications tool and built a system for centralized information management, prioritization, regular updates, and universal access. This facilitates smooth information sharing and aims to improve operational capabilities through training.

Additionally, assuming a scenario where headquarters functions in the Tokyo metropolitan area are suspended due to an earthquake, we are working to strengthen back-up functions. After organizing the necessary functions of the disaster response headquarters, we selected alternative sites, narrowed down back-up operations (not assuming full functionality), and developed systems for executing these operations. Currently, we are strengthening functions through training at the alternative site, including the ability to assess damage in the Tokyo region, internal and external communications of recovery prospects, handling customer inquiries, and product shipment allocation (see **Figure 9**).

Through this dual approach—strengthening site responsiveness and enhancing support and stakeholder responsiveness—we are improving organizational responsiveness.

5.1.3 Five-Year Training Program for Continuous Improvement of Responsiveness

As explained above, improving responsiveness and clarifying issues through training is essential. However, if training is continued over many years, there is a risk that the training itself becomes the goal, and the original intent is diluted. Training is only a means of improvement, and its true purpose is to strengthen individual and organizational responsiveness during disasters and to identify issues that need to be addressed.

To achieve this, it is necessary to clearly define medium- to long-term responsiveness goals, understand the current level of achievement, and design and implement training to measure the gap. With the increasing probability of major disasters centered on the Nankai Trough and inland of Tokyo, further enhancement of responsiveness is an urgent issue. We are considering formulating a medium- to long-term disaster response plan based on experience, and aim to significantly improve responsiveness by

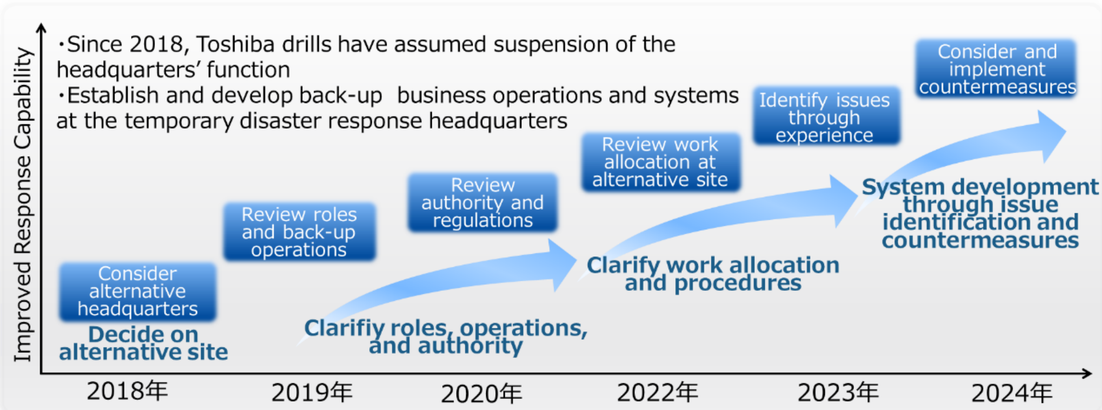


Figure 9. Organizational Setup of Alternative Headquarters in Response to an Earthquake in Tokyo

2030.

This plan will consist of:

- Hard measures: Equipment and building improvements assuming large-scale earthquake disasters
- Soft measures: Development of rules and manuals for responding to disaster across the company and group companies
- Skill measures: Education and training to strengthen individual and organizational actions

We aim to implement a training program over five years that significantly enhances the responsiveness to disasters of individuals, workplaces, and the entire company (including the disaster response headquarters).

5.2 Responding to Emerging Threats

5.2.1 Nankai Trough Emergency Information (Response Strategy Based on Experience)

It has been about 80 years since the last Nankai Trough Earthquake, and the probability of occurrence within the next 30 years is said to be around 80%. The Nankai Trough Earthquake is expected to involve a “partial rupture phenomenon,” where the plate boundary does not shift all at once, but either the eastern or western side ruptures first, subsequently followed by the other side. If a massive earthquake occurs on one side, the probability of a subsequent earthquake on the other side increases approximately 100-fold (see **Figure 10**). In such cases, the government issues Nankai Trough Emergency Information: “Warning of a Major Earthquake,” urging widespread preparedness in the affected regions (see **Figure 11**). Therefore, in addition to recovery from the initial earthquake, it is necessary to prepare for a highly probable second earthquake.

A key issue is whether to continue business operations in the affected regions. While prioritizing employee safety and suspending operations is one option, we must also consider the significant impact on the semiconductor supply chain if operations are halted. Toshiba is carefully evaluating the possibility of continuing operations as one option.

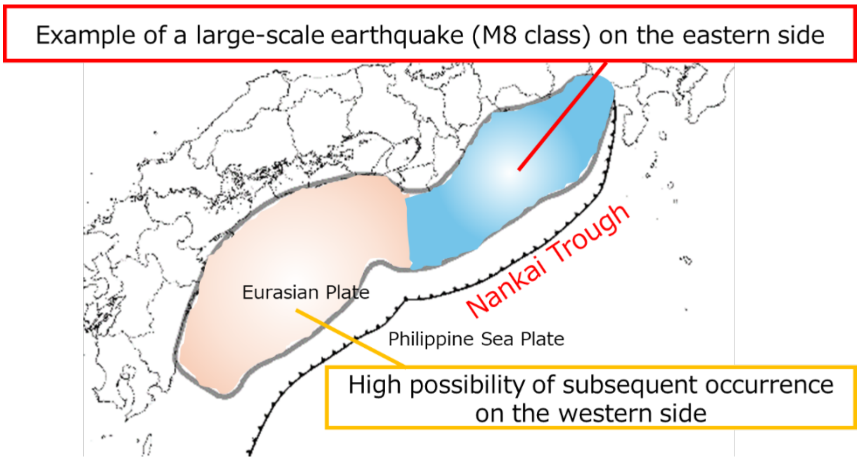


Figure 10. Partial Rupture Phenomenon of Nankai Trough Earthquake

■ **Government Announcement (Prime Minister's Press Conference) 13:00**

“In the aftermath of the M8.0 earthquake off the coast of Suruga Bay at 11:00 a.m. today (29th), **the probability of a large earthquake in the next week is considered to be extremely high**, in the area that was not the epicenter of this earthquake, extending from Hyuga-nada to offshore of southern Mie Prefecture and offshore of Tokushima Prefecture (this covers the assumed Tokai and Nankai earthquake regions of Kagoshima, Oita, Miyazaki, Kochi, Tokushima, Wakayama, and Mie Prefectures). Follow instructions from local government **and evacuate places where tsunami can be expected**. In areas where damage is expected, schools will be closed, highways will be closed and public transportation will be suspended. **Business operators are requested to prioritize measures that ensure human safety above all else.”**

Figure 11. Training Scenario Related to Nankai Trough Earthquake “Warning Information”

We are conducting detailed simulations of potential damage from a major earthquake, including:

- Tsunami, flooding, and liquefaction risks in each region
- Seismic resistance of buildings involved in operations
- Earthquake countermeasures
- Fire and chemical leakage risks
- Damage experienced in past earthquakes

Additionally, we have formulated internal action plans for when the government issues “Warning of a Major Earthquake” (see **Figure 12**). These plans include rapid analysis of:

- Impact on production sites and employees
- Supply chain and transportation network status
- Social conditions and other business continuity risks

This enables swift and accurate decision-making regarding business continuity. Of course, unforeseen events are inevitable, so we continue to build responsiveness through ongoing training and countermeasures.

5.2.2 Diversifying BCP Challenges and Responses

Currently, challenges related to Business Continuity Planning (BCP) are becoming increasingly diverse. While responses to natural disasters such as earthquakes have traditionally been the focus, recent years have seen the emergence of geopolitical risks, cyberattacks, pandemics, and other threats. As a result, companies are now required to prepare for a broader range of risks than ever before.

To address these new threats, it is necessary to evolve traditional rigid BCPs into comprehensive and flexible plans. In addition to conducting risk assessments, establishing emergency response procedures, strengthening training and education, and diversifying the supply chain, it is also important to enhance initial response capabilities and information-sharing systems so that they are highly adaptable to diverse threats.

Moreover, disaster response measures should not be limited to temporary actions but should be integrated into regular business operations, so as to strengthen organizational systems during normal times. This includes standardizing skills and simplifying and streamlining tasks to ensure sustainability.

To increase sensitivity to natural disasters and other supply chain risks, we established a “BCP Risk Sign Sharing Meeting” in April 2022, following the Hyuganada Earthquake. This cross-functional internal initiative is held weekly or biweekly to discuss and share potential future risks based on information from customers and suppliers.

We also continue to strengthen awareness and systems to provide timely and accurate information to customers regarding damage status and recovery schedules for products in the event of a disaster.

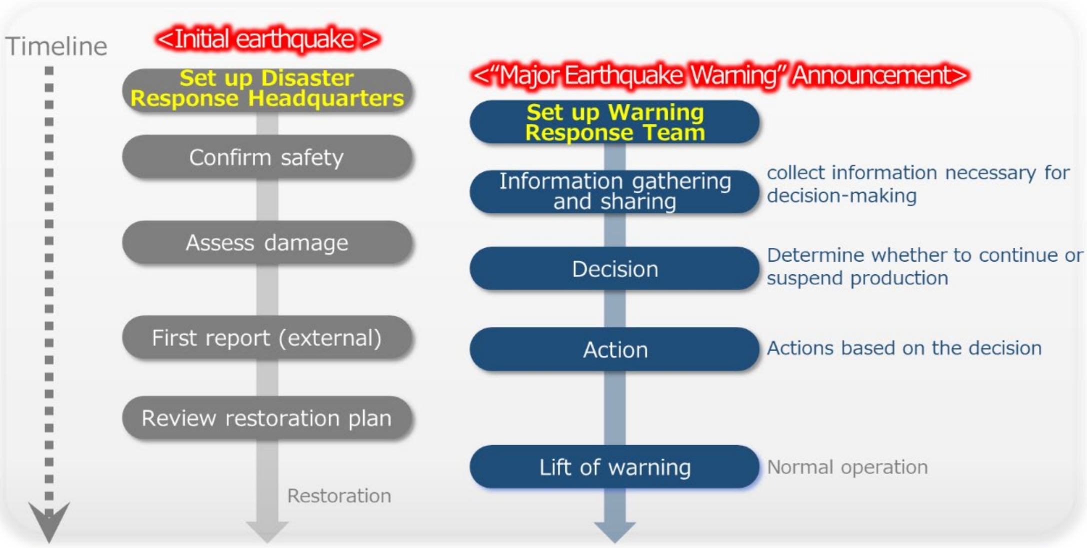


Figure 12. Action Plan Upon Issue of Nankai Trough Earthquake “Warning Information”

6. Recommendations

6.1 Developing Leadership for Disaster Response

As discussed throughout this report, disasters inevitably bring unexpected situations. To respond swiftly and appropriately to such unforeseen damage, flexible responsiveness based on experience is essential. This responsiveness must be cultivated through repeated training that assumes various disaster scenarios.

6.1.1 Cultivating Leadership at the Site Level

It is unrealistic to expect all employees at a site to suddenly acquire high responsiveness. What is important is to build a system where experienced leaders can give appropriate instructions, enabling everyone to act together. Through repeated experience of disaster, we have developed capable leaders in various fields of disaster response. The current challenge is to pass on these leadership capabilities to the next generation.

To address this, we are working to continually cultivate leadership by leveraging the knowledge of experienced leaders, designing and implementing simulation training based on past scenarios, and regularly holding workshops to share experience.

6.1.2 Building Forward-Looking BCPs Led by Management

Strengthening site-level leadership is a bottom-up approach that rests on the inheritance of past knowledge. However, with the increasing severity of expected disasters, geopolitical risks, rapid changes in social environments, and technological innovations centered around AI, new threats are emerging that cannot be addressed on the basis of experience alone.

In this situation, management is required to adopt flexible and bold thinking. While strengthening responsiveness based on experience is a site-level initiative, the ability to anticipate changes in the social environment and proactively guide organizational direction—i.e., building a “forward-looking BCP”—is the capability needed at the management level.

To achieve this, we believe it is important to define the capabilities necessary for management, foster a mindset that encourages flexible thinking and foresight, and establish opportunities (such as workshops) for developing the next generation of BCP leadership.

6.2 Sharing and Passing on Corporate Experience (Disaster Response Is Not a Competitive Domain)

Based on our experience of disaster and training, Toshiba has worked to strengthen preemptive measures and improve responsiveness. These efforts are based on our own thinking and policies, but in disaster response, there is no single correct answer.

The essence of disaster response lies in protecting human lives and strengthening the resilience of the industry-wide supply chain. It is not something that should be pursued individually by each company, but is rather a shared challenge that requires “co-creation” rather than “competition.”

We hope to strengthen disaster preparedness with many companies by learning from what they do. For example, holding information exchange meetings and workshops to share best practices among companies is one effective method. Through such activities, we aim to strengthen the supply chain’s collaborative system during disasters and promote cross-company sharing and inheritance of accumulated experience and knowledge. This will enhance the overall industry’s ability to respond to disasters.

7. About Toshiba Electronic Devices & Storage Corporation

7.1 Company Overview

Location: 1 Komukai Toshiba-cho, Saiwai-ku, Kawasaki-shi, Kanagawa, Japan
Representative: Taro Shimada (President and CEO)
Number of Employees: 3,100 (stand-alone), 17,000(consolidated), as of March 2025
Business Areas: Development, manufacture, and sales of semiconductor products (discrete semiconductors such as power semiconductors, small signal semiconductors, photocouplers; system LSIs such as analog ICs, microcontrollers, automotive ICs) and storage products (high-capacity HDDs for data centers, portable hard drives, etc.)
Application Fields: Our products are used across a wide range of industries, including automotive equipment, industrial equipment, home appliances and communications devices.

7.2 Product Offerings

We offer a wide range of semiconductor and storage products for industrial infrastructure, automotive, and data-centric applications.
Power semiconductors are essential for energy-saving in all electrical devices. We provide high-performance products aimed at improving energy efficiency and environmental protection. Traditional silicon (Si) MOSFETs minimize power loss through high-speed switching and low on-resistance, while IGBTs (Insulated Gate Bipolar Transistors) enable high-voltage and high-current switching, enhancing the performance of industrial equipment and electric vehicles. Additionally, power devices using compound semiconductors such as SiC (silicon carbide) achieve highly efficient power conversion.
In system LSIs, we offer a broad lineup of microcontrollers for automotive and industrial applications that require high performance, high integration, low power consumption, and low cost. We also provide analog ICs optimized for motor control, featuring high efficiency and low power consumption.
Our storage products meet the explosive global demand for data storage by offering high-capacity, high-performance HDDs and portable hard drives based on HDD technology.
Through these products, Toshiba Electronic Devices & Storage Corporation contributes significantly to technological innovation and the realization of a sustainable future.

References

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