Projects for Disaster Revival in National Colleges of Technology

Yasuo UTSUMI 1, Jyun-ichi YAGUCHI2, Kiyotada SATO3, Kazuto MIYAWAKI4, Kazuya KANDA5, and Masamitsu HARADA6

1. National Instates of Technology, Sendai campus, Natori, Miyagi, Japan, utsumi@sendai-nct.ac.jp
2. National Instates of Technology, Hachinohe campus, Hachinohe, Aomori, Japan, yaguchi-z@hachinohe-ct.ac.jp
3. National Instates of Technology, Ichinoseki campus, Ichinoseki, Iwate, Japan, satok@ichinoseki.ac.jp
4. National Instates of Technology, Akita campus, Akita, Akita, Japan, miyawaki@akita-nct.jp
5. National Instates of Technology, Tsuruoka campus, Yamagata, Japan, kanda@tsuruoka-nct.ac.jp
6. National Instates of Technology, Iwaki, Fukushima, Japan, harada@fukushima-nct.ac.jp

Abstract
Northeast six campuses of national institutes of technology in Tohoku region that includes the stricken area by east Japan great earthquake in 2011 shall develop the system of human resource development based on the project of MEXT, Ministry of Education, Culture, Sports, Science and Technology. The project consists of six sub-projects, 1) Construction and administration of the cooperating system covering Tohoku area, 2) Human resource development of engineers for a safe and secure Eco-town, 3) Human resource development of engineers for soil improvement and desalinization of Tsunami-flooded farmlands, 4) Human resource development associated with the construction of a security system by independent dispersed power sources for the risk, 5) Enrich local resources regeneration project of Sanriku coast, and 6) Human resource development of engineers for disaster prevention in Hachinohe/Sanriku area. It is aimed to solve problems in response to short and long-term needs toward industrial revitalization and earthquake reconstruction from affected areas in the Tohoku region, and to establish it in the community. Also the project is carried on by making good use of the strengths of the campuses and industry-academia-government collaboration.

Keywords: Engineering education, Industry recovery, Human resource development, Needs of stricken area

1. Introduction
Northeast six campuses of national institutes of technology in Tohoku region that includes the stricken area by the movement and tsunami of east Japan great earthquake of the magnitude 9.0 in 2011 March 11 shall develop the system of human resource development in the framework of many activities corresponding to the disaster [1-2]. As the background, the human resource is necessary for the local area to achieve the recovery and evolution in future with the matching between the needs and the seeds that can be provided by the concerning stakeholders, e.g. local body, private companies, the academy, etc. The project is supported by the grant for the revolution of the universities, 'human resource development for industry recovery in Tohoku region’, H23 to H27, of MEXT, Ministry of Education, Culture, Sports, Science and Technology.

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It is aimed to solve problems in response to short and long-term needs toward industrial revitalization and earthquake reconstruction from affected areas in the Tohoku region, and to establish it in the community. Also the project is carried on by making good use of the strengths of the campuses and industry-academia-government collaboration.

2. Overview of the project
2.1 Projective of the project
This project is aimed to establish the education system that grows the human resource that can solve the problems of short and long time rages in the stricken area by the earthquake. The problems concerns to recovery from the disaster and to promote the industry evolution and is dealt with the matching between the needs in the region and the seeds of institutes of technology in Tohoku area. The education system is constructed with the collaboration of the industry, local body and academy and would be in the community as a sustainable system.
2.2 The human resource in the scope
The students in the institutes and the engineers in the private companies, etc. are assumed to be the trainee. The number of the students is more than 30-40 for 5 grades and more than 20-40 for the advanced course at each campus per year and the students of other universities and colleges are expected. The engineers in the region are about 40 per year and they are from the collaborative organization of each institutes, the local bodies, NPO, etc.

2.3 The characteristics of the project
All institutes had reached to the agreement at the starting point like the followings.
1) To match the seeds which the six colleges in Tohoku area corresponding to needs and problems at the present. If necessary, the seeds of the institutes in other domestic area is available with the head office of the institutes.
2) To take the advantage of the training system of local engineers and traditional associate degree, major department courses in the technical colleges. The subject areas are manufacturing, nanotechnology, information-communication, environment, energy, life science, technology for medicine, human services, automotive, living environmental system, human resource development of engineers, etc.
3) To establish the framework of the personnel training system to function in the area in order to promote the recovery of the local industry.
To ensure the above characteristics, the concrete procedures are;
   a) The theme in each project may be the task on cite of the local manufacturers surveyed through the interviews, etc.
   b) Students and engineers in the region solve problems together under the secured environment.
   c) Interviewed opinions from stakeholders in response to the curriculum progression is reflected immediately for continuous improvement.
   d) At the meeting for reporting, the manager of regional companies who dispatch engineers is invited and can validate the effectiveness of the project by inspecting the outcome.

2.4 The framework of the project
The secretary is located at the head office of the human resource development center of Sendai campus. The head office deals with the management of all sub-projects. Also it makes the arrangements, supported by the research administrator, coordinators, etc. in the campuses, with the government, ministries, local bodies, universities, NPO, etc. to exchange the information and to seek the possibilities of the collaboration. For example ‘Fukko University’ that consists of four regional universities has close relation to our project.

3. The sub-projects
The project has six sub-projects and project 1 administrates other five projects 2 to 6. Each sub-project is driven by the responsible campus and some other campuses following the steps, the local need, the seed of the campus and existing achievement, the contribution to the recovery of the region. The overview is described as the below.
1) Project 1: Construction and administration of the cooperating system covering Tohoku area (all campus)
   This project adjusts the inner activities of the whole projects with using regular TV and makes the meetings, workshop, etc. to deliver the information towards the society (figure 1).

2) Project 2: Human resource development of engineers for a safe and secure Eco-town (Sendai campus, Tsuruoka campus and Akita campus)
   The engineers to sustain the energy and the environment of local area are targeted. The people in the hit area still live in the temporary houses and may be in the insufficient environment. The measuring method of the environment and the improvement procedures are advised. Figure 2 shows the concept of the environment measuring and the control of
air-conditioning system located at Higashi-matsushima city in Miyagi prefecture. The system consists of 1) measuring system of the indoor environment, 2) hybrid pole that generates power by the solar panel and wind mill and has the battery for the storage, LED lighting, Wi-Fi router, 3) data communication system, 4) the control system of the air-conditioner. The trainees study the evaluation and improvement of the indoor environment with using the communication equipment.

![Diagram](image1.png)

Figure 2 The concept of the environment measuring and the control of air-conditioning system

3) Project 3: Human resource development of engineers for soil improvement and desalinization of Tsunami-flooded farmlands (Sendai campus and Fukushima campus)

With accelerating the soil improvement and desalinization of Tsunami-flooded farmlands, it is expected to stimulate the recovery of the agriculture. The attending trainees can learnt the measuring skill, the investigation of the harvest, the treatment method according to the growing process of rice, the judgment of desalinization. Figure 3 shows the rice field just after the tsunami wiping (left) and the spraying the bio-materials that captures the salt.

![Image](image2.png)

Figure 3 Rice field wiped by tsunami in Higashi-matsushima city

4) Project 4: Human resource development associated with the construction of a security system by independent dispersed power sources for the risk (Tsuruoka campus)

The engineers to ensure the safety with using the independent energy and ICT equipment are grown, since the securement of energy and communication is crucial point in the emergency. The proposed system proposed to the trainee equipped dispersed power source, the sensors corresponding to the needs, communication system with the connection to smart phone, Wi-Fi, the satellite, etc. Figure 4 indicates the concept (left), the solar panel and weather station in winter experiment (right).

![Image](image3.png)

Figure 4 The security system by independent dispersed power sources for the risk
5) Project 5: Enrich local resources regeneration project of Sanriku coast (Ichinoseki campus)

The project deals with the utilization of fishery resource, bio-mass energy and ICT area. The target is to provide the human resource that can work on the new industries for long period in future.

There are three themes; 1) fishery industry toward the sixth industrialization to provide the additional values, 2) the natural energy such as wind power, wood bio-mass energy, etc. with using existing materials, e.g. rubbles, 3) the addressing digital divide issues in the tsunami hit area (see figure 5 from left to right respectively).

![Figure 5 The project to promote new industries for long range in future](image)

6) Project 6: Human resource development of engineers for disaster prevention in Hachinohe/Sanriku area (Hachinohe campus and Ichinoseki campus)

The engineers who can support the reconstruction of the infrastructure such as the port, the bank, lad, etc.

The survey of the damages of the infrastructure was executed just after the earthquake with concerning organizations and described the local situation. Through many workshops and symposiums, the awareness and the acquirement of the disaster and its prevention of local people have been pursued in many aspects, e.g. local bodies, junior hi school, private companies, etc. Figure 6 shows the meeting of local people, volunteers and the lecture of inspection system of the soil (from left to right, respectively).

![Figure 6 The project to grow the engineers for disaster prevention](image)

4. Summary

The situation of the project to establish the education system to provide the human resource for the recovery from the disaster based on the matching of local needs and the seeds of the campuses in Tohoku area. Three years have passed with providing many graduated students and engineers who attended the seminar, workshops, etc. but it is still in progress.

We appreciate the precious supports of MEXT and the concerned personnel of six campuses, the local bodies, private companies and NPO.

References


Biography

Yasunori UTSUMI is a professor, the vice president of SNCT. He is responsible for the research and the collaboration among local bodies, academic organizations and NPO in terms innovation toward the recovery from the seismic disaster, education of engineers including project management and intellectual properties. He is in charge of the vice president of HOPE (Higashimatsushima organization for progress and “E” (economy education energy)), the organizer of ISO TC163/ SC1/WG10 (Thermal performance and energy use in the built environment/Test and measurement methods/Air tightness of Buildings), and the project sub-manager of smart grid working group of Tohoku branch of MITI (Ministry of International Trade and Industry). Prior to them he was the sub-task leader of IEA, SHC34/Annex43 (Testing and Validation of Building Energy Simulation Tools).

Jyun-ichi YAGUCHI is a professor of Hachinohe campus.

Kiyotada SATO is an employee professor of Ichinoseki campus.

Kazuto MIYAWAKI is a professor of Akita campus.

Kazuya KANDA is a professor of Tsuruoka campus.

Masamitsu HARADA is a professor of Fukushima campus.