

Introduction

# Prospective Directions of Environmental Business and the Potential of PSS (Product Service Systems)

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Good morning, everyone. As you heard earlier from Director Amano, we launched a new project on the theme of "business and the environment" last April. Director Amano already talked about the project as a whole. Within that eco-business research, there is something called "product service systems" or PSS that my group is in charge of. Over the next three years, we plan to analyze how effective PSS can be in reducing environmental loads. My presentation today will not be a report of research results. Instead, I would like to explain the framework of research that we plan to do and, through discussions with other PSS researchers from abroad, see how far current state of the research on this topic has gone.

Considering that regular research is being done into PSS overseas, we are late-comers, therefore we believe it necessary to collaborate

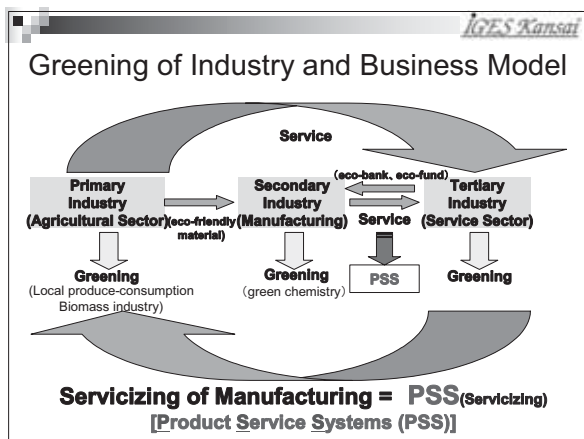
with researchers overseas who are already into PSS studies.

A diversity of activities called the "eco-business" can already be seen in the primary, secondary and tertiary - or if you would - the services industries. We are going to focus on how to reduce environmental load in particularly the secondary industries or manufacturing. Already, Paul Hawken and others offer four business models for reducing environmental load in their book of *Natural Capitalism*.

*IGES Kansai*

BSS Project  
**"Study on Environmentally Sound Business Model" (1)**  
 Topic/Focus

- Greening of Products = Eco-friendly Product
- Greening of Production Process = Clean Production
- Greening of Economic System = **PSS** (or **Serviceizing**)  
 ⇒ Shifting from an Economic System of Selling "Goods" to Selling "Service" or "Function" through PSS.



The first model is about making green products. Green products come from developing and designing eco-friendly products. The second model is not about the products themselves but green production processes, as in building a closed manufacturing loop system, which is called as "clean production" or "cleaner production". A shift has been made towards this "cleaner production" practice to

some degree. The third model speaks of green economic systems that reduce environmental load via changes in business transactions between customers or users and producers and providers. One version of that is to sell services or functions rather than products. The fourth model is about investing in the natural environment. Our research will look at this third model: how well does PSS or "Servicizing" reduce environmental load via changes to the business relationship between customers and providers.

PSS models were not developed to specifically reduce environmental load but rather to respond to changes in external factors that concerned economics, of which environmental redress was just one factor. What must be noted here is that the major issue with businesses that develop and apply a PSS model is not so much the reduction in environmental load that interests us but whether the PSS model is good for business or not, or in other words, whether it is marketable and profitable or not. Accordingly, a PSS model is not just about reducing environmental load. Therefore, we think the first step in our research is to screen for eco-friendly PSS models - let's call them "sustainable PSS models" -- amongst a multiple of models out there.

**BSS Project**  
**"Study on Environmentally Sound Business Model" (2)**  
**Research Scope: "PSS Plus"**

- **1. PSS as usually understood**
  - Many Definitions
  - **Basic Definition (Government of the Netherlands and others)**  
*"Product Service System is a system that is provided as a marketable set of "products" and services" and create value-added which fulfills customers' needs."*
- **2. Recycling-based Products**
- **3. Performance-based Service**
  - Waste Treatment/Management
  - ESCO/Energy-based Service
  - Logistics

+(adding)

We started the project by expanding the definition of a PSS model. A variety of definitions can be found amongst existing models.

The standard definition, as shown in this slide, is "Product Service System is a system that is provided as a marketable set of "products" and services" and create value-added which fulfills customers' needs." By this definition, it is necessary to build a marketable, or in other words, a profitable business model by combining products and services. However, in our research, we intend to screen PSS models for that which reduces environmental load and, by working with another research team in the project, that which enhances sustainability of socially or geographically harmonious areas.

**BSS Project**  
**"Study on Environmentally Sound Business Model" (3)**  
**Methodology**

1. Collecting PSS cases (Japanese PSS cases)
2. Screening collected cases of PSS with respect to:
  - (1) Reduction in environmental burdens
  - (2) Local Sustainability
3. Examining the cases with respect to: (1) Marketability, (2) Reduction in environmental burdens, and (3) local sustainability.
  - (1) Examining the marketability of the cases (examining Non-commercial / profitable PSS)
  - (2) Measuring the improvement in the environmental burdens
  - (3) Measuring local sustainability
4. Analyzing PSS cases
  - (1) Analyzing the factors for success and failure
5. Recommending for stakeholders

In screening for PSS models that reduce environmental load and enhance local sustainability, we will search for a number of models that break with the standard definition and reduce environmental load. To do this, we believe it necessary to slightly expand our perception of the PSS definition. In doing so, we have encountered two environmental load-reducing PSS models that veer from the conventional definition of PSS, because of their environmental load reduction. One is a business model that uses products made of recycled materials. More specifically, as Director Amano mentioned earlier, it adds a service, such as waste sorting or separating, to the discard stage of a product in a disposal-based society to recover that waste as resource. The product is hence made of resources that originated as waste. Though, in a certain way, this

business model gets away from the original definition, it strikes us as a PSS model that couples products and services. In any case, it is our job to include this kind of recycle or remanufacturing model within PSS from the viewpoint of environmental load.

The other model is a "performance-based service", such as to - for example - treat energy not as a product within the domain of economics. Energy is innately a service, but by adding some sort of energy conservation activity to it, projects such as ESCO become possible. This PSS is more a servicizing of a service achieved by adding a new service to an existing service rather than coupling the service with a product. Because this activity clearly reduces environmental load, it falls into the PSS category we are looking for, therefore our intentions are to expand the definition of PSS to include this kind of model in conducting research. We strongly feel that ultimately in the results stage we can expect it to fall within our definition of PSS in some sort of way. In other words, we are looking at PSS models that both reduce environmental load and promote local sustainability.

In Europe and the United States, PSS research began in the mid 1980's and progressed at a rather quick pace through the 1990's. Our guest speakers from overseas today are all leading figures in this field. In Japan, several projects are underway such as the research of Professor Ryoichi Yamamoto and the Global Environment Forum-KANSAI. We will refer to these predecessor studies in collecting and screening examples of PSS in Japan in order to first determine whether or not there are any PSS models as we envision them in our country and secondly screen those that are actually in use based on the definition and two perspectives I gave earlier.

In our research, we will select PSS models that reduce environmental load and PSS

models that promote local sustainability, and analyze in detail as case studies those we identify. Moreover, we will analyze whether or not the PSS is marketable as a business model and the factors that would enable and disable its market launch, or in other words, the success and failure factors.

As for the environmental assessment of the PSS models, the models will be evaluated as to whether or not they have an environmental load reducing effect and, if they do, just how effective it is. These studies have already begun in Europe and the United States. We want to conduct this assessment slightly more from our perspective. In any case, what requires attention in this is that PSS model tends to accompany so called "rebound effect". For example, though a given PSS saves on energy, if twice the energy prior to the energy-savings is used because of lower energy costs, the energy-saving effect would be canceled out. This rebound effect is very important towards assessing the environmental load reducing effect of a PSS model. In that sense, one focal point of the environmental assessment will likely be how to measure this rebound effect.

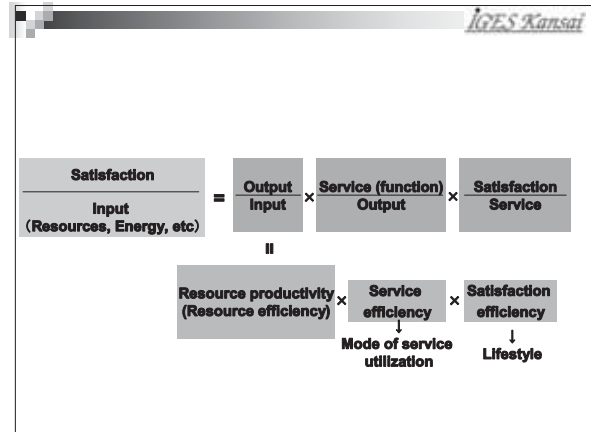
Next, for what regards assessing local sustainability, the key point is generally how well replacing the injection of external resources that form the local economy with internal resources enhances the sustainability of an area in terms of environmental load reduction and job creation. Moreover, though a PSS model is in essence expected to effectively reduce environmental load through the economic activity of private businesses, it should also enhance local sustainability by reducing the environmental load of the area such as by reducing the amount of waste and thus reducing the environmental load of area incinerators. We think it necessary to analyze this relationship and include measurements that can show

us just how much the environmental load of the entire area is reduced in our field of view. In such case, problems will arise that the environmental load reduction should not be double-counted.

Ultimately, we want to conduct this kind of sustainable PSS assessment via case studies in several typical industries in Japan. Moreover, in order to socially promote PSS models, we want to analyze success and failure factors, that is to say, identify which factors lead the PSS model to success and which cause it to end in failure, and then propose the introduction of PSS to businesses as well as make policy proposals to governments.

We want to propose something else as well. Forgive me for repeating myself, but the main purpose of a business introducing a PSS model is not to reduce their environmental load but to improve their profitability, which so happens to effectively reduce environmental load as a side-effect. Nonetheless, there are models that have a big environmental load reducing effect while profitability is not so high. These models are not attractive as business because of the lack or lesser degree of profitability, but they do have a very big social significance. Assuming there are such PSS models of low environmental load, whether their main objective is profitability or not, we want to study them and make proposals in those regards because they are naturally significant projects from a social perspective. If there are any such non-profit sustainable PSS models, how can they be developed? They would likely exist as a social enterprise, community business or community enterprise. Whatever the configuration, it would likely be a niche market. So, how should PSS be promoted within that niche market? Perhaps, an NGO or collaboration with the private sector or some kind of partnership would be necessary. Governmental support might also be

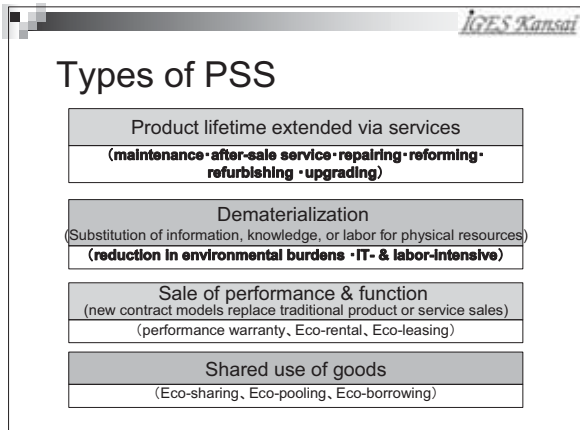
needed. In the end, the questions will be where can this kind of non-profit sustainable PSS model be introduced and how we should go about proposing that.



Let us look at PSS from a slightly different point of view. If we look at the service or function that a product has as the source of satisfaction rather than our owing the product, how much resources and energy must be invested to satisfy us? In this slide, satisfaction/-input is given and then broken down as shown on the right. Doing this, here on the far left of the right side, the issue is resource efficiency or resource productivity, that is to say, the necessary amount of the resource for the production.

The second item on the right side is the degree of service or function that a product has, or service efficiency. In order to increase this service efficiency, or to prolong the service-life of the product, the output given in the denominator can be extended whereby prolonging service that much, or the output can be shared, which enhances usage rate of the service. Thus, to make this service/output a business model is concerning of PSS in general.

However, after looking at this more carefully, another factor comes into play, that being satisfaction/service. What this means is how satisfied we are with a service. Put differently, it is called "satisfaction efficiency" and it is very closely related to the rebound effect

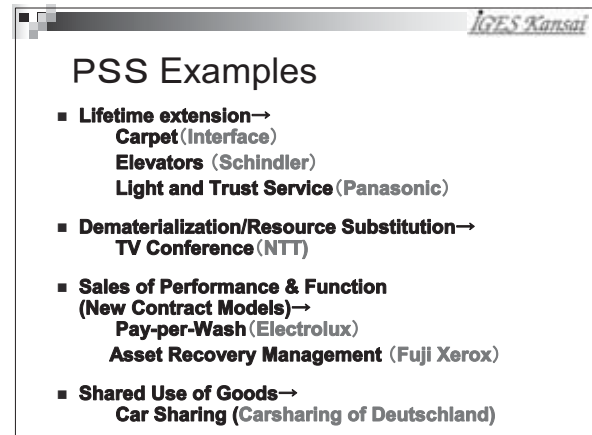


I spoke of earlier. Looked at from that aspect, this rate of satisfaction will vary according to the type of lifestyle one has.

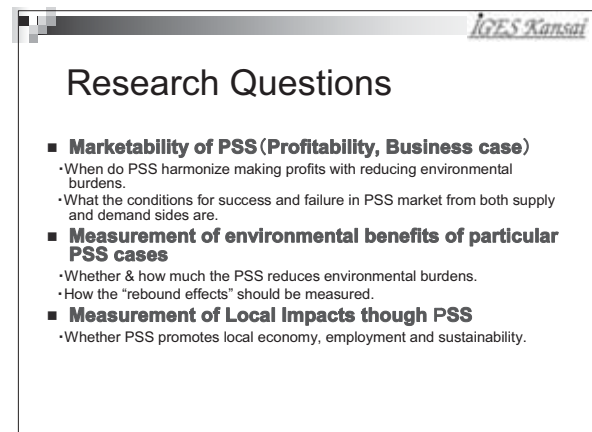
Accordingly, when thinking about PSS, there are service efficiency, mode of service utilization and satisfaction efficiency to think about in addition to resource productivity. In other words, it is necessary to develop a theory by researching this topic from a slightly sociological or socio-psychological perspective.

From this perspective, there are PSS models that sustain a provided service by prolonging the durability of the product, and those that reduce environmental load by using invested resources with lesser environmental load or so-called "dematerialization", by developing the information industry via IT and the use of information, by changing to labor-intensive, but knowledge-intensive work, which necessarily implies some sort of intelligence and not just pure labor, by changing the nature and quality of labor in a certain way, by switching resources to services in a way that increases service satisfaction, or by changing the contract as was mentioned earlier to a lease, rental format or something that assures performance or take-back (product recovery). And, there are PSS models that are based on common ownership.

We are currently collecting information in order to determine which of the types of PSS models I just mentioned are widespread in



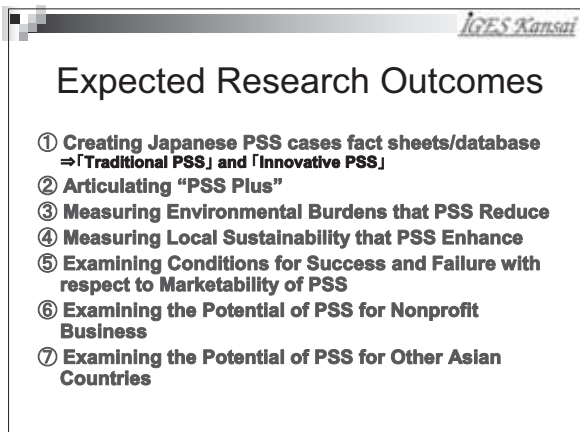
Japan. Naturally, there are more than these four types, but we want to collect examples that conform to these types and develop our case studies around these four types. Both in Japan and overseas, these business models are undertaken in various ways. In any case, talks are planned for today on PSS models in the "Light and Trust Service" by Matsushita Electric, "Third Party Logistics" by Sagawa Express and "Cleaning Services" by Duskin corporation.



I would now like to summarize what I have said. The topics of our research are to see whether PSS functions as a business model in trio with profitability and an improvement to environmental load reduction and local sustainability, and what are the main conditions for that. Plus, we will examine factors on both the supply and demand sides that help put PSS on the market. We further feel it is necessary to direct research at consumer



acceptability, meaning whether or not a model can satisfy the user by providing only service and not ownership, and whether it can change lifestyles or not. Moreover, we want to quantitatively analyze a bit the local sustainability items I mentioned earlier.



As the first step, we want to prepare a fact sheet of what PSS business models there are in Japan by the end of this year in order to understand the development of PSS in Japan. What we will learn is that there are both traditional PSS models and new innovative PSS models in Japan.

For example, nowadays, every home has its own bath, whereas some time ago there were many public baths called "Sento." A public bath can be considered a shared bath in a certain sense. Within the traditional lifestyle of Japan, there are traditional industries pervaded with PSS and its concepts. Ultimately, we want to create a fact sheet of Japanese PSS models that include these traditional industries if possible.

Next, as I mentioned before, through our work, we are bound to encounter several models that the conventional definition does not apply to despite a big effect in reducing environmental load, therefore we want to expand the definition of PSS to encompass those models. We also want to measure the environmental load and local sustainability of PSS as the third and fourth steps of our research. The

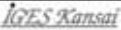
fifth and subsequent steps will be extremely important because, if a given PSS model actually reduces environmental load and increases local sustainability, it will be necessary to promote that PSS. In order to promote that, we want to analyze the factors for establishing it on the market, or success factors, as well as the failure factors, in detail through case studies.

Another point is that we think it is better to think of marketability as profitability, and if the prospects thereof are not good, the model will not be attractive as a profitable business. Nevertheless, that kind of PSS is socially very important from the perspective of environmental improvement. We will look at this kind of PSS by examining whether the model can be developed as a non-profit business or not, and whether it can be provided as a social business or community business or not. This looks at PSS governance.

Lastly, though not shown on the slide, we think it is necessary to include within the scope of our research where the decentralization of power in the form of three in one espoused by the Koizumi administration is promoted, what PSS models mean to small businesses given that most businesses in rural areas are small in size. In addition to this, we want to examine whether these PSS models are applicable in Asia or not and whether research into Japanese PSS models can lead to PSS proposals for Asia.

After all of that and as a conclusion to the planned three years of research, we want to ultimately explore forms of partnerships, burden sharing, responsibilities and governance under an expanded definition of PSS that includes non-profit models, and what sort of governmental support can be used to promote these PSS models.

At present, we have just started working and have yet to screen all models, but in the



**Governance**

- **Marketable PSS**
- **Consider: "Unmarketable" PSS**  
⇒ The Potential of Partnership-based PSS
- **Environmental Regulations and PSS**  
⇒ PSS Promoted by Public Policy

future, we want to study what kinds of PSS models are peculiar to Japan through the international comparison. Moreover, some PSS models will be greatly affected by social systems, cultural backgrounds and consumer behavior, as these can be success factors as well as obstructions. We want to direct our research also at the characteristics of PSS models in other countries through an international comparison that includes such social and cultural backgrounds.

Thank you for your attention.

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The IGES Kansai Research Centre is aware of these problems and wants to research PSS business models as part of a three-year project. To help us with this research, we would like hear about the current trends and present state of forerunning research overseas this morning. In the afternoon, there will be introductions to three representative PSS models in Japan.

To begin things, I would like to hear from Dr. Mark Stoughton, who has been collaborating with the IGES Kansai Research Centre. Dr. Stoughton is perhaps the most versed in servicizing (PSS) in USA. He will be talking about PSS trends in the USA centered on the progress and development of B-to-B, under the theme of "Product Service Systems and Servicizing in the USA".