Session 4

Industry-Academic Collaborations Aimed at Innovation

Shifting the focus from "the transfer of academic findings (as intellectual property)" to the "nurturing of open research communities"

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The necessity of collaboration between academia and business is well recognized and, indeed, has come to be actively promoted. As someone who has actually participated, for around 15 years, in practical examples of this collaboration centered in research in one of the fields of photo-functionalized materials, photocatalysis, the current environment for collaboration is remarkably well-off when compared to the one that existed at the time when I started my research. With the initiative taken by the government, many universities and research institutions are now making efforts to transfer their research achievements as intellectual properties into the business world. However, I fear that should a collaboration with industries that aim for short-term profits happen, the innovative findings by the academia will end in vain without bringing about any social or economical innovation. A truly valid example of academic-industry collaboration is the creation of open research communities where the competence of the university in fundamental research and the expertise of industry in scientific knowledge can be fused together into a capability for the development of practical technologies and products. This panel will set out to ponder collaboration between academia and industry that can lead to innovation viewed from the perspective of the research "shop-floor."

Recently, the Research Center for Advanced Science and Technology, to which I belong, carried out a questionnaire regarding "the role of the university in academic-industry collaborations" to both researchers from industry and academia who themselves have experienced first-hand these kind of collaborations. If I can sum up these findings in one phrase it is that there is a risk that "under the current trend, universities could mislead the industries into detecting what their true needs are." In other words, something which is valued highly by the companies, such as "regular discussion," is accorded less importance in self-evaluations from university researchers, and issues like "the transfer of intellectual property" and "advice about obtaining patents" which have a relatively low level of importance to businesses are over-valued in university researcher's self-evaluations. For a person such as myself who has collaborated many times with companies. the result comes across as natural. It is clear that knowledge and know-how that leads directly to the invention of new technology and products is something that researchers from business have in abundance over their university colleagues. On the other hand, what researchers from business are asking their university colleagues for in their regular discussions is advice based on their deep fundamental and comprehensive knowledge, as well as about discoveries and innovations grounded in new scientific phenomenon and observations. That is to say, academics are actually being asked by industry for their fundamental research expertise and their findings resulting from this research.

Fundamental research in academia can be roughly classified into two categories: pure fundamental research and goal-orientated fundamental research. Pure fundamental research is "research around a theme determined by the researcher's own pure intellectual curiosity," and is something which should be judged by a criterion separate from a sociological or economic set of values. However, the possibility of findings generated from this kind of pure fundamental research leading to innovation is not zero. In addition, fundamental research that can lead to innovation is something that the skilled researcher often senses instinctively. This does not mean, though, that the researcher has a clear idea of the end result when he starts his research. While a research that has an apparent end can only generate results within the scope of the imagination, researches with uncertain exits holds a bundle of potential with unlimited possibilities. Results of actual pure fundamental researches which grasp the core of phenomena have the ability to bring about genuine socio-economic changes as well as conferring on society an impact that is both multifarious and widespread. It goes without saying that this kind of research involves considerable uncertainty and it is difficult to predict innovations resulting from this kind of research in any research field. Given this, it is not advisable to concentrate resources in a particular field or researcher in the initial stages. A serious debate should be made on how the people concerned detect researches with potential from within a wide range of research areas and researchers, and also on how they can appropriately support the researches.

Goal-oriented fundamental research, on the other hand, is research that forms the basis of technological innovation in fields with high sociological or economic demands. The four priority fields for promotion outlined in the Japanese Government's Science and Technology Plan Phase 3 and fundamental research in these areas is exactly what is described by the term, goal-oriented fundamental research. A key topic, within this plan, can be said to be government hopes for academic-industry collaboration. However, even in area where the goal of the research is clearly indicated, the efficiency of fundamental research is generally bad. That is to say, even research issues in these priority fields should be carried out both step-by-step and progressively while evaluating the results of the selection and focus of the research. In the initial stages, it would be unrealistic to apply methods in which research funds are invested in a concentrated manner to specific research topics or groups. In the initial research stages in which a new research field is launched, we expect that a gradual investment to a wide range of topics and researchers in stages will bring about better investment results, This, it can be thought, will generate much more efficient results from the investment. It goes without saying, though, that fundamental research of a high quality should be selected even in the initial stages, whereas fundamental researches with no content should be omitted. At a time when Japanese public finance is in tough shape but when the budget treatment given to scientific technology is exceptionally favorable, it is highly imperative for fundamental research within these priority areas to proceed as efficiently as possible and for academic researchers to produce outstanding results. To achieve this, another important topic is the provision of a peer-review system, where researchers receive a review from colleagues working in the same line of research.

In terms of the collaboration between academia and industry, what is important is the stage after excellent results have been generated at the fundamental research level. It is incorrect to think that simply picking up on technical researches that have produced good results and throwing a disproportionate portion of investment resources at it is a way to generate innovation. It is extremely rare for a genius, just by themselves, to

devise an innovation after they have made a scientific breakthrough. In contrast, it is also incorrect to suppose that the most effective approach for generating innovation is to pass these research findings to industry at the earliest possible point. In other words, we cannot expect that outstanding research findings, which form the basis of an innovation, can lead in an almost linear procession from fundamental research to applied research and, then, product development research. If you accurately observe the reality, what happens is that each stage of research is interacted and that research, itself, goes to-and-fro between these various stages. While this is happening, in succession, several talented players appear and it is only at the point where their activities organically combine that we should think of innovation occurring. For innovation to happen, it is extremely important that within an advanced research and development communities, researchers involved in fundamental research, applied research, as well as product development research enhance their research findings by exchanging information, stimulating each other intellectually, as well as entering into discourse with the market itself. Only through this process will scientific and technological inventions lead to scientific innovations that generate new sociological and economic values.

Finally, I would like to point out that open research communities, which lead to such innovations, will function as places for nurturing talents. In organizations which researchers join in a collaborative project, skilled researchers with new types of abilities will grow. With such researchers interacting and stimulating one another, it may become the driving force behind a new round of innovation. In other words, these kind of open research communities where researchers involved in fundamental research, applied research and product development research can interact, act effectively to continuously nurture talent that will create continuous innovation.

As one of the panelists, I would like to generate a productive discussion on how through collaboration with industries, we can create places within the research communities where driving forces for creating continuous scientific innovations occur.