



Disaster Management and Preparation in Naksung Province

*This case is a hypothetical scenario created for instructional purposes. The regions, companies, individuals, and situations mentioned in this case are fictional and not based on real facts.

Every year, thousands of persons are killed, injured or displaced as a result of natural disasters that strike in Gwanak. The Gwanak archipelago is frequently affected by earthquakes and tropical cyclones. Climate change is only exacerbating the problem. This has become an escalating humanitarian issue, consuming billions of dollars of national and international emergency response funding. In light of such mounting financial needs, disaster prevention measures are usually the first to be defunded, which only adds to the chaos when disaster does actually strike.

Naksung is a mid-size province on the southern edge of Bongchun Island in Gwanak. This province is a historically and economically significant area of the country with a population of about 1.4 million people. Naksung province is also, however, one of the most vulnerable provinces to natural disaster and climate change related impacts in Gwanak, primarily in the form of typhoons, storm surges, flooding, landslides and soil erosion. These disasters have traditionally caused a great deal of suffering to the people of Naksung province, most of whom rely on agriculture as their primary source of livelihood. These disasters interrupt people's businesses and create significant economic damage, including damage to property, failed crops, displacement, and—in many cases—significant injuries and loss of life.

The population of Naksung province is quite scattered. Therefore, transportation and communication become quite challenging when it floods. This is especially dangerous for elderly individuals and children, who often rely on crucial humanitarian assistance being brought into their communities for survival in the aftermath of a natural disaster. Emergency response teams often face significant logistical hurdles reaching isolated areas, a lack of real-time information, and coordination and communication challenges when they do finally get there. Moreover, residents are often unclear of how and where to evacuate in emergency situations, thus causing unnecessary confusion and additional loss of life in high-stakes emergency situations.

XR-Humanitarian (XR-H), a for-profit company based in Dongdae, has created an XR solution to address such issues. Their technology consists of two parallel products:

1. A lifelike VR environment designed to train response teams in scenario-based situations, and
2. An AR simulation built on generative AI designed to simulate the effect of an oncoming disaster within a specific environment.

XR-H has previously trialed its technology in Dongdae, claiming that the technology has significantly improved disaster response logistics there by generating virtual representations of areas affected by disasters, analyzing and predicting logistical needs, and visualizing the distribution of relief supplies. The technology can also create a “digital twin” of a geographical area to collect data and track potential hazardous changes such as weather patterns and topographic changes. The company claims that its advanced technology has facilitated coordination among various disaster response agencies, optimized resource allocation, and enhanced decision-making processes. Most powerfully, the technology visualizes these processes for participants in simulations that are difficult if not impossible to replicate in a written manual or in-person training session.

The Gwanak Disaster Response Management Bureau of the Department of Social Welfare and Development (DRMB), which serves as the lead governmental disaster response and relief agency, is eager to explore how this technology can be used in disaster-prone regions in times of emergency. The Provincial Governor of Naksung Province is a tech-savvy former lawyer, and believes that technology can address some of the challenges faced by emergency responders in his province. He has enthusiastically welcomed an effort to field test XR-H's new technology in Naksung Province.

In its promotional materials, XR-H notes that this is an affordable solution compared to existing models, requiring only XR headset systems for the VR solution and nothing more than a normal smartphone for the simulation of environmental disasters (alongside the fixed costs of providing high-speed internet access to facilitate the services). The company also notes that its solutions are scalable and easily accessible, highlighting the potential of these technologies to be used in schools to help children protect themselves during a natural disaster. XR-H has received extensive startup funding from the government of Dongdae and is willing to trial the technology to monitor its effectiveness and overall utility.

The 2010 Gwanak Disaster Risk Reduction and Management Act mandates a shift from disaster response towards disaster risk reduction. Accordingly, the Governor of Naksung Province believes that XR-H's technology is closely aligned to his local government's policy mandate. However, the government also has several concerns about the potential unforeseen consequences of XR-H's proposal. Most importantly, XR-H's technology is new and relatively untested, and policy makers are concerned about the reality of a for-profit corporation “beta testing” a novel technology in a developing world context, especially in situations where real human lives might be at stake. Disaster management experts warn that ill-conceived or otherwise ineffective training programs risk further extenuating the damage of a natural disaster with misguided disaster response measures. Additionally, the regulatory agencies are concerned whether this technology disparately impacts women, the elderly and children, marginalized and indigenous communities, and minority groups in Gwanak.

Unclear, for example, is how the simulation would account for cultural, linguistic, or geographic differences across the region, and how the XR technologies would recommend different outcomes based on those regional variables. The Gwanak government is also concerned

about accountability in case the technology malfunctions in some unforeseeable way, and how various communities will have equal access to the specialized hardware necessary (for example the customized XR headsets).

Some analysts have also noted the need to think about privacy considerations associated with this new technology, especially given the involvement of a private firm seeking to bring this product to market based on its experience trialing it in Gwanak. Scholars have also raised the issue of meaningful consent, noting that the communities where these technologies will be pioneered may not even understand the implications of that new technology on their well-being and safety.

Gwanak being a developing country, the long-term cost implications of implementing this new metaverse-centered approach to disaster preparedness also needs to be carefully evaluated. While XR-H is currently offering to beta test its technology in Naksung province for free, it is also likely that the Provincial and/or national government will eventually have to assume some of the long-term costs to maintain and upgrade the system.