Building a New Future by Solving Societal Challenges

The Role of Universities as Starting Points for Creating a "Platinum Society"

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While societal challenges including climate change, aging population, and a low birthrate continue to pile up, the addition of a pandemic due to COVID-19 and the Ukraine crisis have made our times even more volatile. What can we do to overcome these difficult times? Masanori Yoshino, Senior Project Manager at the Hitachi Hokkaido University Laboratory and Director of the Hokkaido University COI, spoke with Hiroshi Komiyama, the 28th President of the University of Tokyo and Chairman of Mitsubishi Research Institute, Inc. who has led Japan's innovation strategy by advocating unique concepts such as "Japan as a Forerunner for Addressing Emerging Problems in the World" and a "Platinum Society." They discussed the role of universities and social innovation for a post-COVID-19, post-Ukrainian-war world.

Universities with Young People Are What Will Save Japan, a Forerunner for Addressing Emerging Problems in the World

Yoshino: I have been involved with the work of the Center of Innovation (COI) at Hokkaido University and the Hitachi Hokkaido University Laboratory since 2015, and through this experience, I have always felt that both universities and companies must make major changes in order to implement social innovations. Based on your experience as president of the University of Tokyo, what is your vision for the future of universities?

Komiyama: As a matter of fact, I believe that only universities can seriously confront real societal challenges. This is because universities have young people, or students, and in today's rapidly changing world, it is essential to have young people who are sensitive to and flexible with the changing times. The old model of retraining working people at universities to be useful in the field is no longer the case. We cannot lead society if we take such a long time.

Moreover, universities are socially neutral, allowing people from various sectors, such as corporations, local governments, and non-profit organizations (NPOs), to get freely involved. By doing so, both students and teachers can confront real societal challenges directly, gain opportunities to practice active learning in the true sense of the word, and grow. I believe that a place that can create such a good cycle will become a model for universities in the future.

Yoshino: As you say, I myself have always felt the power of young people through work such as with the Hokkaido University COI, and I feel that it is a great advantage that the university functions as a hub, allowing us to immediately meet and discuss with people from other companies. With the normal route, just making an appointment can be very time consuming.

Komiyama: I believe that universities and companies are now very close to each other. Japan is a "forerunner for addressing emerging problems in the world/a problem saddled developed country," and there are plenty of issues to be addressed. In other words, the familiar challenges we face can become the most advanced challenges facing humanity. Therefore, it is our solutions that will lead the world. I published a book titled *Japan as a Forerunner for Addressing Emerging Problems in the World* in 2007, and it is regrettable that more than a decade has passed since then with no solutions in sight for any of the problems such as depopulation of rural areas, declining birthrate and aging population, and dependence on fossil fuels for energy. These are issues that are now being addressed around the world.

Interviewer:
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In 1972, Hiroshi Komiyama completed his PhD in chemical engineering at the Graduate School of Engineering, the University of Tokyo. He was a research associate in the Department of Chemical Engineering, Faculty of Engineering, the University of Tokyo in 1972, a postdoctoral fellow at University of California, Davis, in 1973, and a professor at the Department of Chemical Engineering, Faculty of Engineering, the University of Tokyo from 1988. In 2005, he became the 28th President, the University of Tokyo. Against the backdrop of the incorporation of national universities, he implemented the "University of Tokyo Action Plan" for introducing educational reforms and industry-university collaboration. After retiring as President, he has served as Chairman of Mitsubishi Research Institute, Inc. since 2009. Over the last 13 years, he has advocated unique concepts such as "Japan as a Forerunner for Addressing Emerging Problems in the World" and a "Platinum Society" and has led Japan's innovation strategy. Since August 2010, he has served as President of the Platinum Society Network (incorporated as a general incorporated association in April 2022).

Yoshino: You proposed these issues long before the Sustainable Development Goals (SDGs).

Komiyama: Yes, it was around 2003 to 2004 that I started referring to Japan as a forerunner for addressing emerging problems. However, rather than solving problems, Japan has yet to escape from the mindset of the processing trade model of the 20th century. With most countries developing their industries and moving toward saturation of all goods, the traditional model of processing trade cannot possibly work.

In such turbulent times, the role of universities should not be that of a "school for sparrows," as sung in the Japanese children's song, but rather a "school for killifish."

Yoshino: A school for killifish?

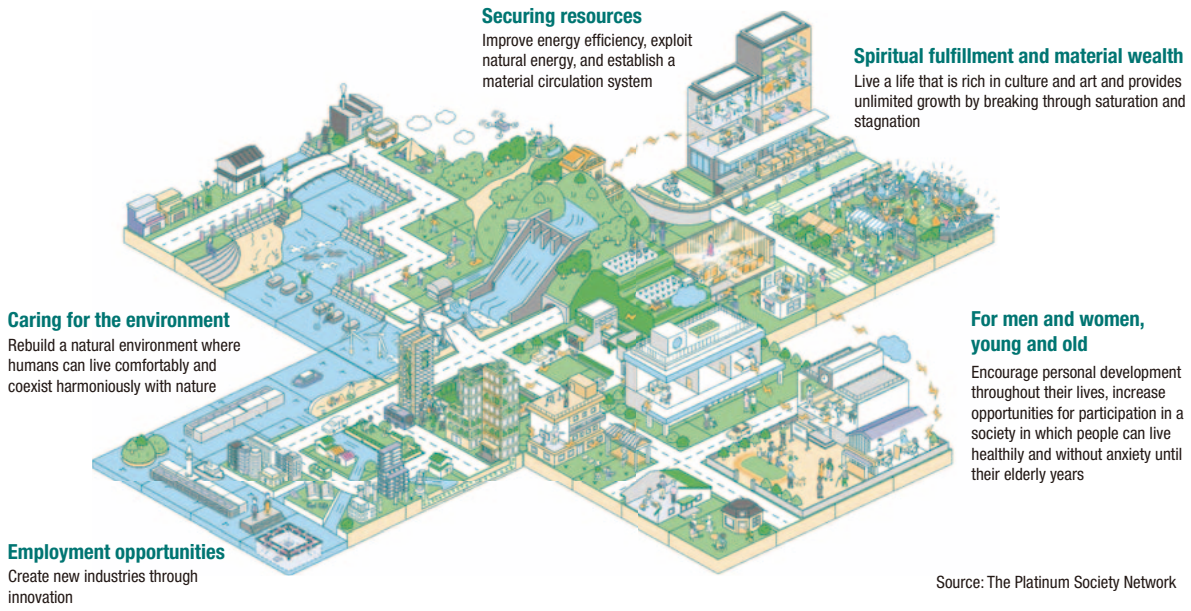
Komiyama: Teachers at a school for sparrows train their students by snapping the whip and drilling until they get it right, but at a school for killifish, children sing, "Who is the student or the teacher? Everyone is playing." The latter model is precisely one in which participants grow through the exchange of diverse experiences and ideas.

Yoshino: In that sense, the various initiatives that you are advocating to realize a Platinum Society are exactly in the style of a school for killifish.

Komiyama: One typical initiative is the University of Tokyo's Presidential Endowed Chair for "Platinum Society," which began in 2012. Currently, Associate Professor Yasunori Kikuchi is leading a project, together with young researchers from several universities, to conduct demonstration experiments on Tanegashima Island in Kagoshima Prefecture, incorporating cutting-edge science, technology, and systems. Already, advanced results have been achieved in such areas as agricultural artificial intelligence (AI), heat stroke alarms, and biomass energy.

What is important here is to mobilize and integrate various types of knowledge to solve challenges, in other words, "knowledge structuring." As part of this effort, I give special lectures at prefectural high schools on the island, where high school students can see cutting-edge examples. We then ask the high school students to present their findings on local issues and proposed countermeasures at a symposium, and they produce some pretty good ideas. Several years ago, the symposium began to include the current head of the island and has evolved into a forum where people from all over the island gather to discuss the issues.

This is truly the power of youth. These initiatives have helped to deepen the high school students' attachment to the island. As evidence of this, as many as 40% of students now say they want to return to the island even if they leave to go on to college or other higher education in other prefectures. Before we started, we had zero students who said they wanted to return. This is precisely one of the key performance indicators (KPIs) of this initiative.



Source: The Platinum Society Network

Platinum Society Concept

A Platinum Society is defined as "a society that is sustainable and prosperous for the Earth and enables self-fulfillment for all people." The Platinum Society Network has been established and is working to solve societal challenges including global warming, energy and resource constraints, declining birthrates, and the aging of society through industry-academia collaboration.

Yoshino: I suppose it is important to be exposed to cutting-edge initiatives at a young age. At Hokkaido University, we are also working on smart agriculture utilizing AI and automated robots. I remember the other day a farmer who was participating in this project was happy to hear that his son, a high school student, wanted to take over the family business.

Practical knowledge is what is important, and the university plays a central role in this.

A Small Start and a Subtle Way of Setting Issues Can Lead to a Social Movement

Yoshino: You say that an attitude of learning together, as in the case of the school of killifish, is important for solving societal challenges, but what do you feel are the obstacles to achieving this?

Komiyama: It is the mentality of seniors. This is especially difficult for male seniors. For example, university students teach programming classes at our robotics school. However, since students alone are not enough to make the school run smoothly, we have also enlisted the help of senior employees, such as company retirees, but not many people can successfully fulfill this role. I guess it is hard for them to get away from the feeling they had when they themselves were working. If things change here, I think Japan will change more quickly.

Yoshino: It is extremely difficult to change mentality.

Komiyama: In the USA, "creating high-impact coalitions" and other such initiatives are being used as mechanisms for moving society forward, and these are exactly the same as the Platinum Society Network, which is a coalition of socially influential people working together to solve problems. If such people could come together under loose rules, trust, and a passionate desire to change society, and work to solve problems according to their own circumstances, I believe that this would be a force that could move the current situation in Japan.

Yoshino: As is the case with the initiatives of the COI at Hokkaido University, I think that by bringing together people from various positions—university, business, and local government—to focus on and discuss the most pressing issues in the community, we can more clearly see the fine details of these issues. In other words, I think it is very important that diverse people seriously look at the same issue from different perspectives.

Komiyama: In that sense, the mother and child cohort research that the Hokkaido University COI and Hitachi led with Iwamizawa City is a successful case.

Yoshino: That is an unprecedented project in a world where all specimens are stored for 30 years and use samples of maternal stool and blood, cord blood, breast milk, and infant stool to comprehensively analyze the effects on mothers and their children and to construct a system that provides empathetic care for mothers and their children. In addition, it was the first Japanese municipality to utilize an integrated health data platform and to address the challenges of so-called gut science. The reduction of low-birth-weight babies under

2,500 g from 10.4% in 2015 to 6.3% in 2019 is a significant achievement.

Komiyama: So the important thing is to set the issues. Perhaps the Japanese are good at problem solving, but not so good at setting things up. In Japan, where the declining birthrate is a serious problem, the number of low-birth-weight babies is as high as 10%, the highest among industrialized countries, and so this was set as one issue. I think the primary factor behind the success of the project was the setting of the issues, and as background, the trust of Iwamizawa citizens in Hokkaido University, as well as the addition of a diverse group of influential people.

Yoshino: As you say, I believe this is the result of the involvement of various players and discussions with citizens at a face-to-face level. I think it was also significant that the project was conducted under the national project called COI.

In response to this, the Hokkaido University COI and COI-NEXT "Life Design Co-creation Center for the Mind and Body" are now planning to establish a future human resource development center (Hokkaido University Satellite) in Iwamizawa City. Specifically, the project creates a system that enables young people to understand their own mind and body and to realize a society in which they can live happily in their own way together with others (people). By doing so, the project aims to energize young people and build a new society by helping them to envision how they will lead their lives, including life events such as marriage, pregnancy, and childbirth.

As part of these initiatives, I recently had the opportunity to talk with the ambassador of Finland, which is considered the happiest country in the world, and to my surprise, he told me that 30 to 40 years ago, they too were having a very hard time. The key to why the country is as happy as it is today, then, lies in "early small starts," he says. In other words, they started with one or two small success stories and used them as a starting point for a larger social movement. In this sense, I believe that the Iwamizawa case is a successful example that could be a starting point for social change.

A New Form of Learning, the "Hyper-university"

Komiyama: Recently, I have been calling the university of the future the "Hyper-university," based on the role of universities in social innovation. The case of Tanegashima Island that I mentioned before is centered on an Endowed Chair at the University of Tokyo, but Tanegashima Island itself does not have a university. And so, we decided to call it a "Hyper-university," which is a system where various people gather with the university at the core. When I say "Hyper-university," people are surprised and ask, "What is it?" That is important.

Yoshino: That might resonate with high school students. I have heard that the problem of today's high school students is that they have so many things they want to learn, but there are no courses they want at the university. I guess it means that the subjects they have available now are far from their interests.

Komiyama: The other day, as part of a local redevelopment project, there was a movement to create a place for training AI human resources, and when I consulted with Dr. Ken Sakamura and Dr. Yutaka Matsuo, leading experts in this field, they told me something unexpected. When I said, "AI is based on mathematics, and in addition to that, it requires a curriculum in statistics and informatics," he said, "No, no, you can't say that anymore."

In other words, they say that the flow from basic to applied should be reversed. Since AI, such as deep learning, can now be easily used in applications, we should start by putting it into practice. They say that if informatics, mathematics, or even statistics become necessary in the course of practice, we can learn the basics from there. If mathematics is taught from the beginning, as in the past, half of the students become disenchanted and drop out at that point. And if we also do statistics, everyone will get fed up with it (laughs).

Yoshino: It is better to start with practical knowledge, isn't it?

Komiyama: The same can be said of university business schools. The university professors' talks are all about theory. It should be more interesting to hear from someone with practical experience. But if you think that there is no need for university professors, that is not true. This is because, although the stories of practitioners are interesting, no matter how many of them you hear, they are nothing more than *One Thousand and One Nights*. So, the conclusion is that it is all about conviction. In other words, piling up individual stories does not lead to the key theory. I believe that "Practice × Theory" is indispensable in education, and that only by multiplying these two elements can we solve real problems.

Yoshino: And the better way to enter is through practice.

Komiyama: If students get tired of it from the beginning, then you have done more harm than good. On the other hand, even though the studies of philosophy and history may not have interested them much when they were young, the older they get, the more they want to know about those subjects. In the future, we will have to learn and grow throughout our lives, so I think it is a good idea to study when necessary.

In any case, rather than learning the classics and theories in a traditional classroom setting, we should use an active learning approach, as in the case of the school for killifish. For example, even if we today read Socrates and Aristotle and find much in them that we can relate to with a sense of reality, the world as they saw it and the world as we know it today are very different. In this light, I believe that simply bringing in old knowledge is not enough, and that it is necessary to constantly solve new problems and create new methodologies.

Yoshino: So even when we read the classics, we must draw on contemporary issues and consider the essence behind them. In that sense, what do you think about the liberal arts that are currently the focus of attention?

Komiyama: I define the liberal arts as "the power of knowledge for better living." So, although they may seem useless, I believe they are actually useful. Even basic research is said to be of no use, but there is no such thing as a study without a purpose, is there?

Incidentally, when I was president of the University of Tokyo, I created the catchphrases "intelligence to grasp the essence," "power to feel others," and "courage to lead." In order to live better, all three are necessary, but I believe that the most important of them all is the third, "courage to lead."

What Is Created by Combining the Real World, Data, Experts, and Amateurs

Komiyama: The Faculty of Economics at the University of Tokyo is currently in a very interesting situation. It has invited Professor Takeo Hoshi, a professor of finance and macroeconomics, and Professor Fuhito Kojima, a professor of matching theory, and others from Stanford University, and they themselves have joined the venture, conducting research while committing themselves to real-world economic activities. There is also Professor Tsutomu Watanabe, a leading expert in commodity price research who founded the economic statistics venture company Nowcast, Inc. Professor Noriyuki Yanagawa, who is sought-after from every direction, has also joined. The economy changes daily and is directly connected to business, so there is no reason not to use the world in front of you as a field of study.

In this connection, what I now consider most necessary is a new input-output table* of inter-industry relationships that is in tune with the changing times. For example, the ripple effect from the sale of a single automobile is completely different when it changes from a conventional gasoline vehicle to an electric vehicle (EV), doesn't it? In this light, it is necessary to update the input-output table dynamically, with the coefficients themselves changing in response to technological and social advances. Otherwise, when new technologies such as perovskite solar cells come into widespread use in the future, we will not be able to predict whether we can continue to produce lithium-ion batteries.

Currently, however, the creation of the table itself is mostly a manual process, and it is not yet a usable dataset for AI. Data updates are also slow to begin with. I would like to see companies like Hitachi also focus on this area.

After all, we can neither predict nor discuss the future without having an understanding of the situation as it changes from moment to moment. For example, in the case of military research in Japan, the debate is a choice between "to do or not to do," but in the USA, the level of secrecy is divided into seven levels, and the organizations and people involved at each level vary. Some experts actually determine which studies belong to which level. In order to implement such precise initiatives that are relevant to the real world, I believe that we need materials (data) that will enable us to understand the current situation in detail.

However, there are many things about the unknown that even experts cannot predict. A prominent example was the development of a vaccine for COVID-19. In fact, in early 2020, when the COVID-19 pandemic began, I contacted seven or eight prominent immunologists and asked them when the vaccine would be available. Most of them replied that it would take three to four years at the earliest, usually 10 years. Some of them even said that there was no way that it could be done. In reality, however, the vaccine was on the market within 10 months. As you can see, even experts, or rather, because they are experts themselves, they can sometimes get caught up

* A data set that lists inter-industry transactions of goods and services during a certain period (usually one year) in the form of a matrix as basic data for analyzing economic ripple effects and revising standards for various economic indicators for the purpose of clarifying the overall economic structure of Japan.

in the conventional wisdom of their field. So I am convinced that we will be carbon neutral by 2050.

Yoshino: We have to do what we think we can do.

Komiyama: That's right. By 2050, renewable energy should be the main source of energy, and if we do nothing, Japan will be left behind, worrying about the situation in the Strait of Hormuz, or having to continue paying high carbon taxes.

Yoshino: How did you come to this certainty?

Komiyama: That is because I had discussions with many people and thought about it honestly. To begin with, you noticed that I was doing a reading group when I was in my master's program. It was said that no matter how many journals we all share and read, we have to catch up. I don't have very much time to read all the literature that I need to read. If that is the case, the quickest way is to ask someone who knows. Ask the experts and discuss. However, as with the vaccine mentioned earlier, even experts can make mistakes. This is because they make a mistake in their assumptions. In other words, it is precisely because of the assumptions held by the experts that the involvement of a variety of laypeople is required. I believe that the university has an important role to play in providing a place where this can happen.

Japan's Chance for Revival Lies in the Forest Industry

Yoshino: Finally, I would like to ask your opinion on the areas of societal challenges that should be given special emphasis.

Komiyama: Forestry. To achieve a decarbonized society, we need to move away from fossil fuels such as oil, coal, and natural gas, but we know how difficult that is. Most of the things in this room that I am talking about are products of petrochemistry. So what do we do? In the case of Japan, woody biomass from forest development should be utilized. Fortunately, we can manage to secure enough supply to balance consumption, though not so much that there is a surplus. And the argument is that Hokkaido would be the best place to develop this.

Yoshino: Hokkaido is the ideal scale for creating an advanced model for improving energy and food self-sufficiency. As a matter of urgency, it is necessary for a population of just over 5 million people to be able to live warmly and safely even in winter.

Komiyama: Simply by installing highly insulated houses, it is possible to reduce the annual kerosene consumption from 3,000 liters per house to about 800 liters per house. On top of that, a good combination of biomass, cogeneration systems,

heat pumps, and other devices will lead to further energy savings. Ground heat exchange, in which heat from the ground is exchanged with a heat pump to utilize ground heat, which is stable at around 15°C regardless of the season, is also useful. However, the problem is that in Japan, the cost of digging underground is high. In the USA, the cost is less than one-tenth the cost in Japan. This is true in other industrial sectors as well, and in the case of Japan, due in part to its structural problems, the cost of equipment is generally nearly an order of magnitude higher. I hope that Hitachi will also focus on this area as well.

Yoshino: We need various reforms, not only in technological development, but also in the creation of structural mechanisms. Thank you very much for your time today.