Technotalk

Social Infrastructure Business in Emerging Economies and Global R&D for Regional Needs

Hitachi is working to accelerate the global development of its Social Innovation Business, which supplies social infrastructure systems supported by highly efficient and reliable information technology (IT). To grow more and operate as a global business, Hitachi needs to expand its business activities and research and development (R&D) resources in both emerging markets and developed economies and regions so that it can meet the changing needs of its various global operations. Here, we have brought together key people responsible for R&D and business operations in different parts of the world to discuss the specific measures needed to realize this strategy, and the challenges they will face.

Social Infrastructure Markets in each Region, and Current Status of Business and R&D

Takeda: Hitachi's overseas sales ratio is expected to be 43% in the current year, and we are seeking to increase this above 50% to further expand our operations in global markets. What do you think of the current state of global business development at Hitachi?

Toyoshima: The question is how to shift resources to specific areas of the world. And we need to focus on our Social Innovation Business, meaning the infrastructure business. Initially, we selected 11 nations and regions, including the fast-growing Asian Belt Zone*, South America, and Central and Eastern Europe. But we shouldn't ignore other parts of the world since we have lots of new business in Africa, as well as in developed economies, including Europe and the USA. This infrastructure business must deal with many unique local characteristics. How to adapt to different local conditions is a key challenge.

Takeda: China and the Asian countries are among the most active parts of the world for building new infrastructure.

Chen: China is in the second year of its 12th Five-Year Plan, in which promoting urbanization is one of the major

* Asian Belt Zone consists of countries and areas, totaled 24, such as but not limited to China, ASEAN countries, India, Middle Eastern countries and other countries located within the territory.

goals. Targets for city construction have been established across the country. This is reflected in terms such as "smart city," "wireless city," "digital city," "eco city," and "knowledge city." Smart cities in China can be broadly divided into two categories. The first, indicated by terms such as "smart city," "digital city," or "wireless city," seeks to provide cities with IT infrastructure. The second category is the eco-city, meaning low-carbon, energy-efficient cities with a closed-loop approach to resource use. These eco-cities can be further divided into those built by upgrading existing cities and those being built on new sites, with China having as many as 400 of these newly constructed cities. Hitachi currently has an active involvement in smart city construction at Tianjin Eco-city and other sites throughout China.

Hohmann: Compared to China, the social infrastructure business in Europe is growing slowly but steadily. Hitachi is engaged in some smart city projects in Europe. Smart cities in Europe are defined as knowledge cities including e-health care, smart energy, sustainable housing, comprehensive information and transportation infrastructure as well as e-education and e-government. The challenge in Europe is to modernize and maintain existing infrastructure.

Hitachi is able to provide technology and expertise for smart grid solutions for small and middle size local

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governments in Europe. In the rail sector, Hitachi is the first Japanese company supplying high-speed trains to the UK. Hitachi Rail Europe has gained a very good reputation over the last decade and continue to do so with the success of the Class 395 model, which has been in service since 2009. Further Hitachi is participating in infrastructure projects involving electric vehicles and water purifying technologies in the south of Europe.

Saikalis: My focus in the USA is on new approaches to applying new technology in the automotive sector. Right now, we are establishing some collaborative work with customers on model-based design, which involves predicting the behavior of the overall system to optimize design, and on electromagnetic compatibility at the vehicle level. Another important research field for us is cyber-physical systems, in which real-world ("physical") measurements are incorporated into systems built in cyberspace. Model-based design and the cyber-physical concept help the design process go very fast from the conceptual idea all the way to implementation or to a feasibility study. We're virtualizing electronic control systems that include central processing unit (CPU) operation all the way to engine/plant behavior, and connecting the different parts together to see the whole system in action.

Simulation technology like this uses large amounts of data, so we need to take greater advantage of cloud computing in the automotive world.

Takeda: You are also working to explore new business fields in South America?

Saikalis: Yes. I believe that our research laboratory at Hitachi America can contribute to some achievements in fields like bioethanol, for example. The level of Brazilian universities and R&D centers is high, and I hope we will have numerous opportunities to work with these institutions in the future.

Takeshita: The Brazilian government has an infrastructure plan, called Programa de Aceleração do Crescimento 2 (PAC 2) (growth acceleration program 2). Infrastructure is an urgent issue for Brazil because it will be hosting both the World Cup of football and the Olympics. So, we are trying to promote our technologies in our Brazil business, especially transportation (monorails and high-speed trains), and also in the field of smart grids.

Contributing to Operation of Social Infrastructure Business through Global Partnerships

Takeda: One thing we should not forget is that social infrastructure is for the people who live in that society. This means that building strong partnerships with local institutions is essential. What can you tell me about activities in each region?

Saikalis: At the Automotive Products Research Laboratory (APL) of Hitachi America Ltd., our mission has always been to contribute to the automotive business in the USA by customizing products for that market, such as engine management systems, components for hybrid vehicles, suspension and brake systems. I have been working for Hitachi in R&D since 1990, including in fields like model-based design. Over the years, we have created a network, not only within Hitachi Automotive Systems, Ltd. but also among our customers.

We are also localizing more design and manufacturing in the USA, and the key to this is long-term human relationships. It is important that researchers like myself are based in the USA, and that we build close relationships with the engineering community there.

Takeda: Hitachi Design Centre Europe (HDCE) has a long history, and I understand the type of design work being undertaken has also been changing.

Hohmann: Yes. I have been working at HDCE since 1992, and over that time the design team focus has moved away from the consumer products we've targeted in our early years. One example is our activities in the information

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system design. This includes king size displays in the semi public area, where people are able to interact with local information through simple gestures, iconography and mobile phone interaction. The Hitachi railway business is another challenge for comprehensive experience design solutions. From invisible railway maintenance, human workflows and man-machine interactions to the train interior/exterior design to the train signaling and control room interface design support.

Hitachi is able to provide advanced technology solutions in various applications and the design team provides meaningful user interfaces and experiences to make technology work smoothly within a given cultural context.

Takeda: How about partnership?

Hohmann: As Hitachi changes towards social infrastructure business, we're exploring the cultural context, human factors and provide value interfaces for the new public services in the future. For example, we're applying a range of user-centered methodologies like ethnography, user observations, qualitative questionnaires, workflow scenario creation etc. to explore local user, or workforce problems with an existing infrastructure in order to provide new solutions to cope with the challenges of future cities. In Europe we are actively working with universities such as King's College London, University of Siegen, Germany or Royal College of Art in London to conduct studies and analysis based on our new service design approach.

Takeda: Dating back only to 2000, Hitachi's R&D in China has a shorter history than in the USA or Europe, but it's notable for the speed of its growth.

Chen: I have been involved in R&D in China since 2000 and this work is growing in collaboration with local partners. Given Hitachi's current focus on its Social Innovation Business, partnerships in China are taking on a growing significance and Hitachi is expanding the scope, objectives, and format of these collaborations in conjunction with the expansion of its China business.

In 2001, for example, back in the early years of our R&D in China, we set up a joint laboratory with Tsinghua University, one of the top universities in China, to undertake advanced research in the area of telecommunications technology. When the focus of Hitachi's business in China subsequently shifted to its Social Innovation Business, joint research with universities also expanded into a wider range of fields, such as energy management systems, with the aim of contributing to local projects and building local partnerships. This has included collaborations with other major universities such as Fudan University and Shanghai Jiao Tong University.

In the smart city field, we're also working with local governments on city development in Tianjin, Guangzhou, Dalian, and Chongqing. Together with the operational businesses, we are working on partnerships and on the development of technology aimed at satisfying local needs.

Toyoshima: Talking about partnerships in Asia, another example is how we've been active in Singapore for 40 years or more. Like Japan, they have few natural resources and a very limited number of human resources, so they need sustainable growth by being deeply involved in developing overseas infrastructures. They have considerable information on this, so maintaining good partnerships with the Singaporean government is very important.

Takeshita: Brazil sometimes requires products and solutions to be designed specifically for that nation. Other factors include distinctive business practices and complex taxation rules, and these too make partnerships with local companies, universities, and R&D institutions an important part of doing business in Brazil.

Future Outlook for Business and R&D in each Region

Takeda: Are there any particular regions or R&D topics you are focusing on in terms of our next steps toward

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globalization?

Toyoshima: We see the Mekong Delta, Mexico, and Australia as being unique markets. The Mekong Delta region has booming potential economies, including Myanmar. Mexico, too, is unique. It has free trade agreements with more than 40 countries, so we should take advantage of that mechanism, which will allow us to export automotive related products to many countries including Brazil without any tariffs. Australia, meanwhile, presents major opportunities in the mining sector, including construction machinery.

Chen: Smart city construction in China is encouraging the application of IT to the field of social infrastructure. This means considerable business opportunities exist in the fusion between IT and social infrastructure being promoted by Hitachi. However, factors such as the scale of data and application features are different to those in Japan. That is why we are undertaking R&D into cloud systems for use as smart city platforms, telecommunications gateways, and other key applied technologies such as energy management and monitoring systems and transportation systems. We are working closely with the operational businesses to deploy these technologies in areas such as the Tianjin Eco-city project or Dalian Biodiverse Emerging Science & Technology (BEST) City project.

Hohmann: In Europe we see the aging of society as an important factor driving future trends and business opportunities for Hitachi in the field of Social Innovation Business. We see the challenges in medical information management, e-health care, personal data security and privacy will play an important role in this context. I believe this will provide significant opportunities for Hitachi. Japan is facing similar problems locally and a closer collaboration would be inspirational for Hitachi's global business. I do see further challenges in the energy and water business in Europe, where Hitachi is able to contribute with advanced technology, after a customization process to meet specific local requirements, explored by a local team including the designer.

Saikalis: In the USA, we try to be very solution-oriented with our R&D. One technology we're trying to use is system level virtualization. One example is virtual hardware in the loop system. This solution models the whole system, not just components. We can see the interaction between all the components, virtually. It's an approach that can also be applied in other areas outside the automotive field, such as construction equipment.

Global Perspectives on the Hitachi Group

Takeda: How do you feel about Hitachi from an overseas perspective? Also, what do we need to do with our global R&D strategy to make a greater contribution to the world?

Takeshita: In Brazil, they use the term "tropicalization" to represent the Brazilian approach. What this means is the design of technology and culture in the Brazilian style. I believe this word has been taking on increasing importance recently as Hitachi has been developing its business in Brazil. Customers in Brazil demand system solutions designed in the Brazilian style as well as imported equipment. It is quite possible that Hitachi will need to establish an R&D center in Brazil in the future.

Toyoshima: Another point relates to how to localize operations. The Social Innovation Business can be said to be order-made type business. This requires people who understand the local markets. In India, for example, we had a manufacturing joint venture for air-conditioning that was successful because it designed and manufactured products to suit local requirements.

Hohmann: It is essential to engage in constructive discussion with the people of each local business in each country or region regarding what constitutes the best technology or the best integration for the infrastructure in their region. I think it's also important to exchange people frequently and have a global pool of ideas and inspirations. Here the extensive use of social media as an in-house technology may provide the knowledge management base where Hitachi employees would be able to collaborate on small incubation projects worldwide and collaborate as a multi-disciplinary team.

Saikalis: I think the language barrier also needs to be lowered and more use made of English as a common language to ease communication and have strong global participation.

Chen: When talking about the globalization of R&D, we need both to encourage the shift to local management and also to strengthen the global unity of our approach. While the current focus is on promoting local management, making the most of Hitachi's strengths in the Social Innovation Business will require that we demonstrate the comprehensive global capabilities of Hitachi throughout the world. This means that, rather than having local operations focus only on customizing applied technologies to suit the requirements of their region, I believe it is also desirable that our research institutions inside and outside Japan should work together on the joint development of common platform technologies in all of our business fields. To satisfy market needs in different parts of the world, it is also important to be able to offer solutions promptly that combine applied technologies developed locally with platform technologies that can be shared globally.

Takeda: We will meet each region's social infrastructure needs by strengthening partnerships, not only between Hitachi's own global R&D departments, but also with other institutions and customers. Thank you very much for your participation today.