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March 2005 IGES Kansai Research Centre

Business for Sustainable Society Project :
Inaugural International Workshop 2004

"Environmentally-Sound Business Model – Potential of PSS for Sustainable Production, Consumption and Supply Chain –"

March 2005

Institute for Global Environmental Strategies (IGES)
Kansai Research Centre

IGES Kansai

Proceedings from

International Workshop 2004 on "Business and the Environment"

Environmentally-Sound Business Model

－Potential of PSS for Sustainable Production, Consumption and Supply Chain－

Date : November 16, 2004 10:00a.m. - 5:30p.m.
Venue : International Conference Center Kobe (International Conference Room, 3rd Floor)

Organizer : Institute for Global Environmental Strategies (IGES)
Collaborator: Global Environment Forum-KANSAI
Sponsors : Ministry of the Environment (Japan), Hyogo Prefecture, Kobe City, Asia-Pacific Network for Global Change Research (APN), International EMECS Center, Hyogo Prefecture Liaison Conference for Air EnvironmentConservation, Hyogo Prefecture Liaison Conference for Environmental Conservation in the Seto Island Sea,
10 organizations of the Advisory Board of IGES Kansai Research Center:
〔Global Environment Forum-KANSAI, Kansai Council, Kansai Economic Federation, The Osaka Chamber of Commerce and Industry, The Federation of Chamber of Commerce and Industry in Hyogo Prefecture, Hyogo Prefectural Federation of Societies of Commerce and Industry, The Hyogo Industrial Association, Hyogo Environmental Advancement Association, Hyogo Prefecture Association for Corporate Environmental Conservation, The New Industry Research Organization〕

Inaugural International Workshop 2004 on
"Business and the Environment" at IGES Kansai Research Centre

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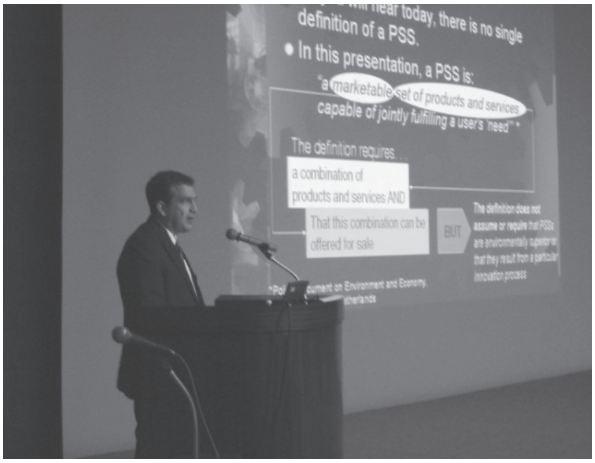
Environmentally-sound Business Model

－Potential of PSS for Sustainable Production, Consumption and Supply Chain－

The Business for Sustainable Society (BSS) Project organised the international symposium and workshop at the International Conference Center Kobe on 16-17 November 2004 to celebrate its inauguration.

The international workshop (16 November) was held prior to the symposium with the aim of examining one of the BSS's core research topics "Environmentally-Sound Business Model" by focusing on the Product Service System (PSS), which has recently become popular in the US and Europe.

At the workshop, the researchers from the UK, the US, Sweden and Germany reported the research trends. Also, three Japanese companies introduced their activities on PSS. Various topics of discussion were made in terms of the mitigation effect of environmental burden, business trends and backgrounds in each country, possibilities of PSS in changing policy measures, and future perspectives. Since the advanced countries' pattern of social change lies beneath the development of PSS, it will be essential to explore how to deal with social needs such as the change of population and labour structure due to ageing and female empowerment.



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Takashi Gunjima Sub-Project Leader, Business for Sustainable Society Project, IGES Kansai Research Centre/ Professor, Faculty of Economics, Doshisha University

Presentations

Session-1 : Current Status of PSS in Western Nations

10:45－11:20 "Product Service Systems and "Servicizing" in the US: B to B evolution and prospects"

Mark Stoughton Senior Scientist, Tellus Institute (USA)/ Visiting Researcher, IGES Kansai Research Center

11:20－11:55 "PSS Applications in the Consumer Goods Industry : Lessons learned in the UK"

Marcus Wong University of Cambridge (UK)

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Oksana Mont Research Associate, International Institute for Industrial Environmental Economics (IIIEE), Lund University (Sweden)

Session-2 : PSS Cases by Japanese Companies

13:30－13:55 "Green Products and Services from Matsushita Electric Industrial"

Shinichi Imai Manager, Corporate Environmental Affairs Division, Matsushita Electric Industrial Co., Ltd.

13:55－14:20 "Environmental Benefit of Rental Business"

Toshiki Yoshimura Section Chief, Environmental Management Quality Assurance Customer Services, Duskin Co., Ltd.

14:20－14:45 "Environmental Business of Sagawa Express"

Kyoichi Bessho General Manager, Environmental Preservation Promotion Department, Administration Division, Head Office, Sagawa Express Co., Ltd.

Session-3 : Implementation Measures - Potential of Governance

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Raimund Bleischwitz Co-Director, "Material Flows and Resource Management", Wuppertal Institute (Germany)

15:35－17:25 *Discussion*

Coordinator Takashi Gunjima

Panelists

Noboru Yoshida (Assistant Professor, Department of Environmental Systems, Faculty of Systems Engineering, Wakayama University)

M. Stoughton, M. Wong, O. Mont, S. Imai, T. Yoshimura, K. Bessho, R. Bleischwitz

17:25－17:30 *Closing*

Takashi Gunjima

Profile

Takashi Gunjima

Sub-Project Leader, IGES Kansai Research Center
(Professor, Doshisha University)

(1947) Born in Fukuoka. (1969) Graduated in Economics, Department of Economics, Doshisha Univ. (1974) M.A. Graduate School of Economics, Doshisha Univ. Research Associate in Economics, Dept. of Economics, Doshisha Univ. (1976) Lecturer. (1979) Associate Professor (1984-present) Professor (1994-1996) Dean, Member of the board of trustees of Association of Environmental Economics and Policy, Former Vice-President of Japanese Association of Economic Policy, Councilor of Association of Experts of Solid Waste Management. Main books are following: "Challenge to Throw-away Society" (Gyousei), "Institution and Policy in Eco-sound Material Flow Society" (Iwanami Shoten).

Mark Stoughton

Senior Scientist, Tellus Institute
Visiting Researcher, IGES Kansai Research Centre

Dr. Stoughton conducts applied research and strategy development for environmental issues at the interface between the public and private sectors. This includes the application of performance-based contracting and environmental accounting to supply chain management, facility-level sustainability reporting, and compliance strategies for regulatory agencies. Dr. Stoughton is also Associate Director of Tellus' Capacity for Impact Assessment and Management Program, which assists international development organizations with environmentally sound project design. At IGES, he focuses on research design for the business models research project of IGES-KRC.
Dr. Stoughton holds a doctorate in Technology, Management and Policy (2000) and a Masters • degree in Civil and Environmental Engineering (1995), both from MIT.

Marcus Wong

University of Cambridge (UK)

Marcus Wong completed his undergraduate studies in Manufacturing Engineering, at Cambridge University. Between 2000-to-2003 he was a member of the Industrial Sustainability group at the Institute for Manufacturing, Cambridge University. During this time he completed his doctoral research, investigating the characteristics of Product Service Systems (PSS) and their implementation in consumer goods firms. His work primarily involved the development of a decision support tool, using case-based reasoning methodology, to facilitate the technical and organisational implementation of PSS solutions. This research has been presented at a number of international conferences, forms the basis of an article in a forthcoming book on Eco-materials and may be accessed at www.sustainablePSS.org. He has also lectured on issues of Industrial Sustainability and has previously worked in technical consultancy. He is currently taking a sabbatical from academic research, while he develops an Internet-based business idea that is not directly connected to issues of sustainability.

Oksana Mont

Research Associate, International Institute for Industrial Environmental Economics (IIIEE), Lund University, Sweden

Dr. Oksana Mont is a research associate at the International Institute of Industrial Environmental Economics at Lund University. She has a PhD in Technology, M.Sc. in Environmental Management and Policy and M.Sc. in Biology and Chemistry. She is involved in projects that study environmental and economic potential of product-service systems, as well as regulatory frameworks for introducing the product-service system concept to companies. Her particular interest lies at the crossroads of consumers' and companies' involvement in developing more sustainable business models. Besides PSS, she is involved in projects on product policy, environmental management systems, cleaner production and waste management. She teaches post-graduate courses in Lund University and other universities of Europe and Latin America, and is involved in educate the educators programmes.

Shinichi Imai

Manager, Corporate Environmental Affairs Division, Matsushita Electric Industrial Co.,Ltd.

Mr. Imai graduated from School of Science and Engineering, Waseda University and joined Matsushita Electric Industrial Co.,Ltd in 1971. He had engaged in products designing, technical management and products planning in Air-conditioner Division and has been in charge of environmental accounting and promotion of recycling of used products in Corporate Environmental Affairs Division since 1998. He has also worked at IGES as a senior visiting researcher from June 2001 through March 2004. His publications include "Environmental Accounting of Matsushita Electric Groups" (Environmental Management Vol.35,No.12, 1999) and "Current Status and Issues on the Evaluation of Corporate Sustainability Management" (IGES Kansai Research Centre Discussion Paper 2003-No.5).

Toshiki Yoshimura

Section Chief, Environment Management Quality Assurance, Duskin Co., Ltd.

Graduated from the Department of Chemical Environmental Engineering of the Faculty of Engineering at Oita University in 1984. Joined Duskin Co., Ltd. in the same year and worked at Production Division. Moved to Development Laboratory in 1990, to Environmental Management Division in 1998, and to Quality Assurance Division (current office) in 2003.
Assistant Judge for CEAR Environmental Management System, A3597.

Kyoichi Bessho

General Manager,
Environmental Preservation Promotion Department,
Administration Division, Head Office
Sagawa Express Co., Ltd.

Established an environmental council at the company headquarters in 1997 on the opportunities presented by COP3. Has played a core role in promoting environmental protection at Sagawa Express ever since. His outside activities include the following: Tokyo Metropolitan Conference for New Market Creation (member), Kinki Federation of Environment Councils of Japan Long Haul Tracking Association (member), Sports and Environment Committee of Japan Olympic Committee (member), and Nikkei BP Environment Management Forum Steering Committee (member) etc.

Raimund Bleischwitz

Co-Director, "Material Flows and Resource Management",
Wuppertal Institute (Germany)

Economist (PhD), Policy Advisor, Research Manager. Since November 2003 Co-Director of the Research Group 'Material Flows and Resource Management' at the Wuppertal Institute in Germany as well as 'Toyota Chair for Industry and Sustainability' at the College of Europe in Bruges, Belgium. Previous positions have been hold at the Max Planck Project Group on the Law of Common Goods in Bonn, at the Wuppertal Institute, at the Institute for European Environmental Policy and in the German Bundestag. Coordination of a governance study on behalf of the Japanese Government since 2000. Fellowships in Japan, Seoul/Korea, USA, and London/UK. Main fields of expertise: Governance of sustainable development, resource productivity (Factor 4), institutional economics.

Noboru Yoshida

Associate Professor, Department of Environmental Systems
Faculty of Systems Engineering
Wakayama University

Graduated from Osaka University in 1988. Doctor of Engineering (1998).
Towards sustainable production and consumption, Prof. Yoshida has conducted researches mainly on product and social systems design for recycling of industrial products, materials, biomass, and so on. His research also involves product service systems, green purchasing, material flow analysis, local currencies, environmentally friendly life styles etc. A book on the above issue, Industrial Society towards waste minimization, was published by Morikita Shuppan Co., Ltd. in 1998 (partially contributed).

Opening Remarks

Director, IGES Kansai Research Centre
Akihiro Amano

I would like to welcome everyone here today--the eminent researchers who have come a long way from overseas to be with us, and the participants from organizations across Japan. It is a great honor for me to have an opportunity to give opening remarks at Inaugural International Workshop on “Business and the Environment” 2004.

Since opening in 2001, the IGES Kansai Research Centre has been promoting a 3-year research project on the theme of “Business and the Environment”. On those foundations, we launched a new “Business for Sustainable Society” project with a 3-year mandate.

There are two reasons for focusing this theme on the relationships between business/industry and environmental problems/sustainability. One is that the Kansai area has many people doing environmental research from a sociological perspective. The second is that the economic world of the Kansai has chalked up efforts to directly combat environmental problems. The Kansai Research Centre got started with the goal of building environmental efforts of the 21st century from the bottom-up, that is to say from communities and businesses, by tapping these human resources and experiences. In fact, many of the researchers here are from businesses or local governments.

As has already been pointed out to everyone attending today, global environmental problems of the likes of global warming are currently heading in the opposite direction of a sustainable society despite the ardent efforts of many.

In order for local communities and businesses to build a sustainable society, we want to explore future development scenarios from both the perspective of environmental business models and eco-friendly technology and locals systems, and hopefully pick which scenario to pursue.

At today's workshop on environmental business models, Product Service Systems, (PSS) on which international research has been recently moving forward, will be reported. With many frontline researchers from Germany, Sweden, UK, USA and Japan, as well as representatives from Japanese corporations that are developing and applying advanced business models, I suspect many problems will be discussed deeply such as what are the current trends in international product service systems, why do they continue to expand, and what sort of outstanding issues are there.

Product Service Systems, which are sometimes called “Servicizing", are a revolutionary business model. I see this revolutionary business model as having emerged about the same time as the environmental policy thinking of extended producer responsibility or, as it is called in the USA, Extended Product Responsibility. People are beginning to think that the foundation of a recycle-oriented society is that a producer's responsibility does not end when he/she sells a product to a customer as it goes on well beyond that to when the product is consumed. The practice of this as a business model includes the concept of product service systems or servicizing.

Businesses and consumers are changing the conventional framework of production, distribution, consumption and discard. New mixes of products and services are being provided through

cooperation between various organizations. In the meantime, businesses are creating business value by reducing their environmental load on the one hand and strengthening their competitiveness on the other. This kind of case is widespread.

We will hear many reports at today's workshop, but there are many things I would like everyone to think about as well.

No matter what is said, it will be very interesting to see what role this new business model, which is called a virtuous cycle of economy and environment, will play in building a sustainable society and what kind of public policy is needed to fully demonstrate this role.

As you know, since Russia ratified the Kyoto Protocol, the Protocol goes into effect at the beginning of next year. I cannot help but feeling that we are finally diving into a carbon-restricted society. I believe the time has come to strive for the ultimate goal of product service systems or, servicizing, which is a business model that eliminates the restrictions of carbon rather than a business model to address a carbon-restricted society.

I ask that everyone here at the workshop stay until the end and constructively add to the discussions. This workshop also is tasked with proposing points of discussion at the international symposium that will be held tomorrow. We hope to have your participation at that symposium as well.

Thank you for your kind attention.

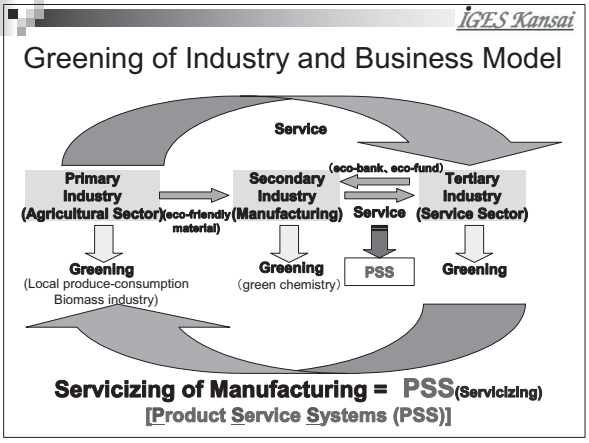
Introduction

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

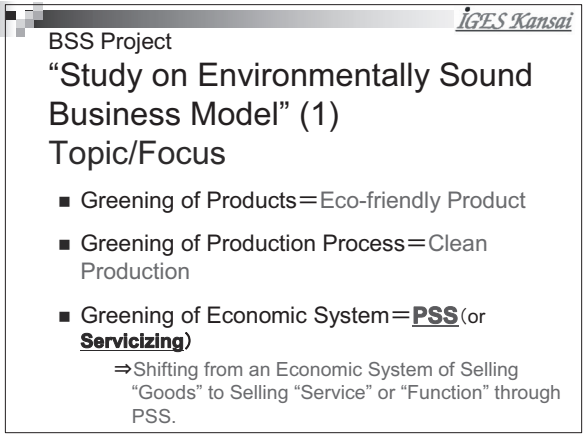
Sub Project Leader, Business for Sustainable Society Project (BSS)
IGES Kansai Research Centre
Takashi Gunjima

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.



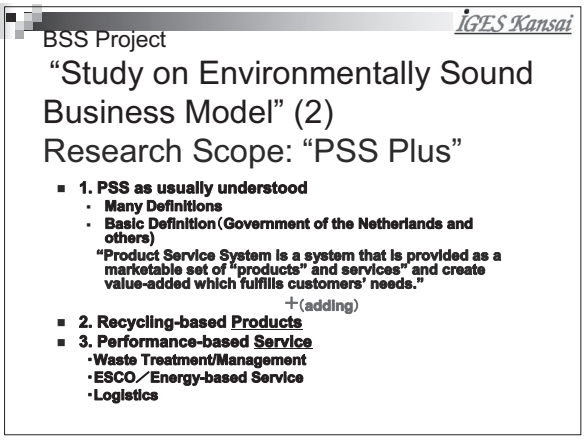
A diversity of activities called the "eco-business" can already be seen in the primary, secondary and tertiary - or if you would - the services industries. We are going to focus on how to reduce environmental load in particularly the secondary industries or manufacturing. Already, Paul Hawken and others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



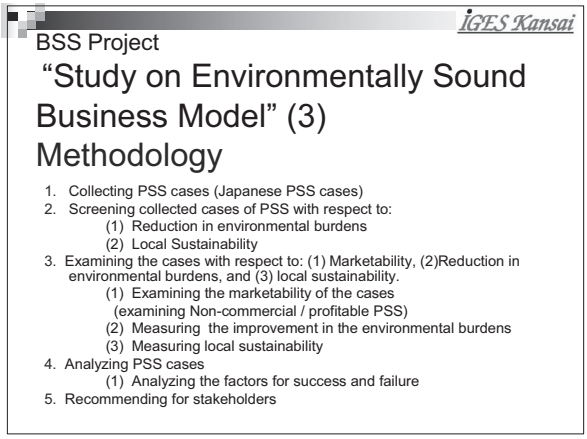
The first model is about making green products. Green products come from developing and designing eco-friendly products. The second model is not about the products themselves but green production processes, as in building a closed manufacturing loop system, which is called as "clean production" or "cleaner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



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.



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.

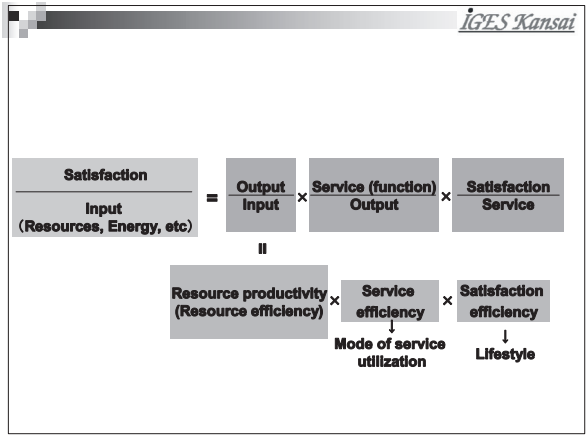
As for the environmental assessment of the PSS models, the models will be evaluated as to whether or not they have an environmental load reducing effect and, if they do, just how effective it is. These studies have already begun in Europe and the United States. We want to conduct this assessment slightly more from our perspective. In any case, what requires attention in this is that PSS model tends to accompanies so called “rebound effe ct”. 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.

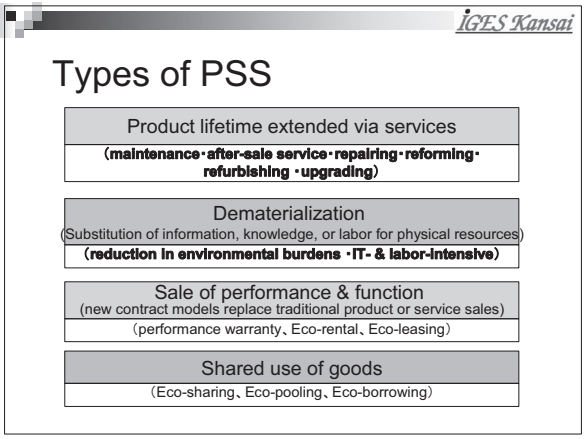
We want to propose something else as well. Forgive me for repeating myself, but the main purpose of a business introducing a PSS model is not to reduce their environmental load but to improve their profitability, which so happens to effectively reduce environmental load as a side-effect. Nonetheless, 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

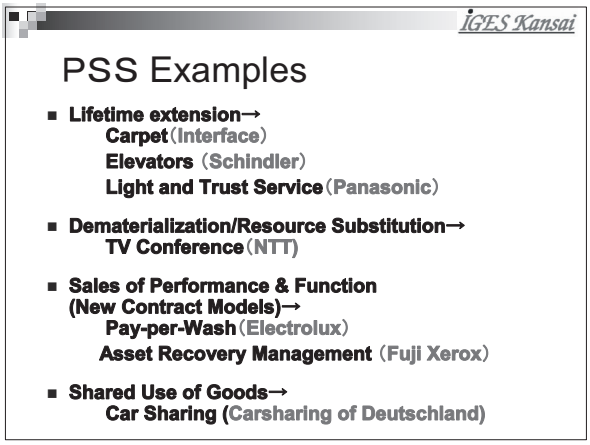


I spoke of earlier. Looked at from that aspect, this rate of satisfaction will vary according to the type of lifestyle one has.

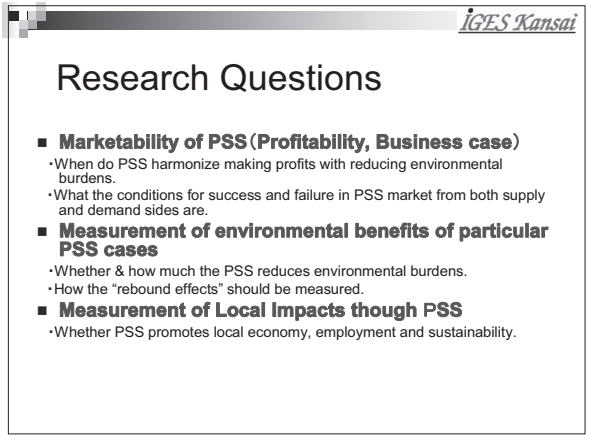
Accordingly, when thinking about PSS, there are service efficiency, mode of service utilization and satisfaction efficiency to think about in addition to resource productivity. In other words, it is necessary to develop a theory by researching this topic from a slightly sociological or socio-psychological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

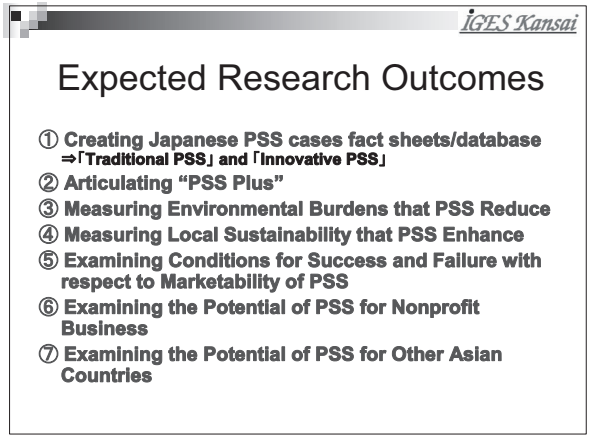


Japan. Naturally, there are more than these four types, but we want to collect examples that conform to these types and develop our case studies around these four types. Both in Japan and overseas, these business models are undertaken in various ways. In any case, talks are planned for today on PSS models 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.

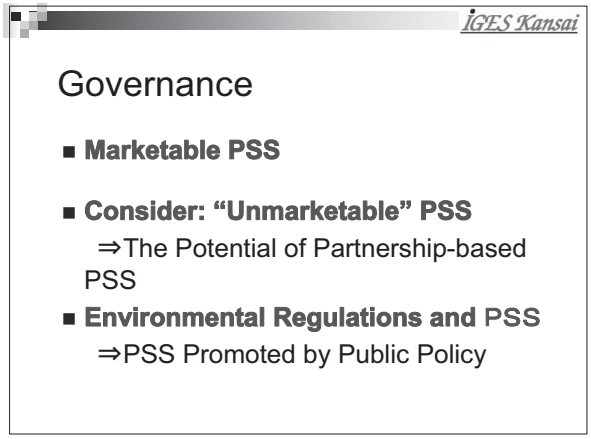
Next, as I mentioned before, through our work, we are bound to encounter several models that the conventional definition does not apply to despite a big effect in reducing environmental load, therefore we want to expand the definition of PSS to encompass those models. We also want to measure the environmental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



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.

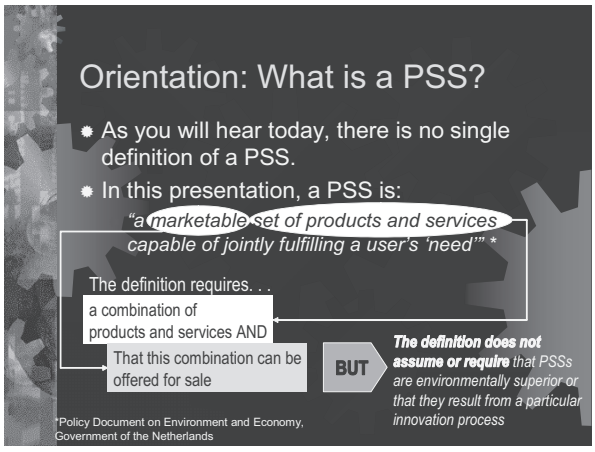
To begin things, I would like to hear from Dr. Mark Stoughton, who has been collaborating with the IGES Kansai Research Centre. Dr. Stoughton is perhaps the most versed in servicizing (PSS) in USA. He will be talking about PSS trends in the USA centered on the progress and development of B-to-B, under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

Session-1

Product Service Systems and "Servicizing" in the US: B to B evolution and prospects

Tellus Institute (USA)
IGES Kansai Research Centre
Mark Stoughton

Good morning. As Professor Gunjima introduced me, my topic today is product service systems in the United States with a focus on the business to business context.



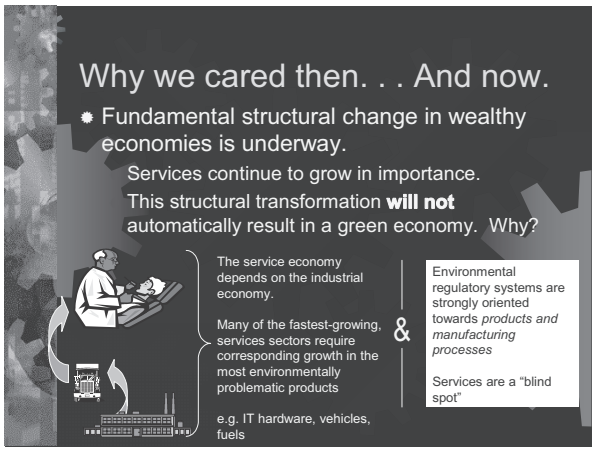
In common with all of the other presentations today, this presentation uses a particular definition of product service system (PSS). There is no single, accepted definition. So, I'll give you mine, and I'm sure that the other speakers will give you theirs. In this presentation, a PSS is a marketable set of product and services that together fulfill a user's need. So this definition has two important requirements. There must be a combination of product and service, and that combination can be offered for sale. This definition does not assume or require that PSSs are environmentally superior or that they result from a particular innovation process or a particular course.

In this presentation, I'm trying to give some idea about the evolution and prospects of product service systems in the U.S. context. So I think a very useful way to start is to look back and see where they have come from.

Five years ago, Tellus Institute assessed emergent trends in business to business product service systems in research commissioned by the U.S. Environmental Protection Agency. This was before the term "product service system" entered the common usage. The term we used was "servicizing". We defined servicizing as; the emergence of a class of product-based services offered by traditional product manufacturers who were now viewing products as a vehicle or platform to deliver service or function.

Today, I would classify servicizing as one important class of product service systems. It's not the whole product service systems, but, it's one important piece. We undertook this research 5 years ago for the same reasons that

product service systems are important now.



There is a fundamental structural change underway in all the wealthy industrial economies. Services continue to grow in importance. They are the economic lead sectors. However, this structural transformation will not automatically result in a "green" economy.

There are two broad reasons for this. The first is on the left hand side of the screen. If you look at a service economy, you see that the service economy relies on an extensive manufacturing sector and other services such as transport. The example of medical services is given on the slide; the services that a dentist delivers require a very large amount of manufacturing and transportation. Many of the fastest-growing service sectors require growth in the most environmentally problematic products, for example, information technology. The growth in trade services requires the growth in transport, vehicles, fuel. In general, environmentally problematic products underlie the growth in services.

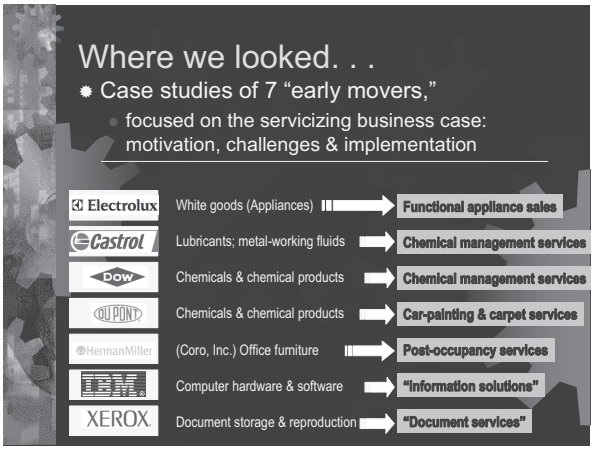
The second reason is that environmental regulatory systems are strongly oriented towards the regulation of products and manufacturing processes. Services tend not to be well-regulated. They are blind spot in the regulatory system.

So, if you look at the structural transformation, and you look at the environmental challenges it poses, there is a clear conclusion:

We must find a way to make a service- and information-led economy a "green" economy. And more specifically, we must figure out some way that services can change the way that products are made, used, and disposed of.

In short, if services continue to require more utilization of traditional products, we've got a problem.

The appeal of product service systems is that in principle, they can change the way that products are made, used & disposed of.

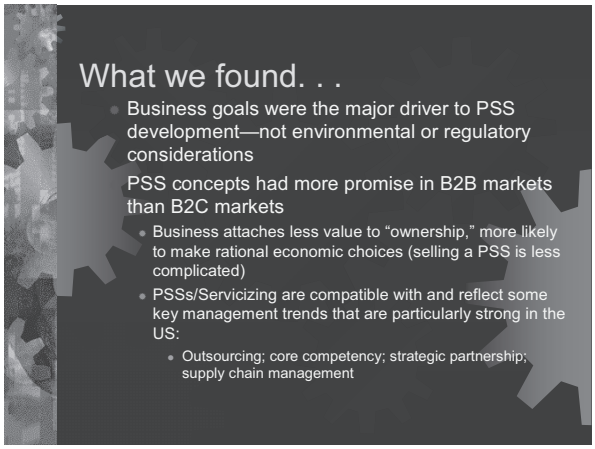


So, in our study five years ago, we looked at case studies of seven early mover companies that were deploying pioneering servicizing business models. We focused on the servicizing business case. We wanted to know what motivated the companies, what challenges they faced, and how they implemented these models.

I won't go into detail in this presentation,

regarding the seven cases. As you can see from the company names, these were on the whole large companies with the well-known products. They were all traditional manufacturers and were experimenting with making profit from product-based services.

Our research was not limited to passive or desk-based study. Since 1998we've been actively engaged in an applied research and piloting of a business to business PSS model. This is performance-based Chemical Management Services. The goal of this PSS is to create financial incentives for chemical suppliers to help customers reduce their chemical use and their chemical risk. We carried out this work via a non-profit organization called the Chemical Strategies Partnership (CSP). The work has been very hands-on. We have more than 15 collaborations with private sector and institutional partners. We've assessed the business case with them for this PSS, helped them develop requests for proposals, and assessed Chemical Management Programs already in progress.

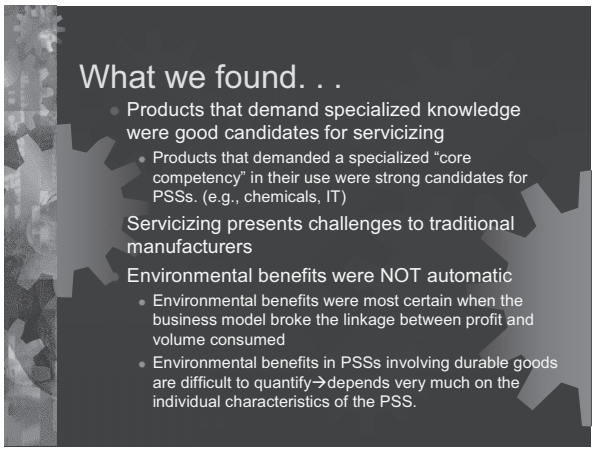


So, what have we found via this hands-on research and what did we find from the more traditional research?

First, we found that business goals in the U.S. context were the major driver to PSS development, not environmental values and not regulatory requirements.

Second, we found that the PSS concepts had more promise in business to business markets than business to consumer markets.

This was for two reasons. The first is that business attaches less value to ownership. Business tends not to care if it owns a car or rents a car. It's concerned with the cost and availability of the service or function that the car provides. So, selling a PSS to business is often easier. The second is that PSSs and servicizing are compatible with and reflect some key management trends that are particularly strong in the U.S. context. These are trends like outsourcing, a focus on core competency, a focus on strategic partnerships, and supply chain management.

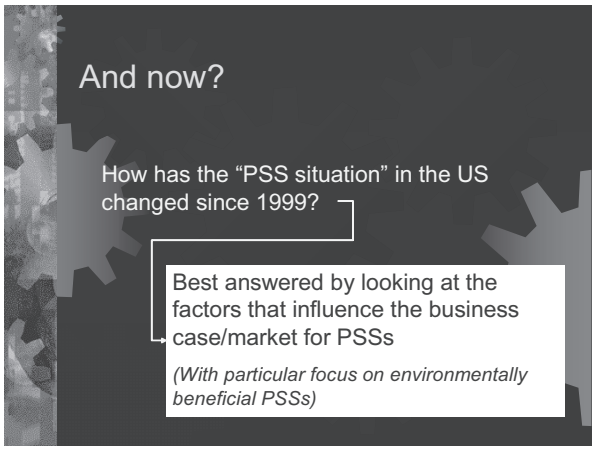


Third, we found that products that demand specialized knowledge were good candidates for servicizing. Examples are chemicals and information technology. Many people use information technology without really understanding it. Many people have a need to use

chemicals, but are not experts in the environmental aspects of chemical use and in the handling and in the disposal.

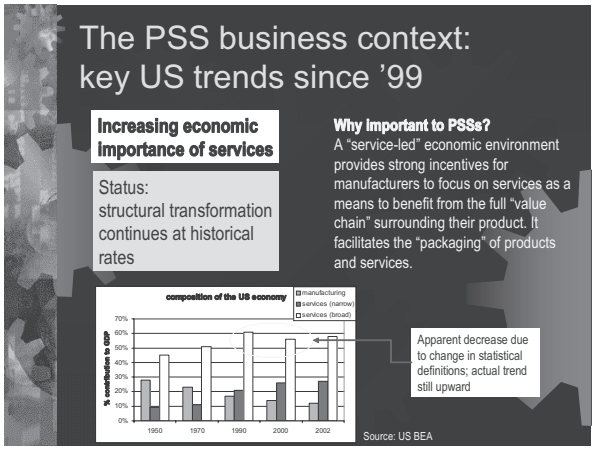
Fourth, we found that servicizing presents challenges to traditional manufacturers, mostly because servicizing can separate profit from the amount of product you sell.

Finally, we found that environmental benefits were not automatic. Environmental benefits in PSS were most certain when the business model broke the link between profits and the volume of products consumed. Many businesses and researchers have focused on PSSs as applied to so-called durable goods. (That is, goods like refrigerators, televisions, and automobiles). We found that the environmental benefits of PSSs applied to these products are very difficult to quantify and it depends very much on the individual characteristics of the PSS, and the speed of technological change in the product.



So, these were our findings five years ago. Now, how have things evolved since then? The way to answer that question is to look at the factors that influence the business case or the market for product service systems. I'm going to particularly focus on factors that may influence the market for environmentally beneficial product service systems.

The first point to note is that the US trend towards the economic dominance of services continues. The structural



transformation of the US economy continues more or less at its historic rate. This is important because the service-led economic environment does provide strong incentives to business as a whole to focus on services as a means to benefit from the full "value chain" or the full amount of profit that is generated in the economy due to their product. It facilitates the the joint marketing of products and services.

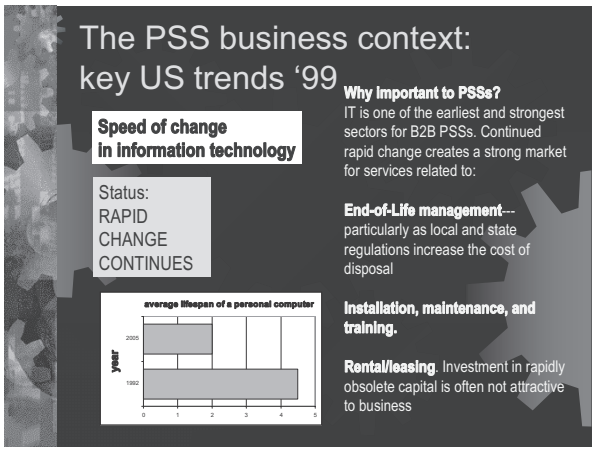
Another key trend is that the globalization of supply chains and markets (a trend that includes outsourcing) has continued strongly. This is relevant to PSSs for a few reasons.

First, there is a huge and growing demand for logistics services vis a vis the management of supply chains and the movements of parts and products across national borders.

Second, many businesses see services as a way to defend home markets from new outside competitors.

Third, outsourcing generally increases the market for business to business PSSs. You're willing to go outside your company for services that previously you accommodated inside your company.

However, close interaction between suppliers and customers becomes more difficult when the supply chain is global. And exactly this type of close interaction is required for many business to business PSSs.



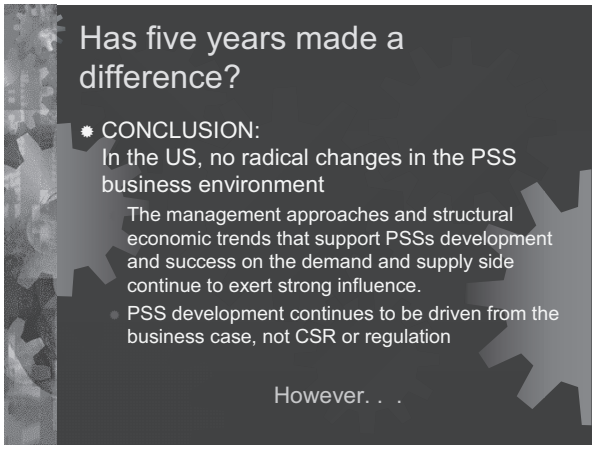
Another key trend is the speed of change in information technology. The trend here is that rapid change continues. This is important for PSSs, because rapid change creates a strong market for services related to end-of-life management of computer equipment, and for services related to installation, maintenance, and training of information technologies. It creates incentives for customers to seek alternatives to owning short-lived equipment and software. Businesses are not happy if they must make capital investments in equipment that is rapidly obsolete. So, the IT sector is likely to continue to be a very strong sector for business to business PSS.

Another important factor regarding the business environment for PSS is environmental regulation. Here we have a very mixed story. Regulation is important to PSSs because regulatory requirements-particularly for extended product responsibility-can create markets for PSSs that address end-of-life management problems. Regulation can create markets for PSSs in environmentally critical areas such as energy efficiency, chemical management, and waste management. However, as we look at the U.S., there is no strong EPR policy or regulation at the national level and under the current administration, it most certainly will not happen. At the state and local level, we see significant activity regarding end-of-life management for electronic waste (e-waste). Some states and regions are discussing CO2 emissions restrictions. Meanwhile, international firms based in the U.S. must comply with European end-of-life requirements and restrictions on the use of certain toxic substances.

The final trend or issue of interest for PSS business is consumer demand for "green" products. This is important because "green demand " can create markets for B to C PSSs that are focused on providing "greener solutions" like

car-sharing. Green consumer preferences are also likely to translate into demand for corporate social responsibility.

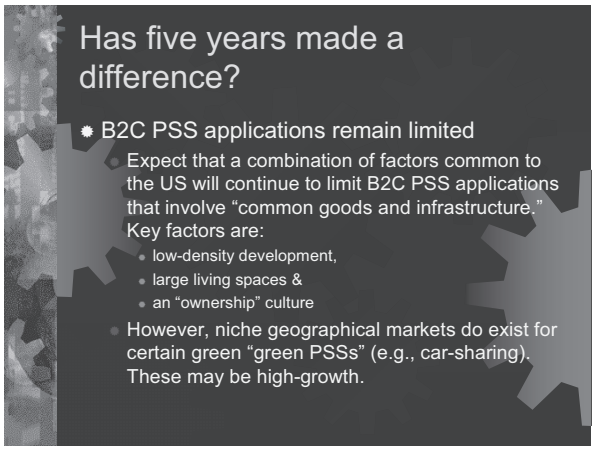
As we look at "green" demand in the US, we do not see any single clear trend. It's extremely easy to find headlines and news stories that point to growing consumer demand for " green products". However, if you look at other indicators of consumer preferences, the story becomes more complicated. US consumers as a whole continue to show a preference for large cars and to demand lowest-cost retail goods, not environmentally preferable ones.. The financial scandals in the U.S. have put corporate, government and civil society focus on *financial* corporate responsibility, not corporate *social* responsibility.



So, where are we today? The clear conclusion for me is that there are really no radical changes in the US PSS business environment now as compared to five years ago. The management approaches and structural economic trends that support PSS development and success continue. PSS development continues to be driven from the business case, not from corporate social responsibility or regulation.

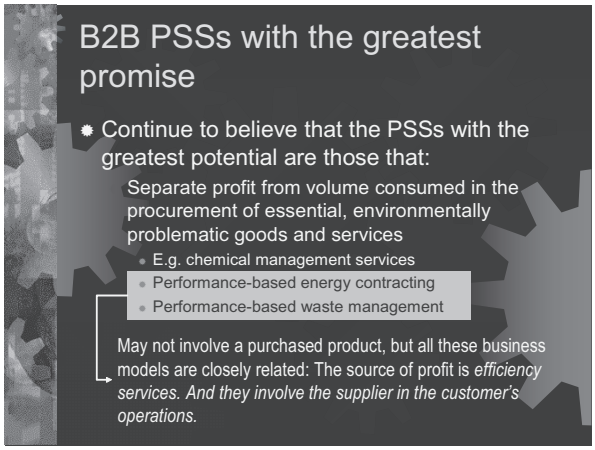
However, there are certain regulatory trends that favor or require end-of-life management services for certain products. The most prominent example is information technologies; however, automobiles and appliances also are

experiencing these requirements to a lesser extent. In these sectors, we see regulatory incentives for end-of-life oriented product service systems.

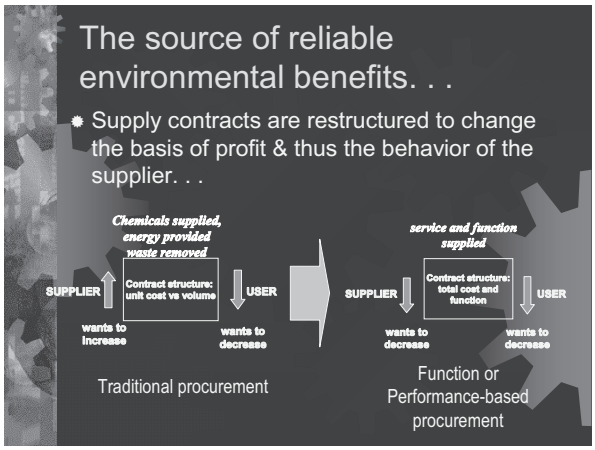


In general, however, business to consumer PSS applications remain limited. I would expect that a combination of factors typical of the U.S. will continue to limit B to C applications that involve common goods and infrastructure. (For example, car-sharing.) Those factors are the low-density development & large individual living spaces typical of the U.S., and a culture that values the ownership of products. However, certain niche or local geographic markets do exist for "green PSS businesses". Again, car-sharing is the most common example. And these green PSS businesses have experienced high growth in these particular markets.

What we've seen over the last five years leads me to continue to believe that the PSSs

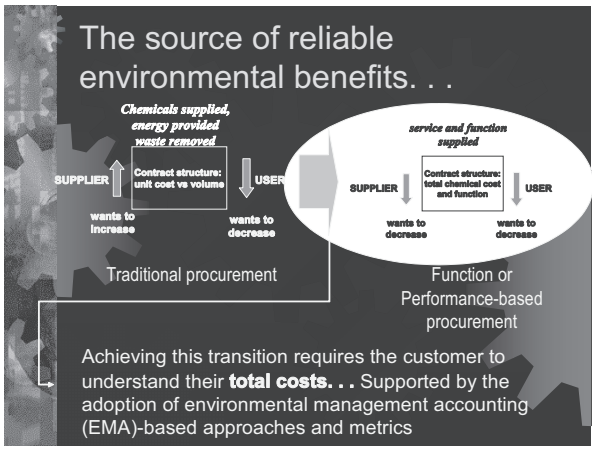


with the greatest potential are those that separate profit from volume in the procurement of essential and environmentally problematic goods and services. Examples are chemicals, energy and waste. All such PSSs create a market for efficiency services and involve the supplier in the customers' operations.

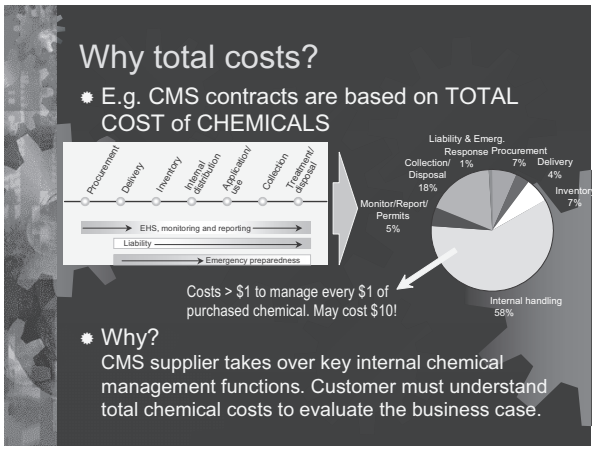


These PSSs all are characterized by the transformation of the basic contract or basic relationship between the supplier and the customer:

In traditional procurement, the supplier makes profit by selling more; more of the product, more chemicals, more energy, and more waste removed. In function or performance-based procurement, the incentive to the supplier changes. For example, the customers are not paying the supplier the liter of cleaning solvent, but per circuit board cleaned. They are not paying per unit of electricity, but they are paying for lighting services. In this arrangement, the supplier has incentive to reduce the use of the environmentally problematic product or service.

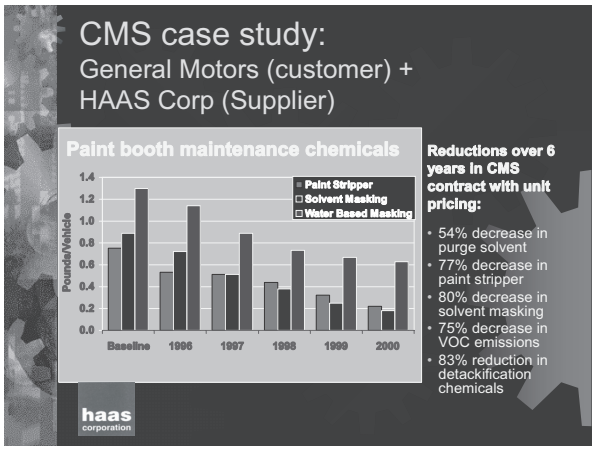


Achieving this transformation of the basic contract or source or profit almost always requires that the customers understand their *total costs*. This means that the movement to performance-based procurement is supported by- and almost *requires*-the adoption of *environmental management accounting approaches.*

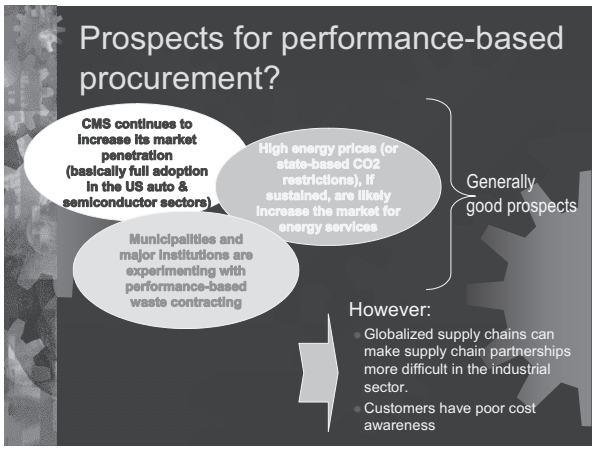


If you look at the example of chemical management services (CMS), you can see this. The chemical customer of course incurs the cost of purchasing the chemicals. But the customer also incurs the cost of delivery, inventory, internal distribution, collection, treatment, and disposal, and environmental compliance. If you add up all of these costs, it always costs more than one dollar to manage every dollar of chemical purchased. If the customer doesn't understand that, they will never believe that

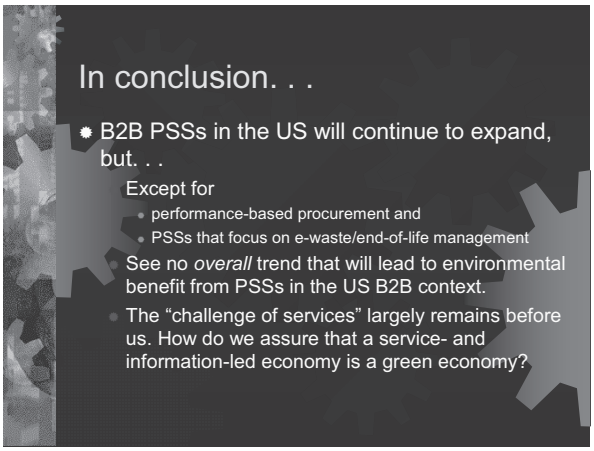
purchasing chemical management services makes economic sense.



Where the customer does understand the total cost argument, you can get very dramatic improvements. This is a graph of a chemical and paint use in a General Motors assembly plant in the painting operation. And it depicts decreases on a per vehicle basis that are the direct result of the CMS program



I think the prospects for performance-based procurement are more generally good. CMS continues to increase its market penetration. Current high energy prices or state-based CO2 restrictions, if they are enacted and sustained, are likely to increase the market for energy services. Municipalities and major institutions are experimenting with performance-based waste contracting. However, not all factors in the market encourage the growth of performance-based procurement: global supply chains do pose barriers, as does poor cost awareness among customers.



So, in final conclusion, business to business PSSs in the U.S., I believe, will continue to expand, but, I see no *overall* trend that will lead to environmental benefit from PSSs in the U.S. business to business context. There are two important exceptions; the performance-based procurement examples that I named just now, and PSSs that are focused on end-of-life management for e-waste, vehicles, appliances. For the US economy, the challenge of services remains: How do we assure that a service- and information-led economy is a "green economy"?

In my personal opinion, achieving a green service-led economy will require more substantial public policy involvement and regulatory drivers than there have been up to now. However, performance-based procurement is at least an important first step towards greening the service economy.

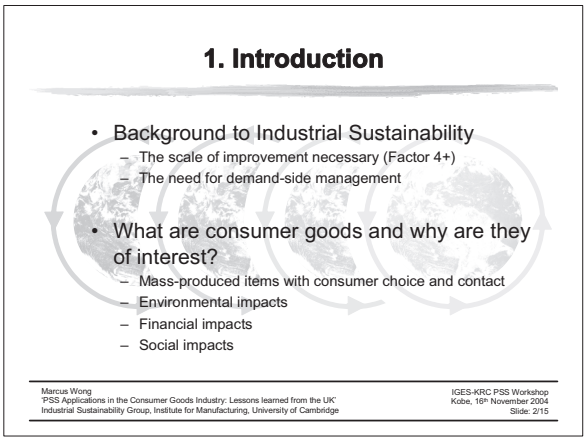
Thank you for your attention.

Session-1

PSS Applications in the Consumer Goods Industry: Lessons Learned in the UK

University of Cambridge (UK)
Marcus Wong

Good morning and welcome to my talk. Hopefully, I can provide a counterpoint to Stoughton-san's work which focused on B to B work in the U.S. My research concentrates mostly on the consumer goods sector and Business to Consumer in the UK and in the EU.

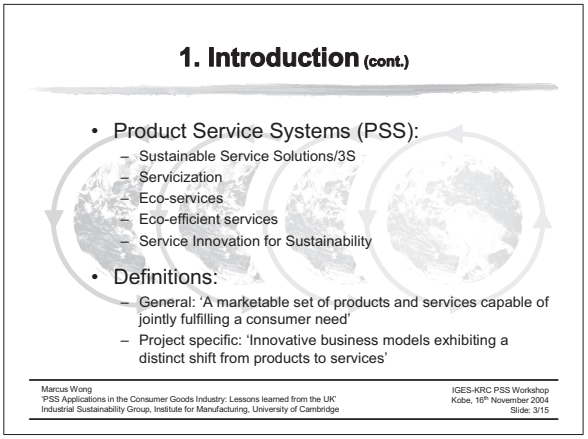


The environmental and social pressures driving Industrial Sustainability are well known; I propose to mention just two specific points, as they have a bearing on the concept of PSS solutions. The first is that the issues of cleaner or greener products are only likely to produce 10%, 20%, may be 15% improvements and most commentators suggest that we require improvements of Factor 4, Factor 10, or even greater Factor 50 or 100. The second point is that there is a great need for demand management - Factor 4 improvements in eco-efficiency are of little use if demand also increases fourfold. PSS solutions are perhaps to only means so-far proposed that can directly tackle these two issues.

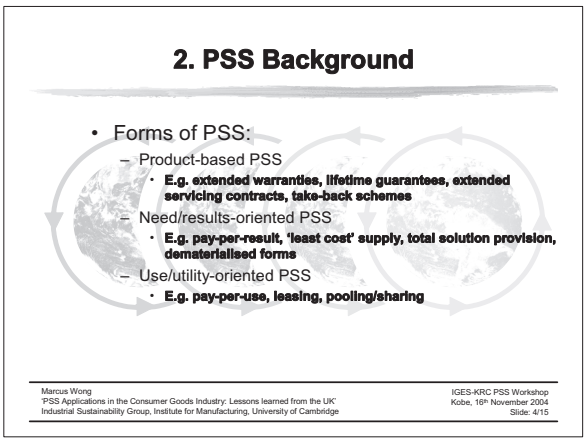
The research looks specifically at the consumer goods industry. Consumer goods have been defined as mass-produced items, where the consumer has a level of choice and a level of control over the use of these particular goods. This excludes such things as pharmaceuticals and also housing and foods, but explicitly includes such sectors as the automobile sector, consumer electronics, household goods and clothing.

Why are consumer goods of particular interest to us? Firstly, consumer goods have significant direct environmental impacts, in terms of energy consumption and waste generated per household. Consumer goods are also financially significant, in terms of the proportion of GDP and the proportion of exports. However, it is for social reasons that consumer goods are of particular interest. There is Western saying: ‘you are what you eat.’ In this particular context, perhaps it is better to say: ‘we are what we consume.’ Consumer goods seem to embody and reinforce the values of the society that created those goods and thus there is a great promise that by changing consumer goods so may in turn start to effect a change in societal values, towards a less resource intensive and more fulfilling model.

There are many definitions of PSS and also many different names for PSS solutions. The most common definition is: ‘a marketable set of products and services capable of jointly



fulfilling a consumer needs.' This is obviously a very broad and very wide definition, and potentially includes such things as a standard one-year guarantee that one may obtain with a standard TV set or wash machine. This research has focused specifically on more innovative and novel models, and so the research definition of PSS is: 'an innovative business model that exhibit a distinct shift from products towards greater services.'

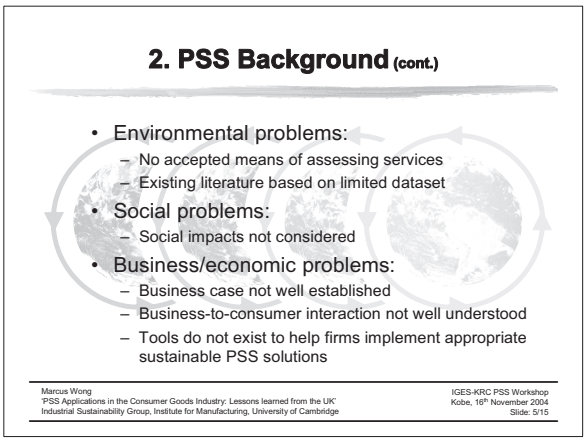


There are many different forms of PSS: The first is warranties, guarantees, and servicing contracts. These were accepted as being innovative if they were applied in new ways and/or in new industries e.g. the Nike Air to Earth take-back scheme, which uses novel collection and recycling techniques. Also, there are outdoor clothing and equipment manufacturers that not merely offer one year or two-year guarantees but lifetime guarantees. These things are particular of interest, because they increase the functionality and life cycle of the products. However they are essentially still product-based -they take the existing products and add a service to them.

The second class is a needs/results-oriented PSS i.e. pay-per-results. This is akin to the idea of functional sales. If you see that the functional sale is achieved without any physical products, we may say that the function has become dematerialised. Within this research, there are a number of case studies which deal with this form of PSS, including the on-line, the on-demand provision of software, and also the peer-to-peer downloading of software-both these replace the physical CDs and CD-ROMs that would otherwise have to be produced and bought.

The concepts of 'least cost supply' and ' total solution provision' take a broader view of the needs which require fulfilment. A good example of this (already covered by Stoughton-san in a previous lecture) is Chemical Management Services, whereby instead of just the functional fulfillment associated with chemicals, associated services to do with providing advice/consultancy, transportation and even storage facilities are also included.

The last class of PSS solutions, 'use and utility-oriented PSS,' include leasing and renting schemes. Both leasing and renting schemes are very common but may be regarded as innovative and creative if they are applied in new ways and/or to different industries. An example covered in the research involves the quite well known example of Interface, whereby they have leased carpet tiles instead of selling carpet tiles. Also included is a case on Ford, which involves an innovative business to consumer leasing models for their electricity cars. Under renting schemes, the research also covers a case study involving Phillips, which involves a pilot study for the



renting of digital camcorders and PDA (Personal Digital Assistant)-style city guides.

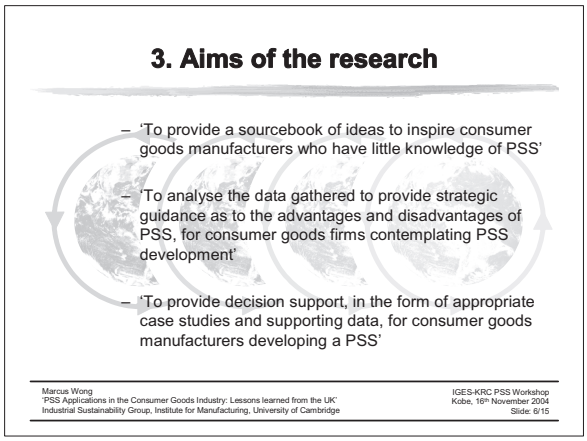
Sharing schemes involve the group ownership of a single product, whereas pooling schemes involve a single owner allowing a wide group of people to use those products. The research includes car-pooling and ride-sharing case studies.

Other papers have discussed the great potential for PSS. However, there are number of gaps in the existing knowledge base. The first and perhaps the most significant of those gaps involves the lack of an accepted means of assessing services from environmental standpoint. This is a significant problem, and concerns the definition of the system and how widely to take the system boundaries. It also concerns the problems of rebound and re-spending effects. This is not something which is directly addressed by the research; instead, a rough-cut estimation method has been used to assess environmental effects. The existing literature is also based on the somewhat limited dataset - the same case studies appear again and again.

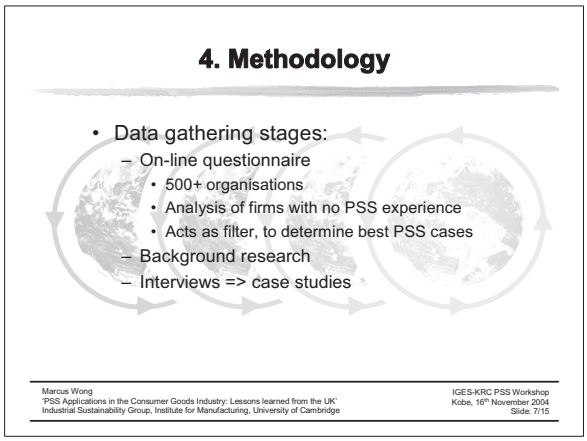
If you look at the existing literature with respect to social problems, most case studies barely mention the social impacts of PSS solutions. Looking at the business and economic case for PSS implementation within the existing literature, the business case is not at all established. Manufacturers and academics know a great deal about the development of services. However, the development of sustainable PSS services, services that perhaps move from products towards greater service intensity, is not at all well established. Also, the research which is being carried out is not very accessible and easily-understandable for firms.

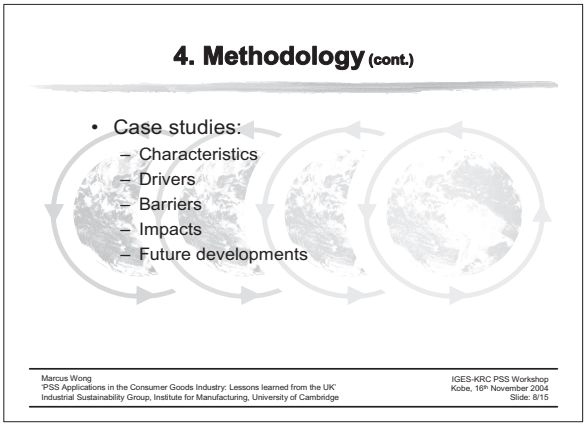
Finally, the business-to-business interaction is somewhat better characterized than the business-to-consumer interaction.

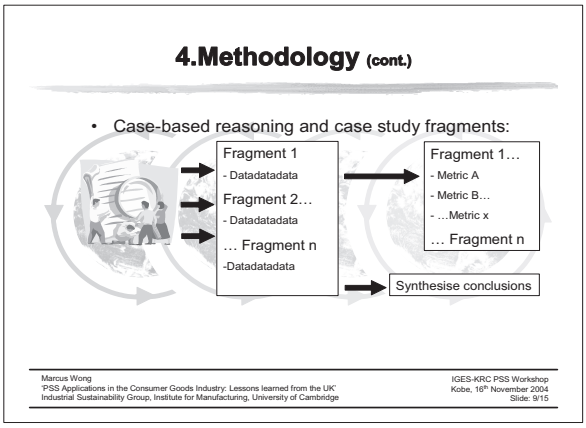
This research has looked specifically to address these issues on three distinct levels.

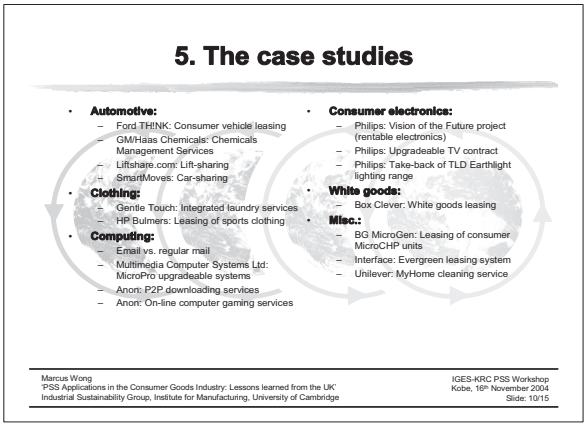


The first level is to act as a source of inspiration, creating a database that can easily and quickly tell interested-parties what is already available. It also involves gathering new case studies, rather than simply using the existing data. The next level is to analyse the data and draw out trends and conclusions. And the third level is to pull all that information together in a way which is easily understandable and accessible to companies.



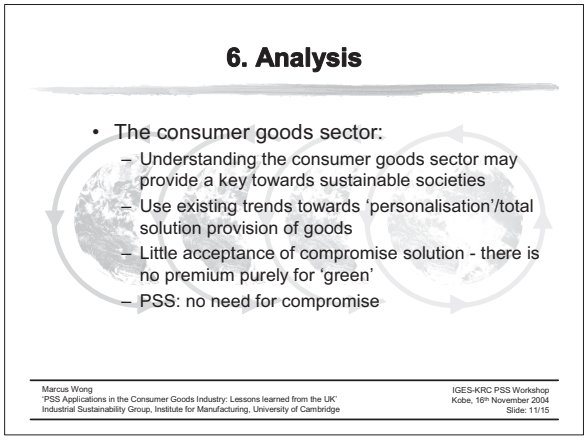






The methodology used for data-gathering involved on-line questionnaires, talking to the companies that had carried out PSS solutions which fulfilled the criteria and also carrying out a great deal of background research. This data produced a series of case studies, covering the typical areas covered in a case study. The case studies were structured using the methodology called 'case-basedreasoning.' The following are the critical conclusions drawn from across the case studies.

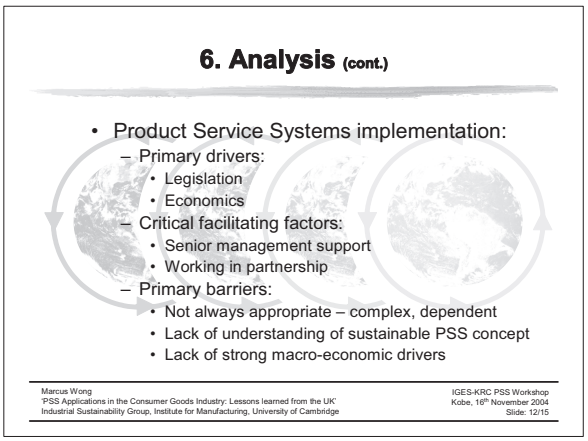
The first conclusion is that consumer goods



appear to be a good place to begin i.e. the correlation between consumer goods and consumer behavior is quite close - consumer goods often have a very personal interaction with the consumer. They are bought for very emotional and often non-rational reasons. And thus, the idea that potentially we can change consumer behavior through consumer goods, has some support.

The second point is that the shift towards services is already happening in the consumer goods sector. We see that customers are increasingly looking for personalized goods and the issue of mass-customisation is increasingly becoming important for consumer goods firms. Consumers in many sectors often do not want physical goods but instead are actively seeking functional fulfillment. These are already trends that are well established in the consumer goods industry. By greening these trends, by making them sustainable and integrating PSS into these solutions, PSS may piggy-back on these existing developments.

There is little evidence for the acceptance of a compromise-solution - consumers are unlikely to pay extra simply for a greener product. However, PSS does not necessarily entail the compromise. PSS solutions can be better in terms of value for money as they can offer greater functionality and greater perceived quality. PSS should be marketed not so much as a greener solution but simply as a better solution, that also happens to be a greener.



Legislation is the key driver that have pushed PSS implementation in the consumer goods industry in the EU. While there is little legislation which mandates for the development of PSS solutions, legislation is increasingly being framed with extended producer responsibilities at its core within the EU e.g. the Waste of Electronic and Electrical Equipment (WEEE) and End-of-Life Vehicle (EoLV) Directives. PSS and service-based solutions are increasingly attractive means of dealing with end-of-life issues and take-back issues.

Economics is also a key driver. None of the cases covered in the research were driven simply for altruistic reasons - they were all driven because the companies noted particular market needs that they felt that PSS could best exploit. For example, companies like Phillips look specifically at environmental issues to gain competitive advantage over other firms.

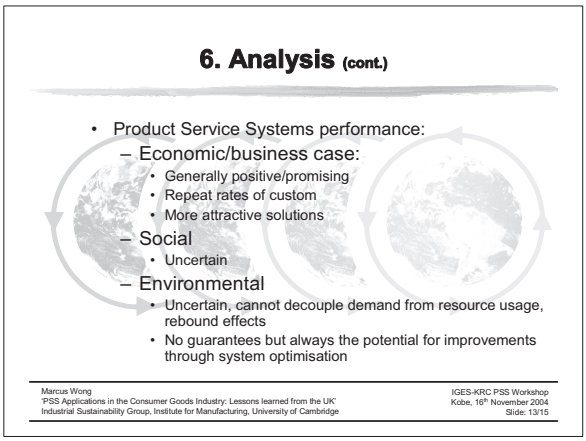
There are number of other factors that, while they may not drive implementation of PSS, nevertheless had to be in place for successful PSS implementation. The first of these is senior management support - having a credible and highly visible champion for the PSS project at a high management level appears to be very important. The example of Interface Carpets shows much difference such a champion can make. The issue of working partnerships is also very important. It is often the case that a single firm cannot deliver the entirety of the PSS - it needs to be done in collaboration with suppliers, retailers etc. A good example is again Chemical Management Services, whereby it took a collaboration with suppliers, transportation, unions, shop workers and of course general workers and management themselves to bring about PSS implementation.

However, there are of course significant barriers to PSS implementation as well. Firstly, it is not always the most appropriate means of going forward. It must be employed with a great deal of sensitivity to the context. PSS solutions are also often more complex to develop, involving more elements to design and to develop than a typical product-based system.

There is also a lack of understanding of the PSS concept. Many manufacturing firms, when looking to generate greater profit, look primarily to squeeze the production cost and perhaps the cost associated with supply, together with looking to sell greater volumes of physical products. PSS fundamentally addresses this mindset. It suggests that instead of squeezing production and supply, it may be possible to extend the value-chain and derive profitability from use, from post-use and even perhaps from recycling and re-use. Instead of greater profitability only being associated with greater volume of sales, it may be possible to generate greater profitability with less physical sales. This idea is often a very difficult one for management to accept, shown again through the example of Interface, whereby an employee re-education system had to be introduced to help employees change their particular mindset.

Finally, there is a lack of a strong macroeconomic driver. PSS would be easier to implement if there were strong systems of eco-taxation but unfortunately these things do not currently exist.

The economic and business case for the case studies in the research is generally very good. However, it must be pointed out that



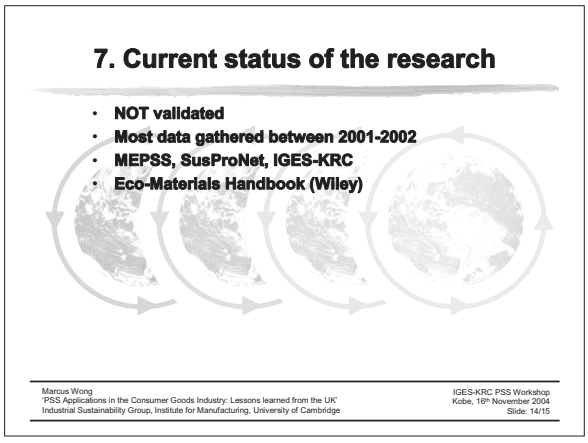
within the research, most of the cases involved only early implementation of the PSS concept. Thus, the situation at the moment is promising rather than proven. The potential is great due a number of reasons:

The focus on ICT/de-materialization often leads to reduced production cost. Also higher profit margin are often possible through offering greater functionality and marketing the idea that PSS may be a better solution, not just a greener one.

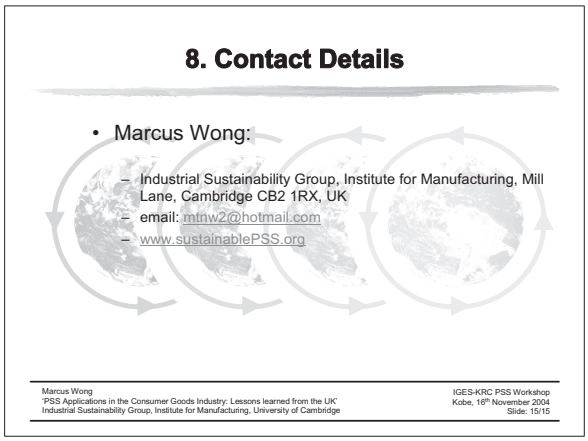
The PSS concept typically ties the consumer more closely to the manufacturer, making repeat-rate custom more likely. This obviously also has implications for customer protection.

However, the social performance of PSS solutions is somewhat uncertain and it is also very much tied up with environmental performance. In terms of the environmental performance, firstly one can say that service cannot entirely decouple demand from resource usage. Services at some point still consume energies and still consume materials. Furthermore, rebound effects are extremely significant in the consumer goods industry. For example, giving a non-PSS example, if one has a more efficient car engine, this may save the consumer a sizable amount of money. However, as the cost per mile drops, it may encourage the consumer to drive more and so the efficiency gain is lost. In consumer goods, the 're-spending' rebound effects is particularly important. If the PSS leads to a cost saving to the consumer, the consumer then may spend it on other, non-associated services and goods. One means of minimizing this re-spending rebound effect would be to keep the price of the PSS at a comparable level to an existing product-based solution, so that there is no re-spending effect. However, by keeping this price high, there are implications for social inclusion. Thus, in consumer goods and for PSS, there is often a balance to be traded off between social performance and environmental performance.

However, through all of this, the focus on systemic innovation and system optimization shows that there is always greater potential for superior environmental performance, even if that potential is not at the moment always realized.



The tool developed as an outcome of this research has not been validated i.e. it has not been tested in a company. Most of the data was gathered between 2001 and 2002 for my



PhD research. The data and the associated analysis is also being used by research organizations as MEPSS, SusProNet in the EU and also IGES and also for my thesis and an article in a forthcoming book.

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Prof. Yoshida:

I have a question regarding "6. Analysis." You mentioned one of the primary drivers for implementing PSS is "legislation." I wonder if you are referring to legislation from UK or the one from EU as a whole?

Wong:

In terms of the research that I have carried out, most of the legislation is primarily, originally, from the EU. But the way that works in Europe is that directives are sent out at EU level, but actual implementation of those particular directives are then up to the nations within the EU to implement. So the original drivers are definitely from the EU.

Session-1

Trends in PSS Field in European Union

International Institute for Industrial Environmental Economics
at Lund University (Sweden)
Oksana Mont

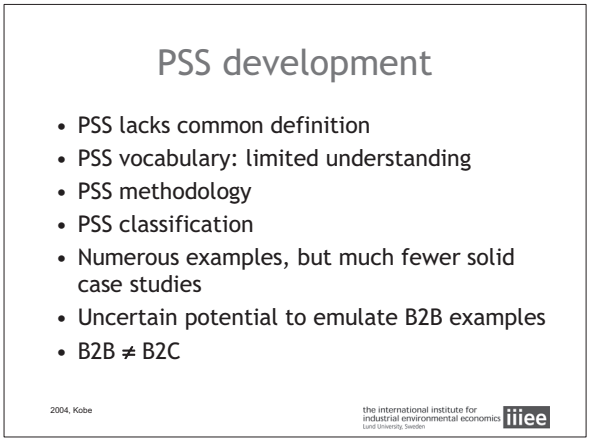
Good morning, everyone. I am very pleased to be here. It is a great honor and I am sure we have a lot to learn from each other.

Now, I would like to share some experiences from a decade-long research in the area of product service systems in Europe. It's exactly ten years ago when the first workshop on "eco-efficient services" took place in 1994, at which some thirty of researchers from Europe presented initial results on eco-efficient services.

However, the idea has a much longer history. One of the prominent researchers in this field was Walter Stahel. His original idea on the product service systems came from the idea of servicizing products, meaning not exactly selling function, but trying to extend the life cycle of products by re-manufacturing products and recycling materials. So, that was the original idea.

Later the research focused primarily on moving from material product to immaterial services. At some point of time, researchers believed that it wais possible to move from selling material products to providing immaterial services. However, then it was realized that any service is supported or delivered with help of material products and any product in its turn is supported by material systems of production, consumption, transportation, and infrastructure.

As the previous lecturer said, there is a



lack of common definition and in Lund we define product service systems as a system of products, services, infrastructures, and networks of actors that are brought together to develop a system that is competitive, satisfies customers and that has lower environmental impact than traditional business models. I think it is very important to add the environmental sustainability or soundness of product service systems to the definition. Many researchers define product service systems very broadly as a marketable set of products and services, which leads to a large number of examples and projects that have very little systems approach and at best can illustrate services added to services. However, since the shift to delivering services is not more environmentally sound, adding services to products does not lead to reduced environmental impact.

This confusion was clearly demonstrated at the last conference in Brussels when

companies presented traditional products with added warranties or with IT software added to products with no record of reduced environmental impact and any suggestions for improvement. So, for this research area to develop as a strategy towards sustainable development, it is very important to have a clear definition and in Lund we are placing much more focus on systems thinking and that is why we say that it is important to define PSS as a system as consisting of elements of products, services, infrastructures and networks to help companies define elements on which they should work on. Also because any offers the company sells on the market consists of material products and immaterial services in whatever form even retailing is a service which is added onto any products.

When it comes to vocabulary of product service systems, it is a strongly restricted to a very limited research community. Therefore, when one visits or works with companies it is important not to impose own terms, but instead learn the terms and strategies that companies are using.

In Scandinavia, companies operate with the term "functional sales", implying that profit is linked to selling function instead of selling a number of products. At such companies we emphasis that functional sales is a financial mechanism, one element of a product service system. We stress that in order for a company to create a more systematic way of developing product-services in a more environmentally sound way, one needs to look at how services are designed, how products are designed, how networks with actors who deliver products and services to the final consumer are created.

In recent years, European Union funded many projects on developing methodology how to develop product service systems in companies. The results of these projects were reported at the last conference on product service systems in Brussels held in October 2004. The current concern is that first of all methodologies are too many. They differ quite a lot from one another, depending on companies, sectors and agencies that developed these methodologies. So methods developed by energy-efficiency companies might not be useful for companies that provide car-sharing services or chemical management services. The general conclusion is that there is a clear need for a simplified and commonly accepted general methodology, which identifies the main PSS elements, but leaves the details of PSS development and implementation to companies, since each company works in its own settings and its own context.

When it comes to product service systems classification, also previous speaker mentioned traditional classification that is used widely which is the result-oriented services, product-oriented services, and need-oriented services. In my opinion, this is not a classification that divides services into separate categories. These are also rather elements of product service systems, because different systems can have specifically designed products for specific use, or additional services or can provide products through sharing or leasing arrangements. So, they are not exclusive categories, but rather you can look at the elements as ideas for what types of elements could be added to create a total system.

Now there is a quite a broad range of examples of product service systems towards different sectors. However, concern is also that we lack really deep case studies which would investigate each particular case in details and provide the historical data developed of context-related data and so on. And another concern is that these cases which we have available in the PSS field, they are often not written in business language. So if you want

these cases to be disseminated to many or to larger population of companies, we need to write them in business management language to speak to managers of companies and not to may be only environmental managers.

Also cases differ in their dissemination extent. Some cases, like car-sharing, are restricted to niches. Some cases like chemical management systems are used quite broadly in automotive industry, 80 percent of companies use chemical management services.

Looking at individual company, famous Interface case actually only creates five percent of profit from leasing carpets, the rest comes from producing carpets and selling them. And if you are looking at the company like Schindler Hose Lease, Elevator Power, they create 75 percent of their profit from leasing services. So we should also be aware that there are not many companies who are completely working on PSS models. Often new companies are created for delivering systems solutions. Very seldom producers would shift 100 percent of the operations to the new models.

It is also quite unclear from the cases we have how well companies can use existing knowledge and create their own PSS. The famous Xerox company leases copy machines, takes care of maintenance and services, and takes back copiers for re-manufacturing and recycling. The company has been developing the idea for more than a decade starting with simple increasing efficiency of production processes, moving towards product design and finally towards service and system-based solution. It took the company more than ten years to create system that it has now. And the question is: can other companies permit themselves to spend decades on developing these new business models and whether it is possible to learn from existing systems and develop model which would help other companies leapfrog and create system solutions in much shorter time. This is still an open question.

Researchers in Europe primarily investigated business to business cases. Lately we saw that a focus is shifting toward consumer foods and to business to consumer cases. It is in this area that totally new challenges arise, because in business to business, there are direct relations between business providers of PSS solutions and business customers. There is often no direct relation between producer of consumer goods and final consumers. Not to mention that there are millions of final consumers. So providing customized solutions is very expensive or in principle impossible in private market.

An additional problem is that there are often additional actors between producers and final consumers. These might be service organizations who provide services to households or community-based companies including housing companies who have direct link to consumers and who might take the role of providing services.

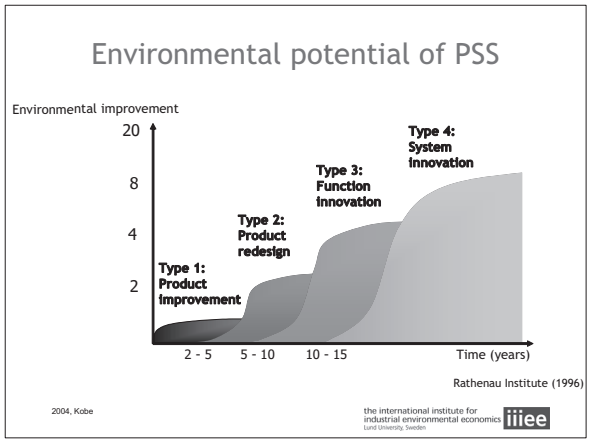
Good development is also that PSS are being found and developed in many sectors. We started with very few cases in a couple of sectors; chemicals, energy-efficiency sectors. Now we have examples from a much broader range of sectors; car-sharing and washing services from private households, leasing of sport goods, and do-it-yourself tools and gardening equipment. These are examples in a business to consumer case and market.

The problem here is that often these services are not supported by changes or adoption of product design. In business to business cases, we see much more concurrent development of products and services. However, on total, we do lack cases where product design would go hand in hand with service design and each of these elements is adopting for development in the other one.

Speaking about policy, at the European level, we do see some shift in policy development. There are no direct policies towards product service systems, primarily because the area is too young. Secondly, we lack clear answer regarding circumstances under which do reduce environmental impact. It is too early for direct policy intervention. However, strict legislation in general in environmental area and especially in extended producer responsibility does trigger companies to explore innovative solutions and more system-oriented solutions.

Our experience is that in chemical sector, legislation or cost of compliance are very high. This triggers companies to look for outsourcing and for sharing responsibilities with professionals that handle chemicals for them. In energy sector, in many European countries we see market deregulation which leads to increasing competition and then companies simply cannot survive on the low-profits from selling energy. The trigger here is purely economic; they need to survive on the new deregulated market.

The PSS concept advocates the idea that by improving one element of the system will not allow us reaching the target which is accepted by many environmental experts - Factor 20 and higher (see picture below).

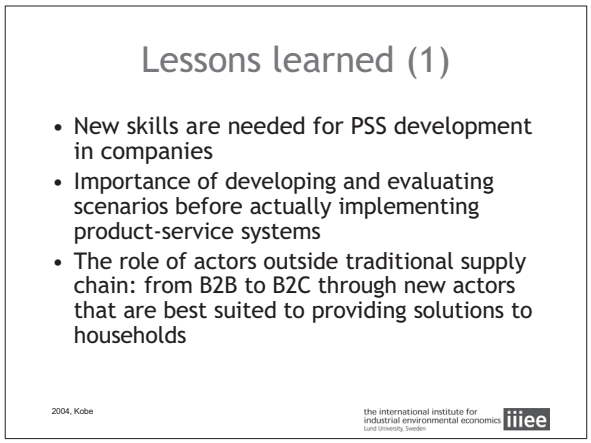


This graph shows that together with product improvement, we need to develop services; we need to think about functional innovation and foremost we need to think in terms of systems. Good example in this respect is car-sharing. It is the most successful example in niche market in business to consumer cases, but the problem is to optimize the use-phase. However, there are no major changes in product design to adapt to new ways of delivering mobility. And this is not to say that our cars are very efficient: from the 100 percent of the fuel with which we fuel our cars, only two percent goes to the actual mobility.

So together with improving the use-phase through sharing or leasing of cars we need to work on efficiency of cars as products. Additionally a question is about infrastructure, because if the country's infrastructure is built around cars and there is no public transportation, then it is difficult to promote car-sharing and more efficient or less environmental damaging systems of mobility. So, together with developing more efficient cars and introducing services which would allow people using cars but not owning them, we need to think in terms of different infrastructure which would help customers to also adopt the new system.

Another example from Sweden is washing machine: not every household has a washing machine. When I moved to my flat, I did not have washing machine. There is a space in my bathroom and a socket for me to plug in washing machine if I would like to have my own washing machine. There is instead a common washing center, where there are three rooms with three washing machines in each room. There is a drier and various other machines to cloth care, which I would not have at home. By providing this type of infrastructure, I have still a choice or possibility to buy my own washing machine, if I really need to own it and put it in my flat. But the whole setting helps customer at least to think if you really need to own a washing machine or you

can satisfy your washing needs with the common infrastructure.

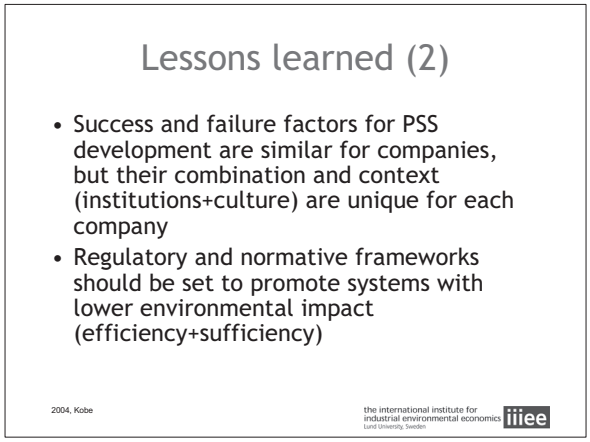


I will now move towards lessons of the decade of the PSS research in European Union. First I would like just to repeat that it is important to agree on the definition which is not all inclusive because this creates problems and confusion in companies and in research as well. So it is important to have as precise definition as possible. But it is also important to have a definition, which would trigger continuous improvement process by companies.

What we learned is that in order to develop product service systems, new skills are often needed in companies, which use to produce products, they suddenly find themselves in a situation where they need to organize the service element and for many companies this is a big challenge. It is a challenge also for researchers because service design research is much less mature than product design and we know even less about concurrent design of products and services that fulfill the same or similar functions or together present a package that fulfills a certain function.

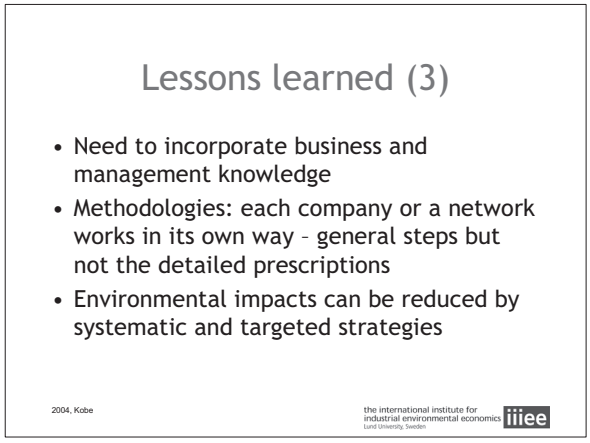
One of the important emerging ways of thinking of product service systems is to develop scenarios. The starting point for developing products and services is to try to imagine the future staring from function that customers require. For many companies, this is a big challenge, because they restrict themselves in terms of their technological capacity or their traditional way of thinking is to develop a technical device and then find possible applications.

In product service systems, companies start from customer needs, think in terms of products and services that can satisfy the need of customers, not in terms of technical solutions they have at hand. Additionally it is important to think about the role of new actors who are traditionally not considered of a part of supply chain, especially in business to consumer market. This has implications also for promotion of local economies, because local companies know their customers better than big multinationals, which have probably problems with knowing what different customers in different counties want and can accept.



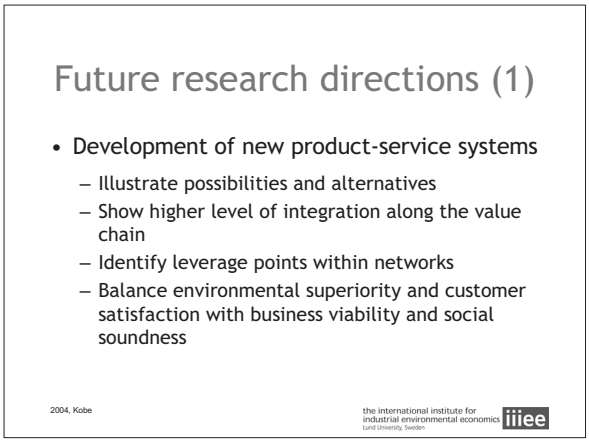
When we looked at success and failure factors for product service systems, there are emerging number of factors which are similar to many companies. However, their combination is different. The combination of these factors depends on institutional setting in each company and also on the cultural context the company is working in. Taking an example of the top management support which Interface has, the CEO is very engaged in the idea and was very active in promoting the idea within the company and outside. However, even a CEO does not change the institutional setting.

As a consequence, the company is struggling with being economically profitable in carpet leasing business. In other cases when institutional settings are favorable for PSS; it might be hard for PSS promoter in the company to obtain top management commitment. So we know what kind of barriers or what kind of factors, a company or a PSS developer should think about, but whether this factor will be positive or negative, will be a benefit or a barrier in this specific depends on the context. Additional "context" factor is the ideology of economic growth, which is unfortunately defined only in materials terms. The main premise of the product service systems is to unlink economic growth from material consumption and instead link the profit to services delivered.

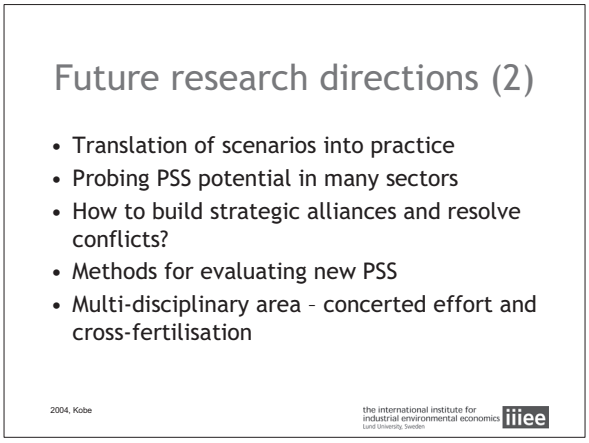


For many companies, this represents a very big challenge. Energy-producing companies, which are shifting towards selling energy-efficiency services, are basically undermining their business case, because one department is getting premiums on selling more and more kilo watt hours, while another department within the same company is getting premium on selling as less energy as possible by selling energy-efficiency services. So for many companies, this is a very challenging situation and it creates internal conflicts.

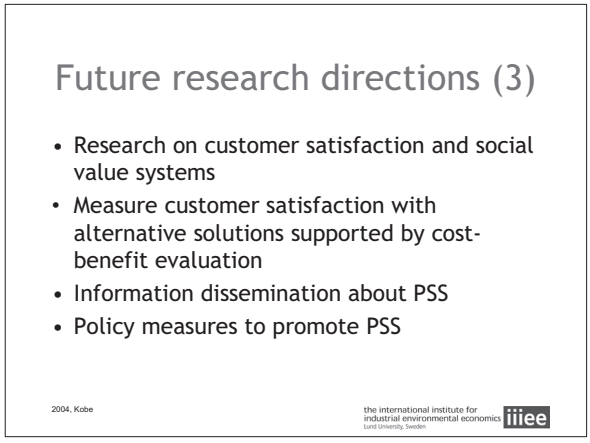
Thus it is a challenging task to introduce an idea based on sufficiency, if the entire society is based on the idea of increasing material consumption. What we also saw is that environmental impacts will not be reduced automatically in PSS. Unless companies develop systematic strategies to reduce environmental impacts, we will not see that product service system will lead to environmental improvement. So, environmental goal should be set from the beginning.



When we look into the future, what European researchers will be researching? The development of new product service systems is still an open question. And here we would like to see more research on supply chain and we need to see more integration in value chain. We will also need to identify the strong actors in networks who should be the leader in the network which delivers product service systems. It will always be a question about finding balance between economic viability and environmental superiority of product service systems.



We started with developing scenarios, but now we need to move towards implementing scenarios in practice and studying what product service systems potential exist in different sectors. As was mentioned before, we do lack methodologies for evaluating environmental features of new product service systems. Again, we have a good starting point with life-cycle analysis of products, but it is a matter of setting boundaries and finding the right units for comparison. What is important and is starting to happen in Europe is collaboration with researchers not only in environmental field but with sociologists and psychologists, who help develop ways of evaluating customer satisfaction and acceptance of new and existing PSS.



To understand how customer acceptance can be created and where the limits and flexibility of customers are, we need these new scholars to take part in the PSS research. Therefore the research on social value systems is needed as well as the research on a customer satisfaction that is combined with evaluation of costs and benefits for each customer.

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Floor:

You mentioned car-sharing has become one of the common B to C examples in EU and it is the users of cars who need to develop infrastructures - not the owners of cars. For Japanese people, it is hard to understand the concept of “building infrastructure of car-sharing”. I wonder if you could give us some examples.

Mont:

Thank you. That's a very good question. In Europe, there are municipalities that support, for example, car-sharing by allocating special parking spaces. And European cities are very crowded. So, for many people, that is very difficult to spend very lot of time trying to find a parking place. By allocating specifically designated place for parking, municipalities help people at least consider car-sharing as an option. Additional consideration is information provided by municipalities on car use. On average in Europe a car is used for 30 minutes a day. The rest of the time the car is just standing on the parking lot and people are just paying for it. Moreover, many cities are not built for the number of cars that currently drive in the cities, which leads to traffic jams and increasing pollution. Since there is a good public transportation system in many European cities, for many cities the combination of these considerations shifts the preference towards car sharing.

Bleischwitz:

It's Raimund Bleischwitz of Wuppertal Institute. I would like perhaps to briefly comment on the question too. Because what we seen in car-sharing is not only a demand for physical infrastructure, but also for organizational or social infrastructure which means essentially that somebody has to run it, since customers need to be organized and the question is who should bear the additional cost for that kind of social infrastructure. Should it be the customer? Or it is difficult to organize. Should it be the car leasing companies? Or

they may say, “Why should we do it?” So, most of the experiences I know from Europe is that the local authorities have delivered some public space and have hired some kind of service assistant to run such an offer. Of course, one needs additional financial means to organize such services.

Wong:

I am just quickly adding on the U.K. situation. I covered car-sharing studies in my research. And one of the things which currently is pushing implementation of car-sharing, ride-sharing services in London, is what is called “congestion charge”. Basically if you want to drive a car into the Central London, you need to pay unless it's something associated with things like car-sharing or it's an electric car. So these things are increasingly becoming common in a number of cities in the U.K. This is one of the issues related to institutions around car-sharing.

Session-2

Green Products and Services from Matsushita Electric Industrial

Matsushita Electric Industrial Co., Ltd.
Shinichi Imai

Ladies and gentlemen, I am Shinichi Imai of the Corporate Environmental Affairs Division of Matsushita Electric Industrial Company. I will be talking to you today about the "Green Products and Services" of my company.

Contents

I would like to begin my presentation by profiling our company and explaining our Business Vision and Environmental Vision. After that, I will explain how we evaluate green products and services at Matsushita, factor X calculations and eco labeling. As the third part of the presentation, I will explain about our Light & Trust Service, a new eco-friendly business model of ours. This Light & Trust System is a good example, in my opinion, of the product service systems (PSS) that are the main theme of this workshop. Finally, I will mention our strong determination on social contribution in the 21st century.

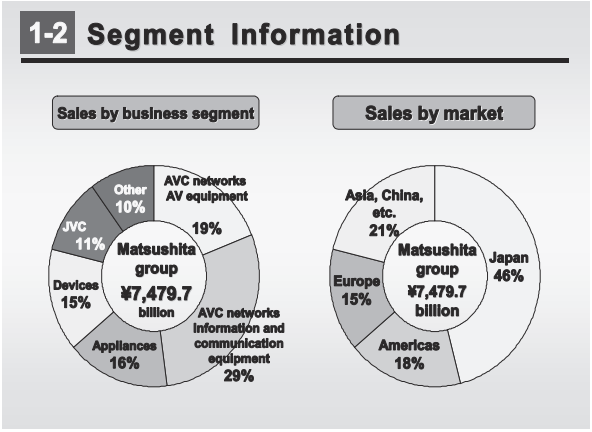
1. Company Profile, Business Vision and Environmental Vision

1-1 Company Overview

Name: Matsushita Electric Industrial Co., Ltd.
Head Office: Kadoma City, Osaka
Date founded: March 7, 1918
Capital: ¥258.7 billion
Net Sales: ¥7,479.7 billion (Consolidated for FY2003)
Employees: 290,493 (Including 371 consolidated subsidiaries)
Global brand slogan: Panasonic ideas for life

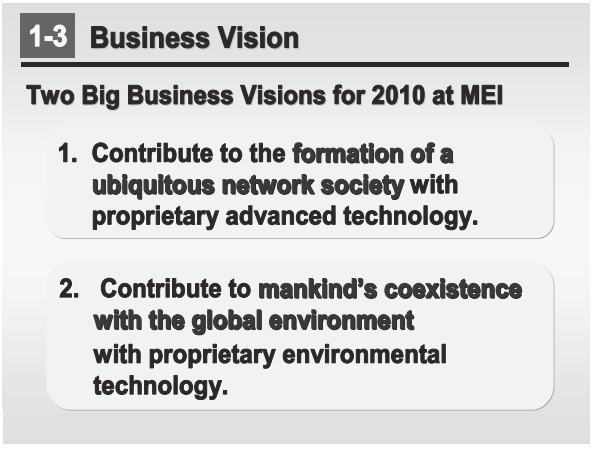
The headquarters of Matsushita Electric Industrial (MEI) are in Kadoma-City, Osaka. The company was founded in 1918 by Konosuke Matsushita. Consolidated group sales for 2003 were ¥7.5000 trillion. Globally, the group has about 290,000 employees. Until recently, MEI has used the two brand names of National and Panasonic, but as of April 2003, all products, except for home appliances sold in Japan, were unified under the Panasonic label. The global brand slogan is "Panasonic ideas for life". This "ideas for life" carries the message that the "worldwide workforce of the Matsushita Group continues to provide valuable ideas that help consumers better their lives and help society to develop through development, manufacture, sales and services."

By business segment, the consolidated sales of ¥7.5000 trillion break down into 19% for audio visual equipment such as TVs, DVD recorders and digital cameras, 29% for information and communication equipment such as



cellular phones, personal computers, facsimiles and car navigation, 16% for home appliances such as refrigerators, air conditioners and washing machines, 15% for devices such as semiconductors and electronic components, and 10% for other products such as electronic component mounting machines.

By region, these sales break down into 46% from Japan, 18% from the USA, 15% from Europe and 21% from China and other Asian countries. The ratio is 46% domestic to 54% overseas, but we believe the share of overseas sales will raise even higher centered on business in China.

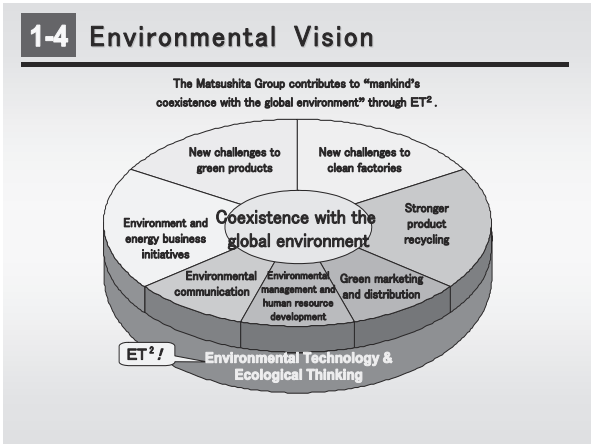


MEI has two business visions to take us up to 2010.

① Contribute to the formation of a ubiquitous network society with proprietary advanced technology.

② Contribute to mankind's coexistence with the global environment with proprietary environmental technology.

We believe "coexistence with the global environment" is the theme not only related to products, services and production activities but to be emphasized in all aspects of operations on down to how we act as a company and how each individual employee of ours acts.



We also adopted an Environmental Vision and Green plan 2010 that are linked to these Business Visions, in October 2001.

What we mean by "the Matsushita Group contributing to mankind's coexistence with the global environment through ET^2" in the chart is that we will promote environmental activities on the synergy of Environmental Technology and Environmental Thinking.

This Environmental Vision is divided into 7 areas of activity, and concrete targets have been set for each area activity in our Green plan 2010.

This chart describes the first half of Green plan 2010, which explains concrete target to be achieved in 2005 and 2010 in four area activities: "new challenges to green products", "new challenges to clean factories", "new challenges to product recycling" and "environment and energy business activities". Among these area activities, new challenges to "green products" and "clean factories" are especially important. I will explain how we calculate the global warming prevention rate and resource conservation rate of green products

1-5 Green Plan 2010 (1)

■Concrete action plan to achieve the environmental vision Reference year: FY2000 Global targets

Item		2005 target	2010 target
New challenges to green products	Global warming prevention	●Improve global warming prevention rate by 30%.	●Improve by 50%
	Chemical substances	●Abolish use of lead, cadmium, mercury, hexavalent chromium, bromine and chlorine flame retardants.	
	3R's	●Improve resource conservation rate by 50%.	●Improve by 70%
	Product development	●Develop product lines with 70% green products.	●Improve to 90%
New challenges to clean factories	Global warming prevention	● Reduce CO2 unit emission by 5%. ● Reduce CO2 emissions to FY1990 level ±0%(Japan).	●Reduce by 10% ●Reduce by 7% (Japan)
	Chemical substances	●Reduce use, discharge and transfer by 40%.	●Reduce by 60%
	Waste	●Reduce quantity per unit sales by 10%.	●Reduce by 20%
	Water	●Reduce consumption per unit sales by 5%.	●Reduce by 10%
	Production methods and schemes	●Build production methods and schemes that efficiently use resources and energy.	
Stronger product recycling		●Establish system for expanding product lines. ●Improve recycle rate.	●Establish recycle system for all home appliance products.
Environment and energy business initiatives		●Develop home fuel cell cogeneration system. ●Strengthen energy management business.	●Full-fledged spread of the system. ●Expand the business.

later in my presentation.

I won't go into details of each and every item, but what is important here is to set targets in specific figures.

1-6 Green Plan 2010 (2)

Item		2005 target	2010 target
Green marketing and distribution	Resource conservation Global warming prevention	●Reduce resource consumption in sales activities by using internet. ●Promote modal shift in distribution.	●Introduce low emission vehicles.
Environmental communication	Information disclosure	●Evolve environmental report into sustainable development report. ●Publish site reports. ●Promote communication with all stakeholders.	
	Corporate citizen activities	●Develop LE (Love the Earth) activities outside of company. ●LE family expansion: increase to 50% or more of all employee families.	●Build LE activity network between business. ●Increase to 80%.
Environmental management and human resource development	Organizational structure	●Strengthen decision-making functions in each area of the world.	
	Personnel training	●Build environmental education curriculum for all levels and departments.	
	Management assessment system	●Establish comprehensive environmental accounting system. ●Reflect environmental load reduction of products and business in performance evaluations.	●Reflect environmental accounting system in performance evaluations.

This chart describes the last half of Green plan 2010, which includes “green sales and di stribution”, “environmental communication”, and “environmental management and human resource development”.

2. Green Products

（Factor X and Eco Labeling）

This section explains how we calculate Factor X for products and Eco Labeling practice at MEI.

First, the global warming prevention rate and resource efficiency of new products are obtained. These numbers are compared against past values and the factor for global warming prevention and resource efficiency are computed.

This figure gives the factor X of existing

2-1 Eco-efficiency and Factor X

Eco-efficiency

$$\text{GHG efficiency (Energy use index)} = \frac{\text{Product life} \times \text{Product function}}{\text{GHS emissions over entire lifecycle}}$$

$$\text{Resource efficiency} = \frac{\text{Product life} \times \text{Product function}}{\text{Resource consumption over entire lifecycle}}$$

Resource consumption over entire lifecycle = Newly consumed resources + Discarded resources
Newly consumed resources = Input resources − 3R²s resources
Discarded resources = Input resources − 3R²s applicable resources

Factor X

$$\text{GHG factor} = \frac{\text{GHG efficiency of target product}}{\text{GHG efficiency of reference product}}$$

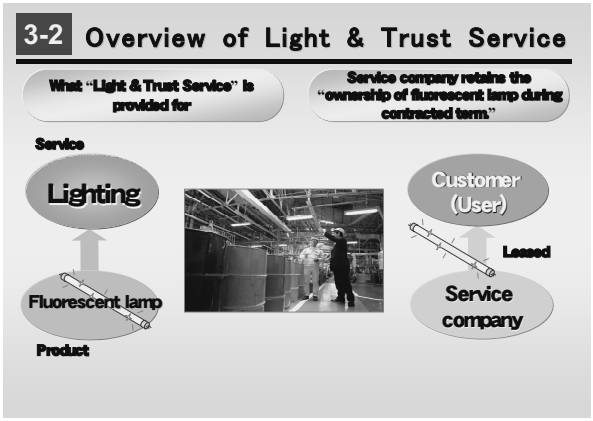
$$\text{Resource factor} = \frac{\text{Resource efficiency of target product}}{\text{Resource efficiency of reference product}}$$

2-2 Factor X Examples

Product	CFC/HFC-free refrigerator	Air-conditioner	Natural refrigerant heat pump water heater	Fluorescent light bulb “Parukku Ball”
				
GHG factor	5.2	3.1	2.4	4.1
Resource factor	1.0	1.4	1.2	2.2
Reference product	Made in 1991	Made in 1990	Made in 2000	Incandescent bulb
Product function	1.0x	1.6x heating capacity	1.2x hot water storage capacity	1.0x
Product life	1.0x	1.0x	1.0x	6.0x

products at MEI. For example, a CFC-free refrigerator has a 5.2 global warming prevention factor compared to a refrigerator from 1991. This refrigerator uses isobutane as a refrigerant and cyclopentane in the place of foamed urethane insulation. It also employs vacuum insulation that greatly reduces power consumption, hence enabling a high factor of 5.2. The fluorescent light bulb lasts six times longer than incandescent bulbs and consumes but one-forth the energy, therefore it has a global warming prevention factor of 4.1 and a recourse factor of 2.2.

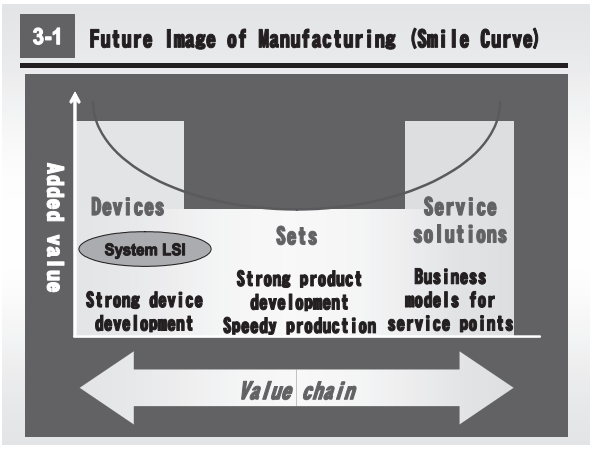
Some of the “environmental labels” that tell consumers about the eco-friendly products of the Matsushita Group are shown in the figure above. Until now, separate labels were used for the Panasonic and National brands, but as of April 2003, a single type of label has been used. Labels bear a symbol mark and comply with ISO14021.



The new symbol mark is used elsewhere besides eco-labeling. For example, it appears on rail containers, which are replacing truck transport.

3. Product Service System (Light & Trust Service)

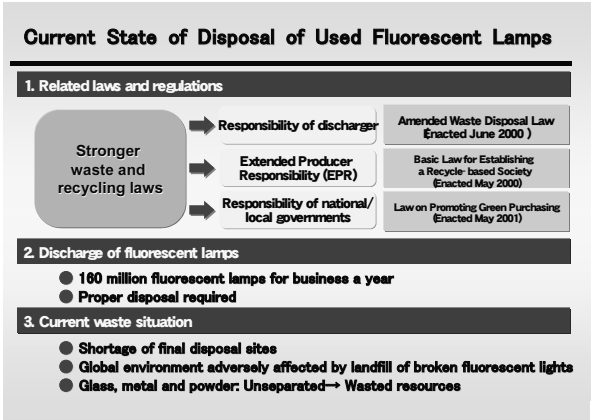
Now I would like to introduce a new eco-friendly business model of MEI. Before moving on to detail explanation on Light & Trust Service, let me talk briefly on Future Image of Manufacturing ('Smile Curve').



The added-value of manufacturing can no longer be enhanced by "Sets" alone, and source of added value has become diversified: "Devices" to "Service solutions". Furthermore, even greater value is born by linking these elements. So, it is important to build a new business model that generates synergy among "Devices", "Sets" and "Service".

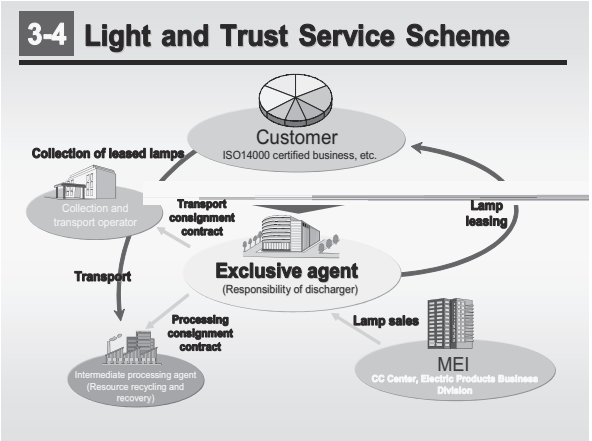
I would like to introduce one example of service-oriented business models of MEI, "Lig ht & Trust Service," a new approach to selling fluorescent lamps for business use.

As you may know, fluorescent lamps contain a small quantity of inorganic mercury on the inside, which makes disposal of used lamps troublesome for users (businesses). The Light and Trust Service offers something functional rather than physical such as a fluorescent lamp. While under contract, the fluorescent lamp belongs to a service company, therefore it is their responsibility to dispose of the fluorescent lamp when used. The user buys only the service and need not worry about waste treatment.



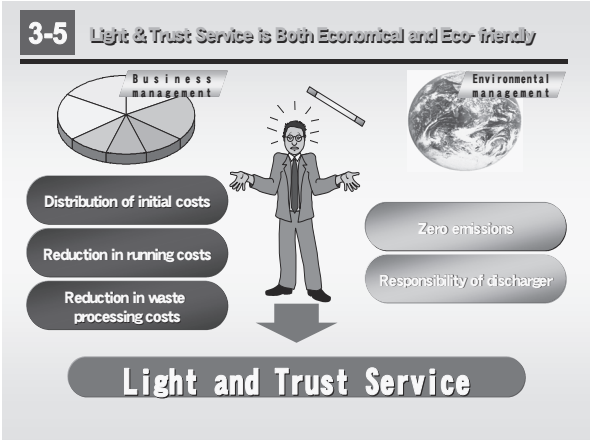
If you think a moment about the current state and future of disposal of used fluorescent lamps, the first thing that comes to mind is that environmental laws and regulations have been enacted and they have spell out the responsibilities of manufacturers and dischargers:

Extended Producer Responsibility (EPR), responsibility of discharger, green purchasing - there seems to be no way to get around. Today, some 160 million fluorescent lamps for business use are disposed of every year, but disposal costs are escalating due to the shortage of waste sites. Moreover, simply burying broken fluorescent lamps adversely affects the global environment. And, it will end up in wasting resources if lamps are disposed of without first separating the glass, metal and fluorescent powder in them.



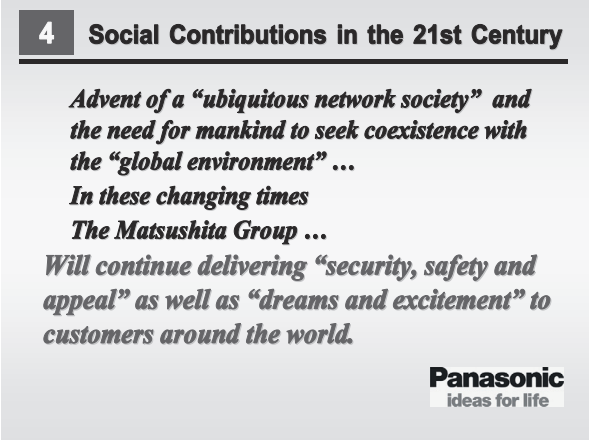
The service is provided by an authorized dealer of MEI. Users contract the service with this dealer. The dealer provides the lamps, collects them when used and transports them to an intermediary handler of lamps. Actual collection and transport is outsourced by the dealer to a licensed operator. MEI sells the lamps to the dealer.

This system satisfies both the user's business needs (distribution of initial costs, reduction in running costs, reduction in waste treatment costs, etc.) and environmental protection needs (attainment of zero emissions, fulfillment of discharger responsibilities, etc.). This service was launched in April 2002 and, as of June 2004, it has been contracted by some 380 businesses.



4. Social Contributions in the 21st Century

Finally, I would like to close my presentation with expressing MEI's devotion to social contribution in the 21st century:



Thank you very much for your kind attention.

Session-2

Environmental Benefit of "Rental Business"

Duskin Co., Ltd.
Toshiki Yoshimura

Consumption behavior that until now has been based on the mass-consumption of resources and business activities that are the pretext to that behavior are today at a big turning point.

Problems associated with abnormal weather patterns, such as global warming, acid rain, desertification and resource depletion, are now seen as real problems for our children. It is commonly recognized today that the time has come for individual consumers and businesspeople to change their systems of values and economics.

In these times, it is necessary to go beyond the simple relationship between business and customer providing products for consumption as has been practiced until now, and provide a combination of products and services that can satisfy customer needs by generating the maximum effect with the bare minimum of materials.

In that sense, "rental" may be one advantageous direction in "providing combinations of products and services".

Environmental Advantages of "Renting"

①Environmental impacts can be managed across entire life cycle of product.

②Similar used products can be collected and mass-processed

③Can reduce quantity of introduced products by improving recycle technology.

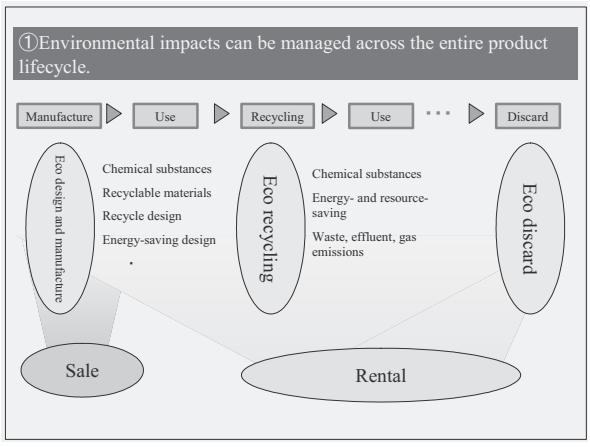
④Repairs are possible before repairs become impossible.
※Can use best repair method.

⑤Products can be designed for secondary use.

⑥Can provide products when needed.

First of all, the environmental benefits of renting with Duskin can be generally summarized in the following six items. However, Duskin has not exhibited these benefits in full. If we look at them as the essence of "rentin g with Duskin," the possibilities have yet to be sufficiently understood and put into action by all parties, so the full advantages have yet to be manifested. Duskin continues to evaluate the situation.

[1] Environmental impacts can be managed across the entire life cycle of a product.



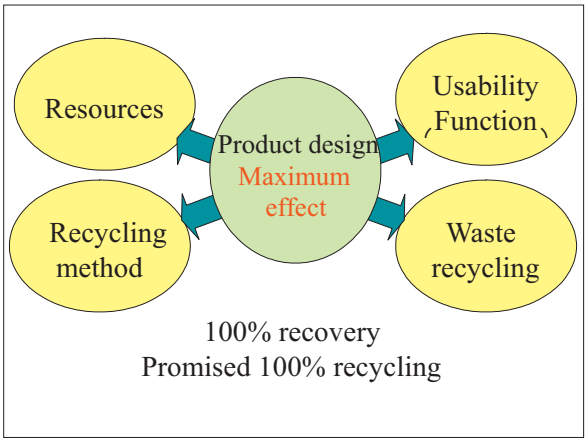
By renting, customers can take advantage of the same products and features that they normally would buy, except that product ownership is not transferred to the customer. The product is managed as property of the business until the very end.

All products are made with resources extracted from the earth. They sometimes are washed, repaired, or consumed parts are replaced, until the product is ultimately incinerated or buried and, hence, partially returned to the earth.

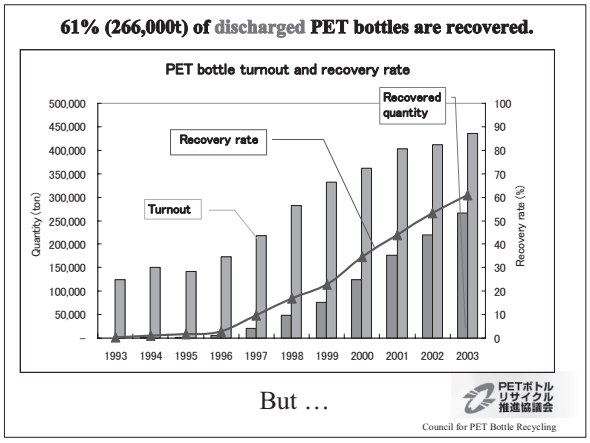
When renting, all elements regarding the product other than usage - that is to say, recycling and disposal of used products - can basically be managed as planned by the business. The big advantage here is that the business knows how the product is treated when it is time for disposal; products made of biodegradable plastic would not be incinerated, which would defeat the entire of purpose of their construction.

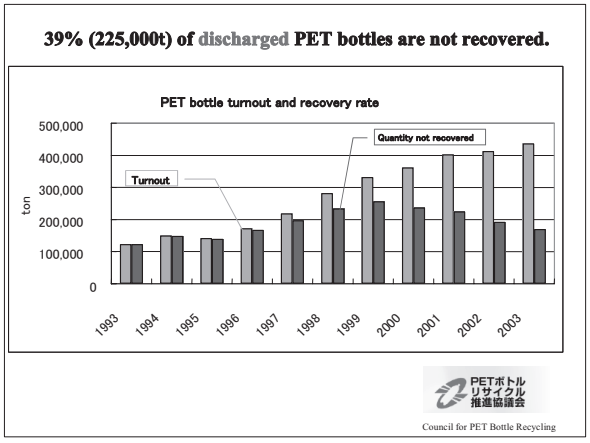
With Duskin products, the specifications are determined based on how they will be recycled or, in other words, based on temperature, detergent compatibility, how easy and safe it is to treat wastewater from washing, and whether to incinerate, bury or recycle the product when discarded.

With so many different ways of handling a product, the care that went into product design may be wasted, or product specifications may be designed in excess of what is normally necessary in order to take into account the worst possible handling scenario.

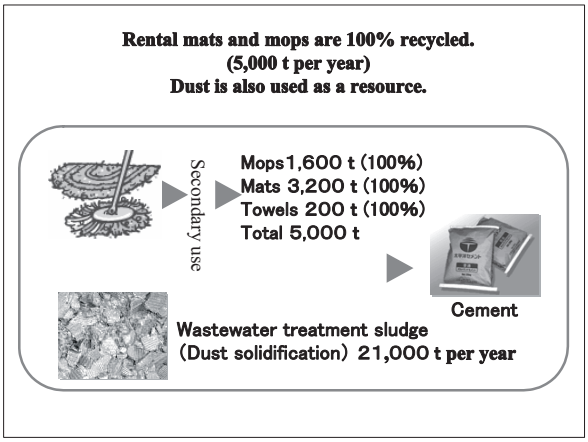


Moreover, another big advantage of renting is that all products that are rented out are returned (or at least are supposed to be returned).

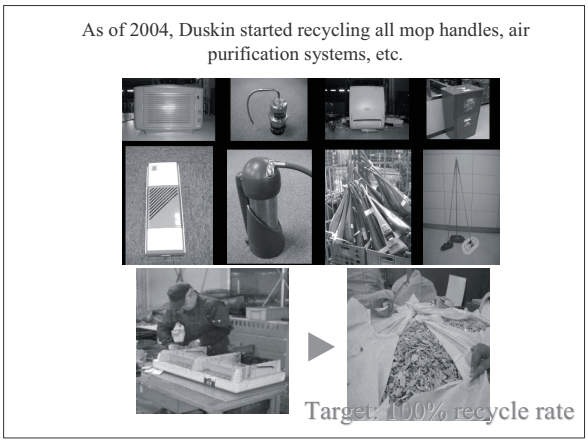




Recently, PET bottle recovery systems have rapidly been built and the recovery rate is uncommonly high. Nowadays, 60% or more of all PET bottles are recovered. Last year alone, more than 260,000 tons were recovered. However, when this same graph is looked at from the opposite approach, more than 220,000 tons have not been recovered. Though some of it appears to be recycled via other routes such as in China, even so, about 200,000 tons of the material held a beverage only once before becoming waste. Looking only at the amount discarded, the entire turnout of the year 1996 turned into waste. To recycle PET bottles, there are a number of technologies and considerations involved, but 220,000 tons of the total produced vanished without any results. As you can understand, it is very difficult to recover an item once it has been sold. In that sense, renting has a big advantage.



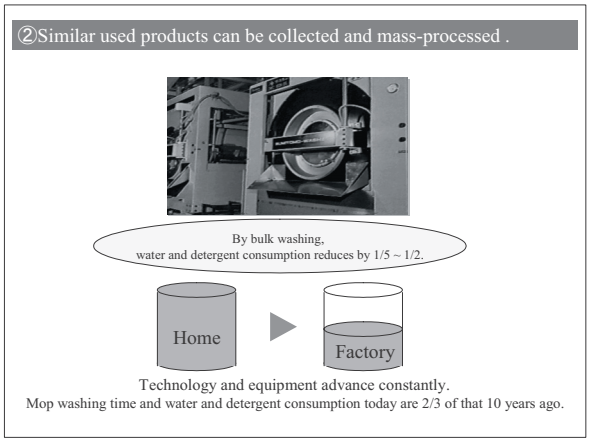
Duskin uses a product repeatedly and, if it cannot be used any longer, it is converted in various ways. All mops, mats and towels are used either as fuel or materials for cement. Moreover, the dust that clings to these mops and mats equates to 21,000 tons a year, but all of it is used as cement material.



As the next step, Duskin initiated activities to recycle all mop handles and air purification systems this year. Operations are already underway in the Kanto area.

[2] Similar used products can be collected and mass-processed.

The rental products collected from customers are grouped by category and mass-processed. Thus, the most effective dedicated equipment can be used and fewer supplies are needed. Especially with washing, it does not take twice the water, detergent and energy to wash two items. There is a major benefit in grouping items because the same water, detergent and temperature can be used with product A and product B.



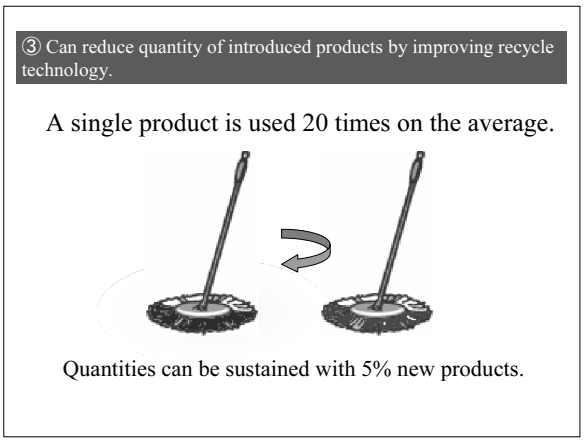
Compared to the small laundry loads done at home, washing at Duskin's factories requires anywhere from one-fifth to one-half the water, detergent and energy, and in some cases even less. Of course, there are products that cannot be recycled without special equipment and, hence, must be discarded.

We continue to make progress with product materials, construction and recycling technology. For example, the resources used to wash mops are two-third or less than those used 10 years ago. Since the effect is only needed for a limited number of products, such as the mops and mats we designed, we have many processes that would be viewed as illogical by other cleaning operators.

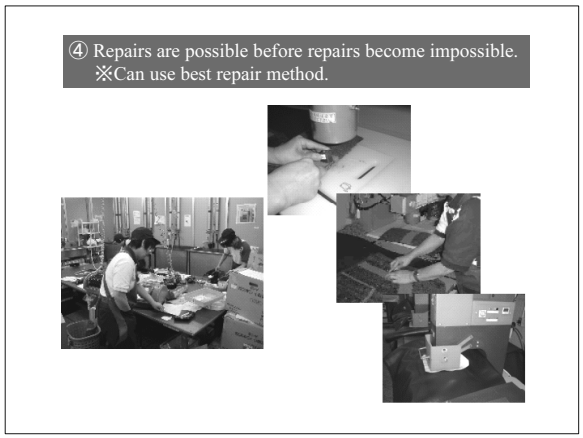
[3] Renting can reduce the quantity of products introduced by improving recycling technology.

Duskin products are used 20 or more times on the average. In other words, even if 100 persons were to use a given product, we would only need to introduce 5 new products. Since Duskin believes that the fewest products there are the better it is, we are naturally putting a lot of effort into long-lasting products and highly recyclable products.

In short, by making less, Duskin makes more (profit).



[4] Repairs are possible before repairs become impossible.



Most products do not break beyond repair right away.

More than half of the products that are discarded because of breakage started with minor damage that got bigger or minor damage that led to fatal damage.

It goes for homes, cars and electric products: if a small leak or damage, loose screw or broken part goes unnoticed and is left for a period of time, irreparable trouble can occur.

Similarly with Duskin products, small breaks and tears, and part damage and deterioration occur, but since the product is inspected at our factory every 2 or 4 weeks, repairs can be made before fatal damage that would require the product to be discarded occurs.

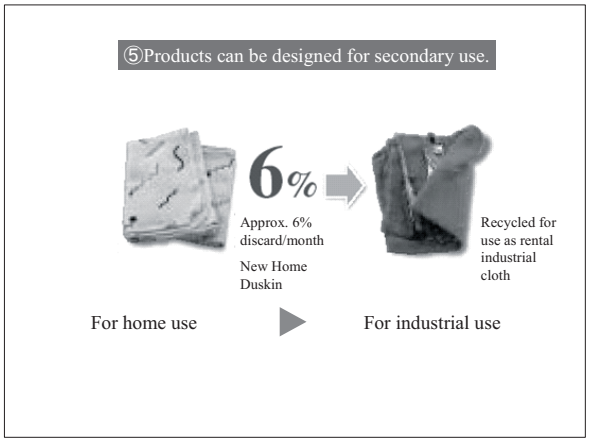
Moreover, since we are always developing specialized repair tools and techniques, we minimize the number of products that would be discarded due to breakage before the product reaches the end of its service life.

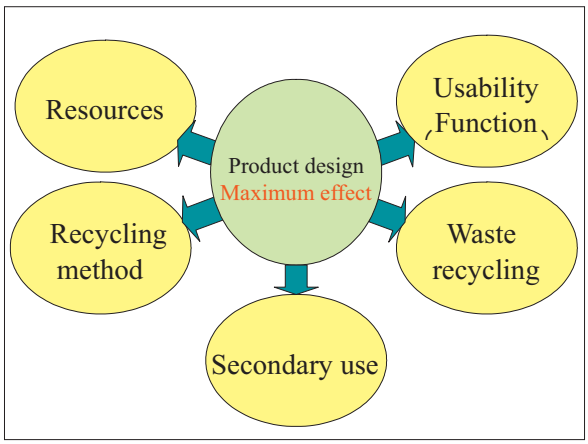
[5] Products can be designed for secondary use.

Duskin has long considered a product at the end of its service life as a "treasure" not to be discarded. Our workforce focuses knowledge on whether there is anything useful in these treasures that can be used for new needs of society. We call this a "treasure hunt".

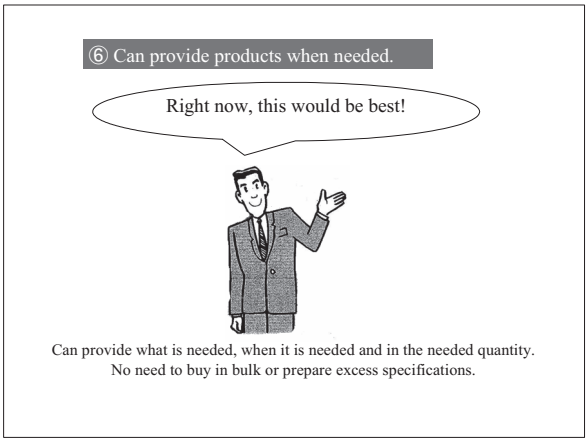
There are many home products that, at the end of their service life, are turned into industrial products and used over and over again.

At Duskin, a single product changes shape and form as it is used. And, when it can no longer be used in that form, it is recycled.





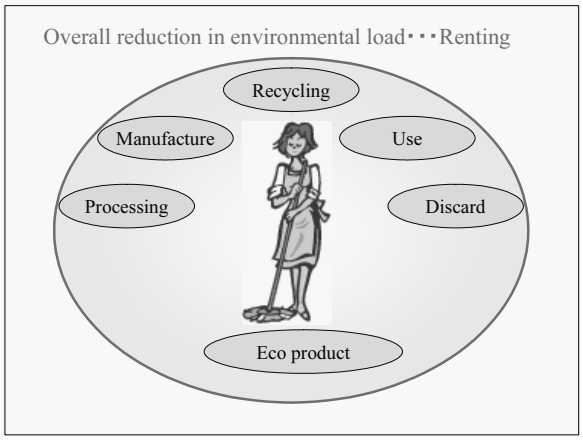
[6] Renting can provide products when needed.



When a person wants to buy something, often he or she thinks up various ways to buy it, such as buying large quantities at a low price or buying a slightly larger size. As a result, extras may become old and may be discarded without even being used, or the product may be too large to be used.

And, at times, it feels like torture not to be able to purchase a newer and better product just because some old ones are still left over.

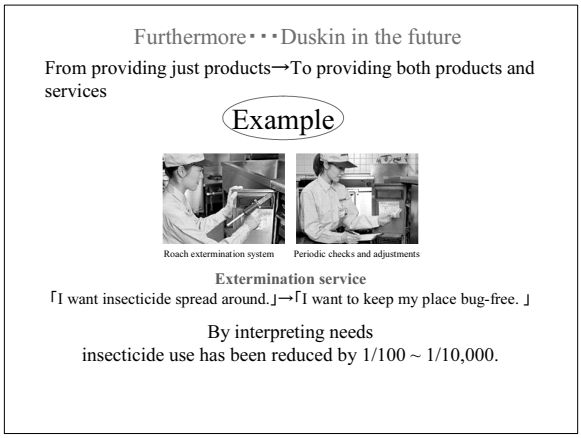
In this regards, renting allows you to acquire only what is necessary, at the necessary time, and in the necessary amount. If, while using a product, the situation changes and a larger one is needed, it suffices to change out the product or the quantity as needed. And, products that are no longer used are not discarded but are used by someone who has need for them. Therefore, customers can use the product that best suits their needs.



In this way, renting has various advantages. Nonetheless, we as a provider must notice and understand the situation and deliver advantages that can be appreciated by customers and society.

As a final note, Duskin still relies on material things in some respects. That is because we are paid according to how many products we rent. If we were to double sales in this way, we would have to recommend to customers to consume twice as many resources. This is a serious dilemma.

But, when think about it carefully, a customer's need for a cleaning product is not a true customer need. He or she wants to use the cleaning product to clean somewhere. He ore she may attain his or her objective more effectively using a tool other than the selected product, or there may be other products or services that can do the job.



For example, the extermination services that Duskin provided in the past used the same general method of spreading large quantities of insecticide underneath floors at the customer's request. The service aimed at ridding homes of infestations and preventing infestations in places where they were yet to happen.

Nevertheless, what customers really want is to never ever be overrun with insects. Today, the recommended approaches are to identify the initial stage of insect infiltration and use only the bare minimum of chemicals

needed or, with termites, use only a very small amount of a specially adapted chemical that, when eaten by larvae, prevents their development into adults. By using a method based on early discovery and forcing insects out before they proliferate, the job can be done with anywhere between one-hundredth and one-ten thousandth the original dose of the chemicals. Because the objective of these chemicals is not to directly annihilate entire communities of insects, safety is improved.

If Duskin had introduced a pricing system based on the amount of insecticide used, this kind of approach would never have been adopted.

We see “providing a combination of products and services,” or “service's” will be granted more importance than “providing products only” in order to bring customers more “benefits” assuring safety and satisfaction. Nevertheless, as we said before, Duskin, in some ways, has not escaped from the system of collecting payment for products provided.

Since our founding, Duskin has carried out business as a “unification of discipline and economics”. Duskin will continue to develop eco-friendly business so as to enjoy the safety, security, and high trust of our customers and society.

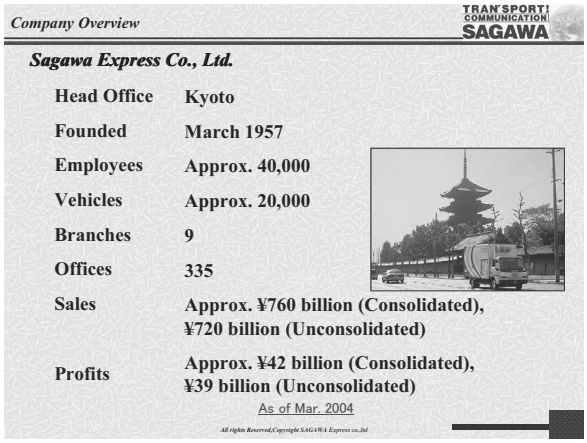
Thank you for your support.

Session-2

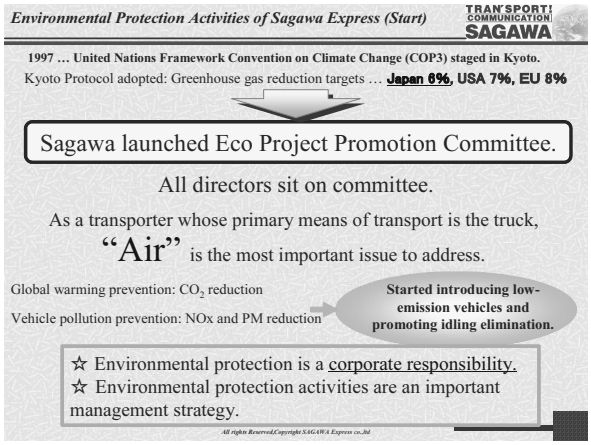
Environmental Business of Sagawa Express

Environmental Preservation Promotion Department, Sagawa Express Co., Ltd
Kyoichi Bessho

Ladies and gentlemen, as you just heard me introduced, I am Kyoichi Bessho of Sagawa Express. I would like to thank the organizers for having me here today. So, let me get started. I will be talking about our environmental activities at Sagawa Express.



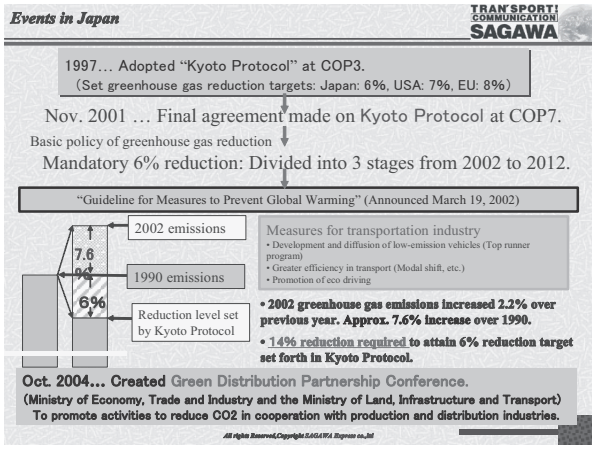
I would like to begin with an overview of the company. Our headquarters are in Kyoto. The company was founded in 1957, starting with that Kiyoshi Sagawa, the founder of our company, transported commercial freight as a handyman between Kyoto and Osaka. Our main line of work is B-to-B freight, which has been around for some time, but as of recent, we have been handling an increasing amount of B-to-C packages. By the way, Yamato Transport started out with C-to-C, but I hear they have pretty much moved into B-to-C. There will be a brief explanation of that later. We have about 40,000 employees and a vehicle fleet of 20,000, consisting predominantly of delivery trucks. We have 335 offices across Japan, while consolidated sales were ¥760 billion with ¥42 billion in profit.



In 1997, COP3 was held in Kyoto. This was the year that our real environmental activities got started, so the history of our activity is still rather short. With our headquarters located in Kyoto, the local government and others came asking at the time if we could help out in some sort of way. We did not have an environment section at the time, so we launched an eco project promotion committee. The committee was chaired by our president and filled with directors, hence it was a decision-making body.

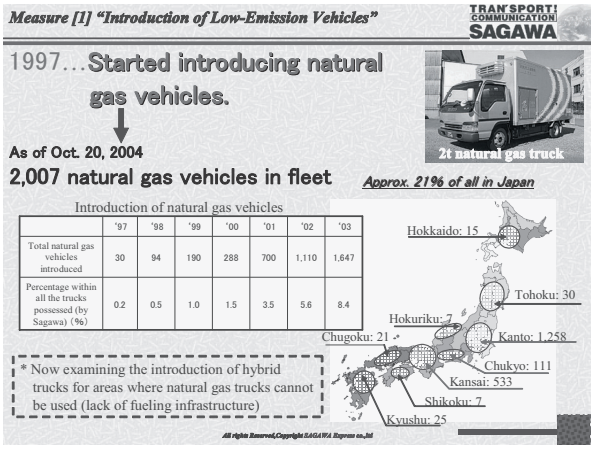
In our line of business, air is the most important environment issue. There are two air problems here, one is global warning, meaning a reduction of CO2 (carbon dioxide), while the other is vehicle emissions, which means a reduction of NOx (nitrogen oxides) and PM (particulate matter). Since it is imperative that these two air problems be solved, we quickly

introduced low pollution natural gas vehicles that same year. Another thing we did, which is related to eco-driving, is to start instructing drivers to "stop idling" when parked. As for the company's stance on environmental protection, we of course view it as one of our social responsibilities as a company and have also positioned environmental protection activities as one of our important business strategies.

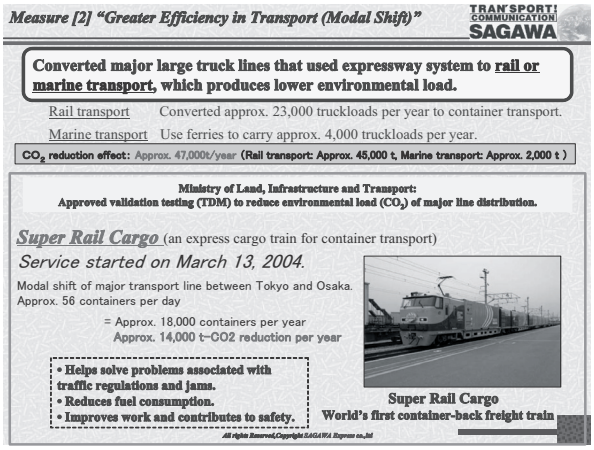


At COP3 in 1997, the Kyoto Protocol was adopted and Japan promised to reduce greenhouse gas emissions by 6%. This Kyoto Protocol has reached a final agreement in 2001 and the Japanese government decided, as the basic policy, to reduce greenhouse gas emissions in three stages over a period of ten years from 2002 to 2012. In March 2002, the government announced their Prospectus on Promoting Measures for the Prevention of Global Warming. Within that, as an undertaking by the transportation sector, they specify the "top runner" system whereby CO2 emissions are to be reduced by developing and diffusing low pollution vehicles without reducing its fleet size. Another undertaking is efficiency, which is a topic of discussion at this conference today. In our industry, this constitutes the approaches such as a modal shift. Furthermore, another thing that must not be forgotten is education. As a company, we are addressing the action of the transportation sector with awareness activities for all stakeholders, which necessarily includes employees, their families, and the people in the communities where we do business.

Though it says October, 2004 at the bottom of the slide, it is not official yet. The Ministry of Economy, Trade and Industry and the Ministry of Land, Infrastructure and Transport plan to stage "Green Distribution Partnership Conference". The purpose of the conference is to jointly promote CO2 reduction activities in the manufacturing and transportation industries. I have heard that this conference will be officially launched next year.

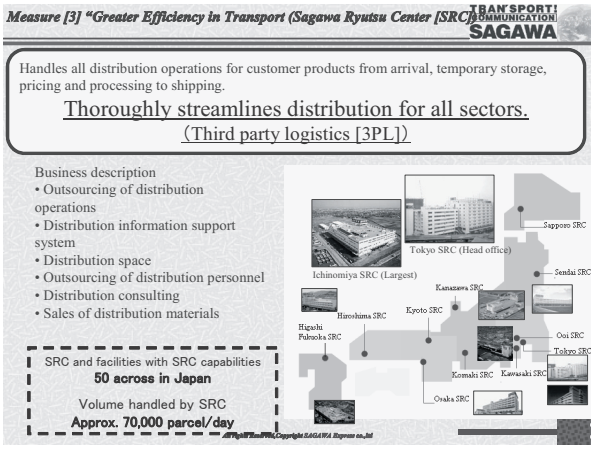


One measure that we have taken is to introduce low pollution vehicles. Since 1991, we had been adding electric vehicles and methanol vehicles to our fleet, but we reexamined our strategy in 1997 and, since tests showed that natural gas trucks reduced both CO2 and NOx and did not emit any PM at all, we started introducing a large number of them into our fleet, realizing that this was the most environment-friendly vehicle around. As of October this year, we had about 2,000 natural gas trucks in our fleet. This is 21% of all the natural gas trucks in Japan. We are using these vehicles all across Japan, but there are problems concerning the use of natural gas vehicles in the countryside, because of the lack of infrastructure like filling stations. So, since October of last year, we have also been introducing hybrid vehicles instead of the natural

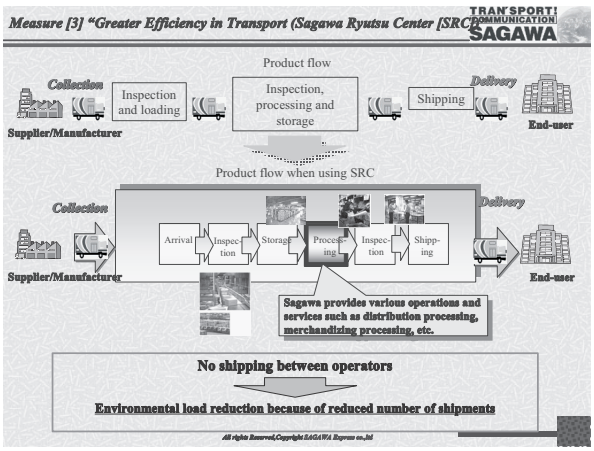


gas vehicles.

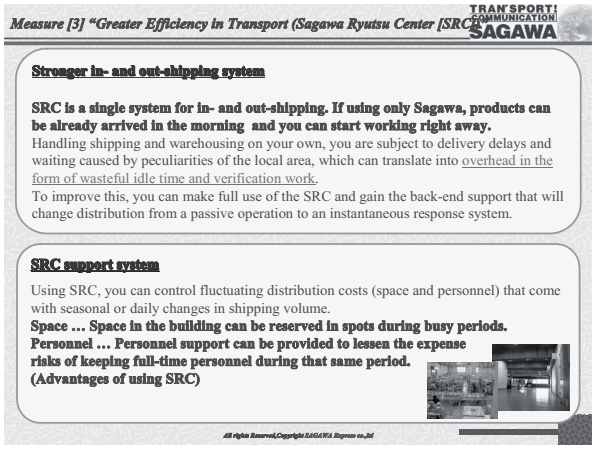
I would like to talk now about efficiency in transportation. The first point is a modal shift. A modal shift is the use of multiple means of transportation, which means a shift from trucks to more efficient combinations of trains, ships and aircrafts along primary transportation routes. Our primary means of transport is trucks, so we are converting them to trains and ships, which have less of a load on the environment than trucks do. In a year, we use rail transport equivalent to about 23,000 10-ton trucks and, with marine transport, mainly by ferries, it is about 4,000 trucks with the bulk. This modal shift has a CO2 reduction effect of about 47,000 ton a year. Another effort of ours is the Super Rail Cargo service we jointly developed with Japan Freight Railway. Between Tokyo and Osaka, which has the largest amount of physical distribution in Japan and has difficult distance to shift, we have switched the freight traffic equivalent to 56 large trucks a day, or about 18,000 trucks a year. This reduces about 14,000 ton of CO2 a year. These efforts have secondary effects such as helping to solve issues associated with traffic regulations and congestion, reducing fuel consumption, improving operations and contributing to safer transport. As you well know, a speed limit rule has gone into effect, which prohibits trucks from going over 90 kph, so the merits are diverse.



The second point in our efforts to enhance transport efficiency is the Sagawa Ryutsu Center (SRC). The SRC is a third party logistics operation that handles all distribution operations from various distribution process such as accepting packages from customers, temporarily storing them and attaching price tags to shipping them out. Operations are streamlined in every aspect. The content includes the outsourcing of distribution operations, an information support system, space, warehouses and tenants. We have facilities across all Japan to contract temporary staff, deploy personnel where needed, provide consulting and purchase supplies. There are 50 locations in Japan. In a single day, an SRC handles about 70,000 packages. When converted into CO2, the reduction effect is about 6,000 tons per year. It also reduces fuel consumption by 2,300 kl, which in monetary terms is a savings of about ￥200 million.



I have attempted to illustrate what I have just explained here. On top is the former package flow. In Japan, distribution used to flow like this; a package was brought to us by a supplier or by one of our own trucks, inspected and stored, then transported by truck to a wholesaler or retailer, where it was stored again, then transported by truck to the end user. By getting the manufacturer involved, we have streamlined the whole process from acceptance to out-shipping in the SRC, or in other words, made transport more efficient. This has made transport between businesses unnecessary and, because the number of shipments decreases, I can say that it reduces environmental load.



Additionally, the system of in-shipping and out-shipping have been strengthened. Packages are already there when employees report for work in the morning, so they can start working from that moment. It used to be that employees waited for the packages to arrive and, once they did, then started working. When deliveries were late because of traffic and all sorts of things, that very much affected operations, but all of that has been eliminated. The SRC is helping customers to improve the efficiency of their operations and reduce expenses at the same time.

Another key aspect is the support system. In a nutshell, space is always a problem; there are seasonal ups and downs, but even during

the busiest periods, we can minimize the flood by sharing space in our facilities. Moreover, in order to reduce the cost risks of full-time employees, we have a personnel deployment subsidiary operating inside the SRC. They can send personnel around during busy periods to help keep the customer's costs down.

Before closing, let me say that Sagawa Express is taking part in the WWF's Climate Savers Program. In this program, together with the WWF, an environmental NGO, we are staking a challenge to Japan's 6% CO2 reduction target in whatever way we can as an individual company. We have plans to introduce 7,000 natural gas trucks by 2012 and install solar power chargers at natural gas stations, in order to achieve this 6% reduction. As you well know, the amount of CO2 emissions from the transport sector has increased with respect to the 1990 levels. As a distributor, we want to challenge this 6% target and then, by introducing low pollution vehicles and taking steps to improve the efficiency of our operations, set even higher targets and stake a challenge at attaining them.

This concludes my presentation. Thank you for your attention.

＊＊＊＊＊＊＊ Q & A ＊＊＊＊＊＊＊

Bleischwitz:

I have a question regarding the activities you mentioned on the Modal Shift. Usually, in

Europe here, logistics companies are complaining that such a Modal Shift is difficult for technological reasons. Because the speed of which you lift containers is too slow. I wonder if your system in Japan might be superior or whether you are intending to invest in research and development in this area together with other companies.

Bessho:

I believe the situation is the same as in Europe. Before, Japan's freight trains went no faster than 110 kph, but we have enabled a top speed of 130 kph with the challenge of our Super Rail Cargo service. Tokyo - Osaka is the maximum distance we can apply a modal shift without delays or drops in service level. However, there is still a difference between Japan and the West in this regard. In Japan, passenger trains are the mainstream in railway traffic. Freight train schedules accommodate passenger trains, which have priority on the rails, so it is hard to organize the train schedule that meets the needs of our truck operators. The Super Rail Cargo service, an entire freight train, finally started running just this year. As to whether it will grow rapidly or not, there are still many difficult problems to tackle in the future.

Session-3

Trends of Governance for Sustainability

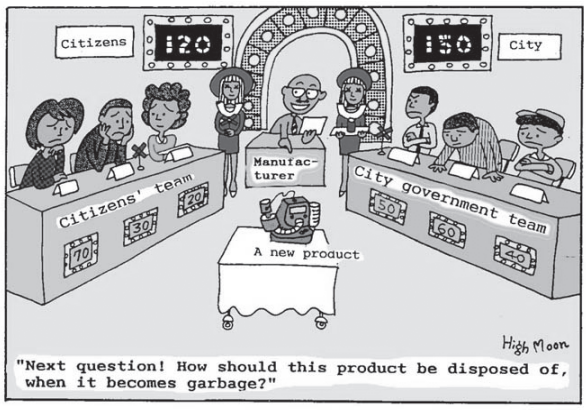
Wuppertal Institute
Raimund Bleischwitz

Thank you very much, Mr. Chairman. I would also like to thank you for invitation and for the opportunity for sharing our research finding with you. I should apologize for not being able to speak Japanese. I am sorry. So, I will make my presentation in English, then.

I could perhaps start by briefly introducing our institute. The Wuppertal Institute has some 120 staff, doing research on what we call "applied sustainability research". The staffers are allocated in four research groups and mostly conducting research in Europe for European Commission, for the different governments, also for local governments, for companies. Indeed, we are proud that we have been elected as one of the partner institute of IGES, our host today. We also participated in the collaboration Millennium Project run by the Japanese Economic and Social Research Institute over the last four years.

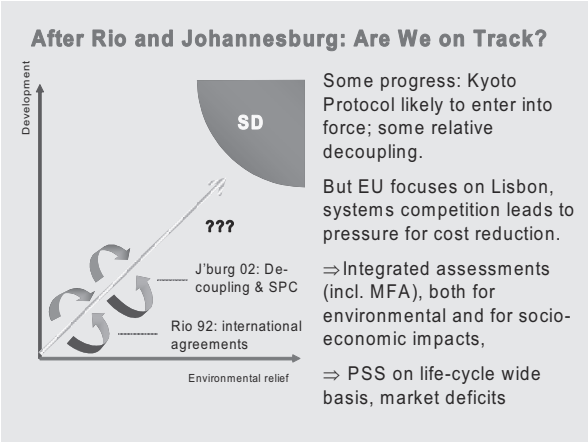
My presentation is on trends of governance for sustainable development. It will be about measuring performance of networks, some deficits, which have to be addressed, some innovation by which the deficits can be overcome. Methodologically, my presentation refers to what is called 'impact assessment'. i.e. the impacts of networks for sustainable development on the environment and on the economy.

I may illustrate some points via a nice Japanese cartoon. When you see the company sitting among panelists not as a panelist but as



Note: From now on, manufacturers will also be required to appear as panelists.

a referee, the question arises, how could manufacturers also appear as panelist, taking over full responsibility. We have already leaned during the symposium that companies take over responsibility, but the 2question remains, by which incentives those practices diffuse and improve even in harsh times of competition. This is where networks may come into the picture.

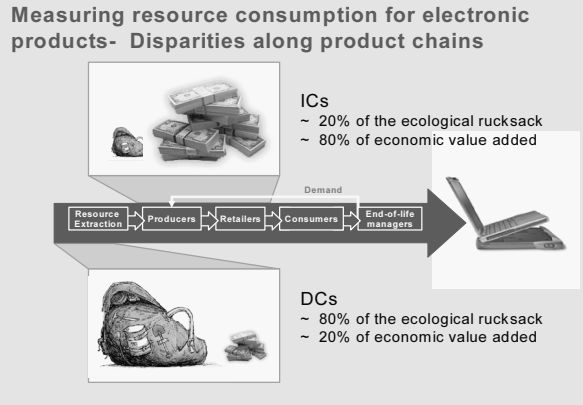


So, let us perhaps look first at the political context of governance processes. We are aware

of the Rio Summit and Johannesburg Summit that took place two and 12 years before now. The question is, “Are we still on the track?” With the developments pursued by these Summits, regarding Kyoto Protocol, there are some progresses. It will likely enter into force in next year (2005). This is indeed a huge progress, because it could not be expected in the last years since ratification process was almost blocked. Regarding other areas, there are some signs for a progress too, meaning that the majority of industrialized countries has been able to decouple energy use and resource use from GDP growth. When you look at the figures, you see that these indicate a stagnation below GDP growth.

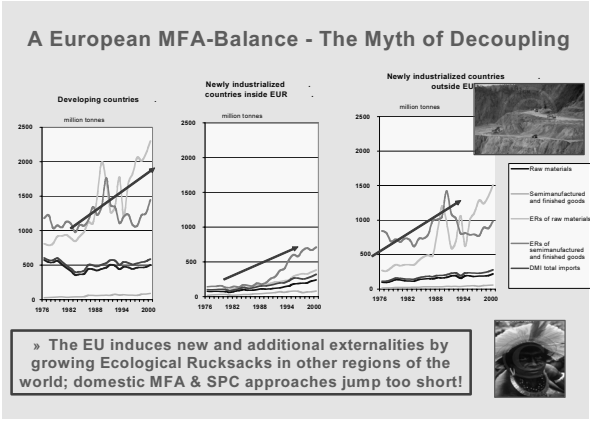
Looking at the European debate, policy makers and business markers alike focus on what is called the 'Lisbon Agenda'. The Lisbon Agenda is on increasing competitiveness in Europe, which does not necessarily means that environmental aspects are considered to the extent necessary. Moreover, the widening of the European Union with now 25 members increases competition among member states of the European Union. Especially the old member states of EU 15 like for instance Germany, France, Italy are now realizing increasing competition from the new member states. Many industries in particular manufacturing industries, but also small-and-medium-sized companies relocate their manufacturing process because the production costs in the new Member States are on average just 20 percent compared those in high wage EU 15 states. This is indeed significant and it leads to hard pressure for cost reduction in manufacturing industry. Siemens, VolksWagen, all the established manufacturing industries now have programs on how the cost of the traditional labor can be reduced.

This context is hardly an immediate stimulus for those kinds of environmental innovation which we would like to be pursued. What it calls for is an assessment for measures that is more integrated. With such methodology, both the economic impacts and the environmental impacts can be assessed rather simultaneously, not separately. This should, as I would include, material flow analysis. Material flow analysis has been introduced by our Institute some 10 years ago. And essentially, it is up to the materials weight by kilogram and tons during the lifecycle of a product. Then you can compare different alternatives according to different materials intensity. MFA this can be done and assessed at the level of products and whole economies, which would mean as a sort of tentative research conclusion that product service systems ought to be analyzed on a lifecycle-wide basis and indeed also market deficits ought to be taken into account.



Looking at few case studies, I may introduce a study on digital equipment in modern electric industries and media industries. We have figured out that when you look at the material intensity, the industrialized countries bear some 20 percent of the what we call ‘ecologi cal rucksack’, which is essentially the material intensity, while gaining some 80 percent of economic value added. Comparing these findings with the share of developing countries you see that the developing countries have to bear some 80 percent of the ‘ecological rucksack’ and only benefit from some 20 percent of the economic value added.

This unequal share in environmental impacts is mainly due to the resource extraction processes. The ecological rucksack arises from resource extraction, which is overwhelmingly in the developing countries. This can be called a disparity along the product chain. With increasing scarcity in certain materials, this rucksack is likely to become larger.



When we look at the figures for whole economies, I have already mentioned that the decoupling process is going on for most industrialized countries. These are figures for European countries and for developing countries. Looking at the different lines, the bottom line here indicates of the amount of raw materials and goods. But when we look at the green line, the ecological rucksacks, you see that the amount of ecological rucksack is still increasing.

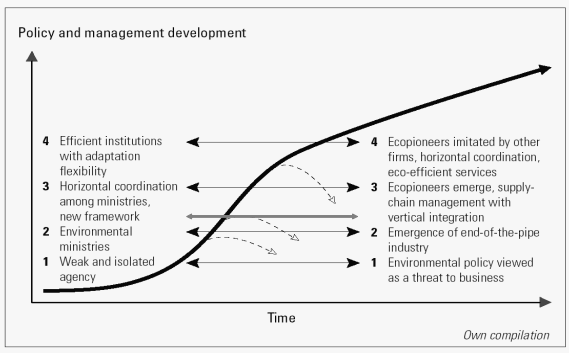
So, this decoupling process does not account for when you take into account the whole life cycle of goods and services, including the extraction process. This also indicates that the extraction process has taken place in ecologically more sensitive regions where resource are more scarce and the share of materials are lower, compared to former extraction places.

This phenomenon of growing resource use in a life cycle wide view should indeed be analyzed and taken into account. Given the scarcity of natural resources, these ecological rucksacks are likely to grow in near future too. One should therefore hesitate to say that we are witnessing 'decoupling processes' as called for in Johannesburg because it relies upon the definition and the scope of your analysis. When you have a wider scope, considering the ecological rucksacks, any decoupling process would be understood differently. Looking at the European Union it leads to the conclusion that the European Union induces new and additional externalities by growing ecological rucksacks in other regions of the world. Any domestic material flow analysis or analysis on domestic patterns of sustainable production and consumption would jump too short and would fall behind.

This is why we have to address a few what I call here innovations on different areas. We speak about political innovations, social innovations, and technical innovations. Because of these different arenas I like to use the term 'governance': It addresses not only the level of governments but also - and essentially - the level of business makers and society where most decisions are taken.

Let us look first at political innovations - not in the sense of a hierarchy but in a sense of policy analysis according to which formal rules ought to be assessed.

Co-Evolution of Institutional Reforms (e.g. Economic Instruments), Soft Incentives and Self-Enforcing Contracts



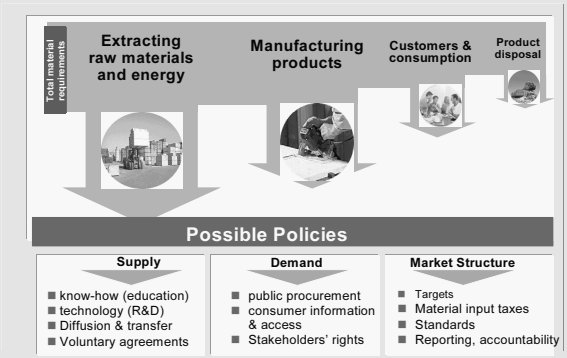
The question would be how policies can set incentives and change institutions (understood as rules of the game) for supporting

Product Service Systems. When you look at the levels of policymaking and management altogether, you see over the years that there is a co-evolution between both. In most OECD countries the environmental policies have started to begin in the 70's, what it was called here, Stage 1. In this stage, we can observe an isolated environment agency or, from management perspective, environmental policy was viewed as a threat to business. Now slowly most countries are moving forward to the Stages 2 and 3, where I guess we are now. For example, coordination among ministries gets better, framework regulation like the basic law on the environment is introduced and reinforced, and we not only have the end-of-the-pipe industry but also what is called here 'Ec opioneers', firms that do better than any regulation requires..

At the same time, the figure reminds us that this stage might not be sufficient in order to find incentives for society and business makers as a whole. We may have to look for what is called here 'efficient institutions with adaptation flexibility', meaning not only a framework but rather flexible day-to-day incentives. The question is, how the Ecopioneers are imitated by others, how the horizontal diffusion and coordination takes place, how the overall shift from eco-efficient products to services can take place. This may well take some 10 to 15 years. In analytical terms, we should not only look at the basic laws but also at flexible instruments and soft incentives, not only voluntary agreement but all schemes of local and regional persuasion and implementation.

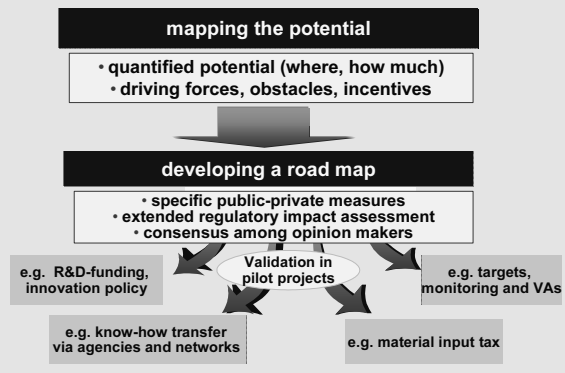
Contracts are an interesting candidate for such approaches. They can not only be negotiated among different firms but also among, for instance, governments and corporations, government and business sectors. Agreements can be enforced by specific provisions within those contracts and then the question is what kind of contracts are applied and how the can be analyzed in terms of incentives and enforcement procedures.

Policies for Increasing Resource Productivity and PSS

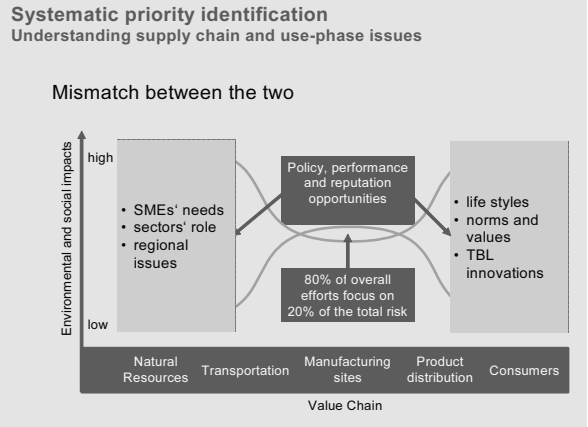


So, this might give you an overview on our analytical framework for that kind of research. More concretely, we have started to look into possible policies for increasing resource productivity and lifecycle-wide indeed. You have to look at the extraction processes; manufacturing processes, customer and consumption processes, and product disposal and possible policy would then have to address supply-side, demand-side, market structure. There is a variety of measures which can be taken into account. Essential is a know-how transfer. It is a matter of technologies, diffusion policies, etcetera. But I will not go into the detail here. However, WI currently formulates elements of a program on increasing resource productivity for the German federal ministry for the economy.

Program elements for Resource Productivity & PSS



WI assesses the potential for increasing resource productivity in a quantitative way, it addresses the driving forces, obstacles and then as a second step, we are going to develop a roadmap for increasing resource productivity, which would contain specific public, private measures and also include options for know-how transfer and options by which the consulting groups can approach business in order to foster the systems. So, this would be a publicly, or partly publicly funded program by which consulting groups can go into different businesses.



However, having said that we should also bear in mind that it is not only a matter of governments indeed, but also how these incentives fit together with social innovations and how then vice versa social innovations can drive incentives that are more flexible. Here this means that we look at how to initiate a transition towards product service systems along the global product chain, which is the current challenge indeed. And currently, we see that still a mismatch between the different supply chain. Most attention is paid to the manufacturing site.

All those processes of natural resource extraction do not receive enough attention. At the other side, looking at the downstream product distribution and usage phase, the consumer is also quite often neglected yet. So, when we talk about social innovation, we should always try to understand the whole supply chain and the use phases in order to meet environmental and social impacts. This means that small-and-medium-sized enterprises ought to be taken into account too. WI also addresses the role of sectors like metal industry and deeply also looks at regional issues. Because often the question is what happens with a region where resource extraction takes place or a large manufacturer organizes transformation of materials when these processes change. Regarding the downstream processes, it is a question of lifestyles, norms and values and other kinds of social innovations.

Market Deficits need to be tackled

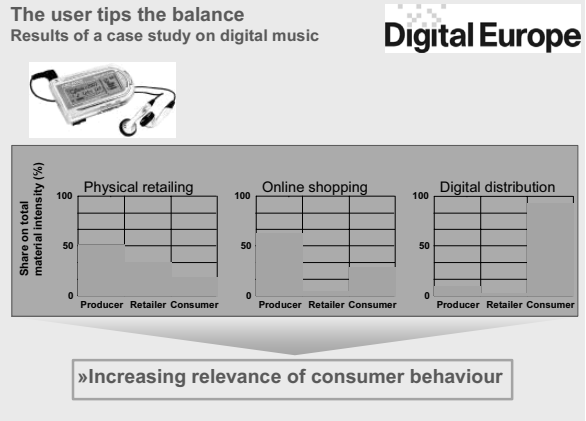
- *Information deficits:* attention is scarce, search is costly, quality difficult to assess.
- *Split incentives:* owner, designer and user of any technology are not identical. Coordination costs are high.
- *Biased calculation:* payback times used by either firms or consumers in savings calculation are too short.
- *Market power*: established companies guard their market position and market share. Newcomers need to establish a critical mass of supply at emerging markets.
- *Customs and routines*: humans keep to their customs and routines. New ones need to be established, leading to high cost for any pioneer.

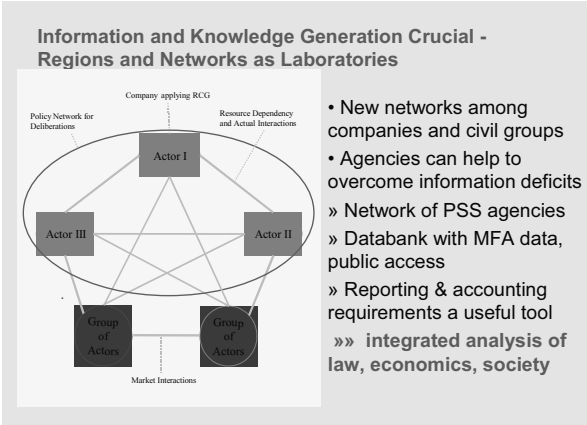
Being an economist, I would also like to underline that this is not just a matter of psychology but also a matter of microeconomics, especially industrial and institutional economics. Market deficits usually are considered as externality or public good issues. These are the dominant market barriers when we look at standard environmental economics. But having analyzed quite a number of case studies other types of market deficits become more important. It is firstly information deficits. This is relevant because attention for any new product system and its quality is scarce. The search of consumers and businesses is a cost-intensive activity. So, the question is how you can reduce the information cost for search and for learning. Any superior quality needs to be advertised that different quality and credibility for the new quality can be assured. Information

deficits also matter in what is called split incentives. The owners, designers, or users of any technology or products are not identical. The coordination costs among these different actors are relatively high at least. They should be taken into account.

You also see a deficit called biased calculation. Pay-back time used by either firms or consumers in savings calculation are too short. According to empirical research, expected pay-back time of e.g. consumers is about two to three years maximum. Everything, which is above that kind of pay-back time, is hardly considered as beneficial. So, the question would be whether financial services could address that kind of biased calculation or what kind of information tools can address the pay-back time issue. In addition, market power is quite relevant when one looks at small-and-medium-sized firms trying to set up new business. This might be relatively difficult in particular in oligopolistic markets such as energy.

Looking at companies, the question also arises how their habits and their routines. may change. Humans and organizations like to keep their customs, so the costs for changing customs are high and it might be more rational for a company to act as second mover: Let the first mover kick off established routines. If that is the case, then incentives for first movers are important, and the second and third mover need softer incentives for an imitation.





Technological, innovations are indeed also quite relevant. The question is what kind of technology is there and related to this how processes of diffusion can be improved.

The study on Digital Europe shows relatively clearly that we see fascinating new PSSs. The impact of the consumer phase increases. Also, in this regard, you have to look at consumers' behavior.

Following our previous remarks, we did some analysis on networks where different actors are involved.

We did this analysis on networks where not only private firms but also consumer organizations, local groups and public policy groups were involved. Our evaluation methodology draws upon the sustainability or 'regulat ory impact assessment', as developed in the European Union, and our research team has specified those criteria in order to make them more operational.

Evaluation of Networks via Sustainability Impact Assessment

Relevance	(C 1) Process of problem identification, Pressure to act	How and by whom is a relevant problem addressed? To what extent and by whom is there a consensus about causes, effects, and the need to act? How urgent is the need for action seen from the actor's perspective? Does the network address main actors? Is the process stakeholder-driven? Is the process used for priority area identification in line with other stakeholders' agenda? Is it in line with global or regional trends?
	(C 2) Decentral solutions, Possibilities for Compensation	Is there an obvious link with other policy issues, to whom the network might add negotiated solutions? Does the network include relevant groups of society? Does it lead to an exchange of (financial or other) resources, which is considered fair and does not lead to additional externalities?
Effectiveness	(C3) Targets and strategies	Are there clear and verifiable targets? How consistent are sets of targets in the relevant area beyond the case study? Is the structure suitable for policy deliberations? Does the structure allow for stakeholder participation and interaction on targets and strategies? How consistent is time horizon of targets with appropriate action? Is there a defined norm or a baseline year?
	(C4) Implementation	Is there a specific action plan with concrete measures? How can the targets and/or the action plan be related to individual action? Are there performance indicator systems? Are these mechanisms supported by written and continuously reviewed routines? Do these mechanisms entail a monitoring of costs (see C5)?
Efficiency	(C5) Cost Reduction, Allocation	Which internal and external damage costs does the network try to address? Is there a visible strive for minimizing overall costs? In what ways are transaction costs included? In what ways is there a reduction of external costs? In what ways might new externalities emerge?

Evaluation of Networks via Sustainability Impact Assessment

Side Effects	(C 6) Positive Side Effects	In what ways does the network spur incremental or radical innovation? In what ways are processes of diffusion enhanced? Are there tendencies for inertia or is there a systematic effort towards openness for new ideas? What kind of benefits emerge (tangible and non-tangible assets)? To what extent can the network exploit economies of scale and/or network externalities?
	(C 7) Negative Side Effects	Are there systemic leakages, which may lead to problem shifting? Are there incentives for free riding? Are there new and additional negative externalities?
Adaptation Flexibility	(C 8) Freedom and flexibility	Can relevant actors freely choose among a set of instruments? Is there sufficient flexibility to make investment decisions consistent with network aims? Can actors develop new tools that have an influence on the network?
	(C 9) Evaluation and review	Is there a formal mechanism for evaluation and/or review? Does it include reviewers outside the network? Are there clear performance criteria that help to readjust the network?
	(C 10) Participation und Transparency	What mechanisms for participation and transparency exist? Are all relevant groups (affected parties) members of the network? Do public interest actors hold specific competences? Is the process open for new participants?
	(C 11) Control	Which formal and informal control mechanisms exist? Is there a sufficient division of competences between controlling and controlled actors? What processes ensure independence and power of control over time? What sanctions are foreseen in case of non-compliance?

We have also added guiding questions where you then later on can add scores to the different criteria and try to statistically compare the performance of different networks, analyzing their strengths and weaknesses. This is on the second sheet of our impact assessment. We did an assessment of different case studies.

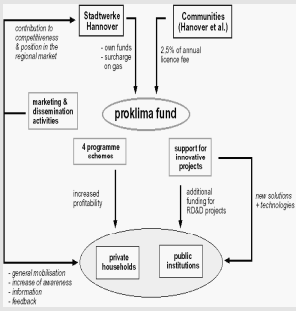
Case Studies analysed via SIA
'Millennium Collaboration Projects' (www.esri.go.jp)

1. ***EcoProfit***: local learning for integrated environmental technologies.
2. ***Responsible Care:*** Trans-boundary Chemical Network
3. ***PIUS***: Production-integrated environmental Protection (eco-efficiency agency NRW)
4. ***Eco-Industrial Parks:*** Horizontal Corporate Networks (Kalundborg + Brownsville)
5. ***Energy+****:* Public-private market transformation
6. **BP plc:** Tradable Permits at Corporate Level
7. ***ProKlima***: Funding for local Climate Protection
8. ***DJSI:*** Financial Markets shape TNCs

"P*roKlima*": Cooperative Climate Protection Funding on a local Level (Hanover)

- Combines management interests (utility), consumer needs, & public local interests in the region of Hanover
- Promotes energy efficiency & climate protection
- Designed to a deregulated energy market through promotion of regional responsibility & innovation leadership
- Implements the declaration of German corporate sector on global warming prevention on a regional level.

=> High involvement of energy utility, funding mechanism at low transaction costs

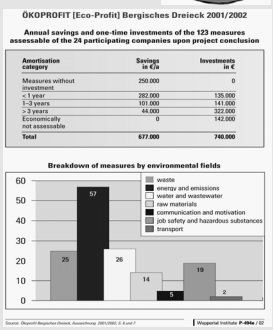


You see here the eight case studies, out of which I have chosen a few for presentation. This is the ProKlima Fund, which is a local

***Ecoprofit* - A Local Public Private Partnership Programme for Sustainable Development**

- Offers SME's consultative support
- Strengthens companies by cost reduction through minimisation of waste, emissions, etc.
- Creates social environment of qualification, innovation and trust via stakeholder dialogues

=> High flexibility, high involvement of SME's, horizontal diffusion

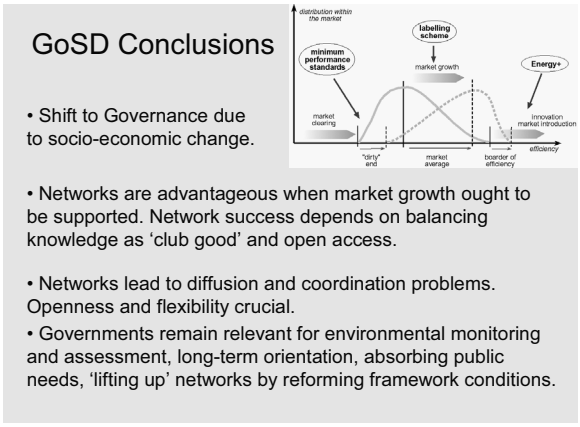


climate protection support fund organized by the local municipal utility of the city of Hanover (and others), which together run the ProKlima fund. The fund finances all kinds of initiatives in the region in favor of climate protection at the level of small firms, private household and public administrations.

The second example, which I would like to mention briefly, is 'Eco-profit'. This is a promising trend emerging out of mid-European cities, which might be interesting for the IGES project. Especially small-and-medium-sized enterprises take part and they participate in the learning processes, by which they can then later on make up their decision making in favor of environmentally-friendly investments. They are calculated here according to what has been done in the city of Wuppertal and its neighbors in this regard.

Let me now come to conclusions. The general shift from governments to governance is mainly due to socio-economic change, not due to change in the sustainability area.

Looking at those networks with different kind of actors, they have advantages when market growth ought to be enhanced from a market share of, say, less than five percent to a market share of 10, 20, and slightly more percent. This has been calculated here for the Energy+, the scheme by which electric appliances are supported. In those processes of market development, the frontier slowly moves from a low



percentage to a higher percentage. This certainly has its merits for sustainability driven by markets.

But that also means that market development driven by networks stop at a certain point. Networks can address the early imitators and the early adopters, but they hardly address those firms, which are not innovative. Looking at the Innovation Trends Panel of EU, for instance, innovative firms account for some 45 percent, while 55 percent are not considered as innovative. So, the question from a policy analysis point of view is how one address those non-innovative firms. And therefore, most likely you still have a need for some additional policies.

From our case studies analysis we would also conclude that governments still have task of environmental quality monitoring, and linking those assessments with activities that put pressure on the environment. This comprehensive monitoring task cannot be done by the private sector. Governments remain relevant for the integrated assessment of the environmental situation; especially for a long-term orientation following from those assessments, for instance, CO2 reduction and minimizing the use of natural resources. This can also be done at the local level. But as mentioned earlier - this is also a task for policy coordination among governments because not only OECD countries but also Developing Countries are relevant.

In regard to the provision of collective goods where public needs may change over time , policies and their administrations ought to absorb signals of change and to re-formulate objectives and targets. Again, the local level is essential for these tasks. But despite the manifold advantages of networks and local activities, there seems to be a need for a next generation public policy program, elevating business and local initiatives while addressing the laggards - for the sake of sustainable societies.

Thank you very much indeed for your attention.

＊＊＊＊＊＊＊ Q & A ＊＊＊＊＊＊＊

Floor:

You mentioned about the sustainable development assessment. In Europe, strategic environmental assessment are commonly used. Why is sustainable impact assessment different from the strategic environmental assessment?

Bleischwitz:

The new impact assessment has been introduced some two years ago in order to streamline the different assessments of legislation in Europe, complementing the existing environmental impact assessment and strategic environmental assessment for infrastructure projects. The new regulatory impact assessment now tends to harmonize those different impact assessments. EU now has started to formally pre-assess each regulation before it gets into force. So the process is that when the Commission formulates a proposal there is an impact assessment of the various options before the proposal goes to the Parliament or Counsel of Ministers. How the concrete relationship to environment impact assessments will look like remains to be seen. This depends inter alia upon how this process is managed in organizational terms within the Commission.

Floor:

Here is another question. You mentioned about pay-back time. When you are introducing some kind of new products or new technology, using resource, why is it difficult to have idea of pay-back time in Germany or France?

Bleischwitz:

The technical pay-back time is different from the pay-back time as customers or companies perceive it. In energy efficiency measures, for instance, you have quite often a pay-back time of less than two years. We calculated also material productivity and technologies, finding pay-back times of less than two years. Intention with introducing of these measures is a pay-back time of two or less years - because this is easy to communicate. Product services systems can perhaps be designed for immediate service too. Pay-back times of more than five years are problematic.

Discussion

[Coordinator:]

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Professor, Faculty of Economics, Doshisha University

[Panelists]

Mark Stoughton
Senior Scientist, Tellus Institute (USA)/ Visiting Researcher, IGES Kansai Research Centre

Marcus Wong
University of Cambridge (UK)

Oksana Mont
Research Associate, International Institute for Industrial Environmental Economics (IIIEE), Lund University (Sweden)

Shinichi Imai
Manager, Corporate Environmental Affairs Division, Matsushita Electric Industrial Co., Ltd.

Toshiki Yoshimura
Section Chief, Environmental Management Quality Assurance Customer Services, Duskin Co., Ltd.

Kyoichi Bessho
General Manager, Environmental Preservation Promotion Department, Administration Division, Head Office, Sagawa Express Co., Ltd.

Raimund Bleischwitz
Co-Director, "Material Flows and Resource Management", Wuppertal Institute (Germany)

Gunjima：

During the morning and part of the afternoon, we heard reports from the panelists. For the next two hours, until 5:30, we will have all participants here for an open discussion. Within that, I would like us to deepen our understanding of PSS theories. Before we start the discussion, I would like Prof. Yoshida, whom you just heard introduced, to talk about research directions in Japan. Prof. Yoshida is an assistant professor at Wakayama University and active at the Global Environment Forum Kansai, which had started the research of PSS models ahead of us. We will start by hearing his talk, interests and viewpoint of PSS research at Global Environment Forum Kansai, after which panelists can ask and field questions and then we'll move into the open discussion. So, Prof. Yoshida, if you would please.

Yoshida:

Thank you, Mr. Chairman. Ladies and gentlemen, I am Noboru Yoshida of Wakayama University. As you just heard, I make proposals concerning environmental problems such as this as well as policy proposals based on research, at Global Environment Forum Kansai, which is a cooperative effort between industry and academics

that brings together experts from governments, private businesses and academia of the Kansai. Within that, there is a subcommittee on technology for a recycle-oriented society that is looking into PSS. Prof. Makimura of Kyoto Women's University and several members of the Kansai Forum who are here in attendance today have been researching PSS since two years ago.

In the reports heard earlier today, there was mention of B-to-B and B-to-C approaches. At Global Environment Forum Kansai, a challenging topic we face it how to focus on B-to-B and then work in B-to-C. The Forum has staged symposiums several times because it is necessary to promote green purchasing in order to change the basic way consumers think about consumption. Consumers hold the key to green purchasing, therefore one of the hopes of PSS is that it will provide the driving force for changing how consumers think. Another thing is that the business chances that will come from looking squarely at consumer needs from the perspective of the consumer will lead to business models that will help activate the Kansai area.

At present, we are continuing research that we have been doing for some time on what kinds of PSS models have potential in Japan, including the examples we heard presentations on from Matsushita Electric Industry, Duskin and Sagawa Express. Preparations are currently underway to compile findings into a book. In that regards, this workshop has been a great opportunity to learn and put our thoughts together. I would like to thank everyone for that.

I think that, during the presentations we heard today especially in the morning, everyone focused their attention on the factors and what sort of schemes are necessary for promoting PSS. We are interested in this and, as was said in the beginning, various IT will be very important as the drivers. Especially in the case of Japan, when thinking up PSS strategies for the future, social trends will cause future scenarios to change greatly. We are very interested in how the elements, information and keywords like an aging society, security and sustainable development will determine our society, Japan's future or the future of other nations, and future scenarios, and whether they will act as a tailwind for PSS or bear some kind of negative effect.

There was another topic at the core of today's discussions: the underlying support of PSS. How do we build the social capital and social schemes that will support PSS? I will talk today not about the hardware but about regulation and deregulation and about organization. It was pointed out by Dr. Mont that, unless this underlying yellow area is included, unless we look at it with system concepts, it won't work. I find that very valuable advice.

While doing research at Global Environment Forum Kansai, I visited the USA to see examples of car sharing. I learned a lot. If I were to describe myself, I'd say that I'm a late-comer and the type of person that learns by asking questions. Though this may be getting into the next section, I've got questions about each of the presentations we hard earlier because of our interest in drivers and social capital. After I finish talking, I'd like to ask those questions during the discussion.

In the first presentation given by Dr. Stoughton, I'd like to ask how IT can really function as a tailwind for PSS. In Mr. Wong's presentation on “PSS Applications in the Consumer Goods Industry: Lessons Learned in the UK”, he mentioned countermeasures to rebounding. I am interested in knowing if a single PSS system would be ineffective in canceling out the rebound effect. And, I am interested in the positions and roles of government that Dr. Mont touched upon in her

presentation on “Trends in PSS in the European Union”. Even in Japan, the government is playing a big part in green purchasing and other initiatives in order to lead market formation. Then, there were the PSS examples from the business sector. I think we are at the point that we need to evaluate the specific business models such as Matsushita's and whether they are good for society or not, including the degree of customer satisfaction

Lastly, there was Mr. Bleischwitz's presentation on governance, which is a very complicated topic. In Japan, there are cases where laws on articles and buildings actually prevent PSS from working because of ownership rights. Some effective tools were also introduced in the presentations, so I want to ask which tools would be effective towards further promoting PSS.

I got a little ahead of myself, but this has been a great opportunity to learn and I want to thank everyone for that.

Gunjima:

Now to continue, I would like to move into the open discussion in which we tie in the questions from Prof. Yoshida and several other questions from everyone else.

As was pointed by Prof. Yoshida and it was even asked from the floor, a recent problem we are interested in is PSS seen from the perspective of environmental demands. Nevertheless, when thinking about PSS unto itself, Japan, which is directly faced with a dwindling population, cannot avoid a shrinking economy, an economy with a shrinking population. This will conceivably bring about changes in the balance of market labor pools and production strength, and the significance of investment. I think PSS will be looked at closely as a managerial approach to a shrinking economy and the situation will eventually act as a tailwind for PSS. As Prof. Yoshida pointed out, PSS cannot become business just because of environmental factors; there are various aspects to look at. In that sense, there was the explanation of Dr. Stoughton; PSS models may gradually emerge in the globalization of materials procurement because of the escalating cost competitiveness of globalization, whereas it used to fall within business affiliations or supply chains used until now. And, there are the problems of environmental load, greening and the question Prof. Yoshida raised a short while ago as to whether or not IT can act as a true tailwind or not. Then, there is the care service that Duskin is providing amidst Japan's aging process; services like this will gradually be in demand from welfare perspectives. Given the situation, I would like us to begin talking about what the driving forces of PSS are and what actors act inversely as a tailwind for PSS as we heard earlier, which is what Prof. Yoshida was asking. I want us to talk about not just how PSS reduces environmental load but what driving forces will increase these types of business models, and how PSS will grow or not grow in its relationship to current social changes and economic changes. Mr. Wong is researching all aspects of that, so I'd like Mr. Wong to touch off things.

Wong:

In terms of the driving forces for PSS within the European situation, one of the key driving forces is legislation. This may not be as clear as the example in the U.S. from Dr. Stoughton's talk area. In Europe, directives as passed at the EU level, with detailed implementation left to the individual member states. However, there can be no doubt that these issues are a very powerful driving force. Beyond that, we are also looking at the economics and specific business case for PSS, and looking at particular market niches in which

PSS best fits. This is also very important. We are also looking very much at IT and the aging society. Both of these things I believe are also important as broader factors.

Stoughton:

In my talk about PSS prospects in the US, I did not discuss demographic issues as an important economic factor for PSS. And that is because while the U.S. population is getting older, it is not as sudden or as dramatic as what is happening in Japan.

The effects of an aging population on PSS prospects is an interesting question. Clearly, an older population creates demands for certain kinds of services, especially "at-ho me services" related to health care, delivery and that kind of thing.

To my knowledge, though, I have not seen anything published in the English literature discussing the impacts of demographic transition on consumer services. If any of my fellow panelists have, I would be interested to hear. But I think Japan may be the first economy that will really experience and illustrate these effects.

Mont:

I was thinking about drivers a little bit more for business to consumer market. In Lund, we are talking about distributed economies, meaning local economies, versus globalization. We see a lot of examples in the PSS field, we are looking at the possibilities to develop local systems and this is especially driven by concern of consumers in, for example, food sector. How long your food travels, does it come from New Zealand, Australia, all the way to Scandinavia, or is locally produced food means that it is fresh and many people do not have to worry about transportation cost and environmental impact. It is also clearly linked to sort of health effects and perception of people about food whether it has been ripe on the road or actually on the field. Many people are much more eager to pay a little bit extra to support local farmers than to support middle or long distance transportation.

Another driver being discussed at European level is the volatile work market. The job market is quite flexible. So, people are moving a lot and this leads to that many people start questioning the level of possessions they have. They need to drag their possessions all the way to different countries, depending on where the jobs are. For many people, this flexible working pattern becomes a trigger to reevaluate their ownership criteria. In Sweden it is a long-term discussion on aging population and on services that are provided to elderly. In Sweden we have a different problem - the high taxation of services. So, for many people to buy services is very expensive. We need to provide services, but we need certain changes in taxation system to promote services and local economies. It also becomes a question or rather a driver: would aging population increase the upper limit of working age. This also leads to a question: can many people consider this option of working late in their life, if it is a part time work. A lot of services that are provided at community level to elderly are part time work and flexible working hours. This is also one of the drivers for this service-oriented solution.

Gunjima:

Thank you. It was pointed out that, even though there is B-to-B PSS, B-to-C PSS is more difficult, but B-to-C PSS seems to be expanding. One case is home care services for an aging society, as Dr. Stoughton pointed out. Does Duskin have anything to add to that?

Yoshimura:

There are still aspects we have yet to

understand such as how society's aging will affect our service and whether that will act as a tailwind for servisizing. But, we want to develop business within that, make it a pillar business and prove useful to society at the same time. There are still some sticky points in how this will relate to the environment, but it is definitely a prospective direction.

Gunjima:

I believe so, too. Another thing is the high taxation of a welfare nation as was explained by Dr. Mont. Since these kinds of welfare services are shouldered with public money, on the local level, they are shouldered by - shall we say - a market economy or social economy. Dr. Mont also pointed out that flexibility in the labor market is important towards PSS models. Also, food is a problem in globalization. In Japan as well, food security and safety are very important issues. We also heard it said that fields that enhance sustainability on the local level are gradually expanding. From these talks, I got the impression that the environment is not the sole driving force behind PSS; rather, one direction we are seeing is that economic changes or demographic changes, as Dr. Stoughton pointed out, may gradually make PSS possible. Prof. Yoshida, if you have any questions or anything else to add in this respect, please do.

Yoshida:

Thank you. The explanations were quite clear. As was said earlier, the way elderly people live will change as the overall population gets older. More specifically, as one comes to need nursing care, he/she leaves his/her home to enter a semi-public facility such as a group home. How things are used within that and how people think about owing things while living a service-oriented life will more than likely change as we go forward. In that sense, I think society's aging will become a positive driver.

Given this opportunity, I would also like to learn more about the growing use of information and IT that Dr. Stoughton spoke of. I myself deeply recognize the role that information plays as an alternative to labor, time, energy and resources, so I believe IT will also act as a positive driver. As you probably know, the IT industry in Japan even has their hands on managing baseball teams. The IT industry has grown recently by providing products to consumers at very low prices not just via e-commerce and internet communications but by serving as an intermediary between industry and consumers or, in other words, by eliminating the retailing and distribution that created visual relations with consumers. The chairman spoke of globalization, but I'd like to inquire as to another aspect of IT, that being whether or not IT can harmonize with PSS and the information be used to efficiently enhance local value. Can it harmonize well?

Marcus Wong said before that partnerships with high-level managers are extremely important towards socializing PSS. Can IT, which creates value chain and maintains relations with consumers, maintain the value chain and coexist with it in the future?

My question may not be all that clear, but it's a problem I am troubled by. I asked it with the intent of getting a confirmation.

Wong:

I think IT is critical. Looking to my particular case studies, there are very few where IT was not a factor, even in such cases as car-sharing. The information which is provided to the people who are members of car-sharing or even the ride-sharing scheme tends to be Internet-based. If we look at things like CMS, it is based very much on having a comprehensive database which tends to be electronically-

based and that has to be arranged using IT. So, I believe IT is very much a critical factor involved in the facilitation process. I am not sure whether I would describe it as a driver. It is, to my mind, more something which needs to be in place, to be managed correctly for a PSS solution often to be successful.

Stoughton:

I mentioned IT as a PSS driver in the U.S. economy, simply because it creates a market for certain types of PSS. And by that I mean that as long as information technology continues to change very quickly, it creates a market for services to manage IT for companies.

What Marcus was discussing is rather different and I agree with him. But in most of the business to business PSSs that I am familiar with, the value proposition to the customer is that the PSS provider can perform some logistics function better than the customers can do for themselves.

For example, in the case of chemical services, the provider can manage the ordering, the inventory, the distribution and the disposal of chemicals better than the customer. In the case of the successful car-sharing schemes that I know, what seems to make them successful is, (1) the fact they have cars at convenient locations, but (2) and just as important is effective application of IT. Effective IT means that when the customer makes a reservation, it is guaranteed. The IT system remotely unlocks the car, verifies the location of the car, and debits their account automatically.

So, it is the IT investment that makes these logistic-based PSSs possible.

Mont:

I would also like to add that we should think about IT as not a final end but as a means of enabling solutions. We have looked at some IT solutions such as application service provision, in which companies or consumers do not have to own complex computer with the hard drive and all its hardware. One just needs to have a so-called thin-client or even an old computer which basically links you to server. So, on your monitor you see the same picture as in traditional computing, but the communication is only the clicks on the keyboard. In a way, it is outsourcing IT resources to provider. It works quite well in Swedish companies. In order to investigate attitudes of households to such models, we conducted a survey of households. People were very concerned about outsourcing their private letters or whatever database systems they had. One would think that businesses would be much more concerned about security and business secrecy, but in fact it is private people who are very careful with what they are outsourcing. So, I think there is still a big potential in business to consumer area. But, there are certain barriers, which need to be overcome in IT field as well.

Gunjima:

Thank you. As Dr. Mont just said, IT is only a means. As Mr. Wong pointed out, IT is a means of communication in the supply chain. As Dr. Stoughton pointed out, it is a logistics issue. And, Dr. Mont introduced IT for outsourcing. So, there are various intertwining issues. It's by doing those things that IT has a cost reducing effect in the supply chain. Another point is that IT takes various shapes and forms such as to cut costs and raise productivity, skip intermediary communications and so forth. On the other hand, IT is reducing environmental load via TV conferencing and other applications. IT is not PSS but seems no more than a means that brings all sorts of positive and negative factors. I think we need to research those points

a little more. This problem was put forth by Prof. Yoshida, I believe. Thank you, Prof. Yoshida. Are there any "this is what I think" comments about today's IT from the floor?

Floor:

IT all of sudden eliminates the restrictions of time and place, so I see it as a big chance for PSS. In existing business, there has only been product selection, shipping and supply with the restrictions of time and place. The way business is done is determined by the rules they are bound by. It would be advantageous to business if there were no restrictions, so this may be an alternative approach to reducing environmental load. Regardless whether restrictions are lifted by IT, IT is being introduced on the pretext of old restrictions. We should be able to avoid the mistakes and losses if we look from a PSS perspective. Thinking with a PSS perspective presents particularly big opportunities when it comes to introducing IT.

Gunjima:

Thank you. We need to restructure our socio-economic systems. The economic structures of the 20th century disposal society are changing. Not just environmental restrictions but also economic and social restrictions, including demographic restrictions, have emerged. In Japan as well, restructuring in the form of economic and social changes are taking place. I'd like to hear what sort of outlook Mr. Bleischwitz has on PSS in light of those changes and trends. Would you give us your opinion on how restructuring, not as a driving force but within its relationship to social foundations, can give PSS greater social significance?

Bleischwitz:

First I think that it generally fits together. They tend to see towards service economy, decentralization, a more offensive competition policy in favor of small-and-medium-size enterprises and with regard to sociological side also change towards individualism. I would think all these trends are very much in line with PSSs. And the question would be whether there should be additional policies for PSS. I am not sure. I would think that within these existing policies, it might be worthwhile to look at what specific measures are being undertaken and what their likely impact would be on the PSSs. Then you would come up with more specific analysis. I could imagine that product services systems are not yet in the mind of the regulator of the central government. Therefore, just a few pieces of regulations could perhaps be added to the already existing tracks. In particular, I do believe that perhaps it needs a framework for the environmental impacts; because what I learned today is that many of the case studies just pick up their individual environmental assessment which is fine indeed. They look at CO2 and waste etc. But I guess it is also the interest of the business to have some kind of orientation of what the main environmental indicators would be. I think this would be a task where policies could be appropriate. In addition, I would also think that the tax system is quite relevant. I can indeed argue in favor of environmental tax which is under consideration here. But also I think the general idea of what should be taxed. If not labor or capital, what else? And then you automatically see that taxing services less seem to be reasonable. Given public tasks, a certain tax amount should be raised. The question is: where should it come from? Then you could look at energy, materials and water which could be taxed. With regard to decentralization, the fiscal federalism issue would come up. So, the question is why shouldn't there be

federal taxes or local taxes or prefectural taxes. This is now under discussion in some of the European states.

Gunjima:

Thank you. Mr. Bleischwitz made the point that the systematic problems of taxation and decentralization have considerable significance with regards to PSS. Prof. Yoshida spoke earlier of ownership as a factor for discouraging PSS under today's legal system. It would seem that, in order to promote PSS models, socio-economic restructuring is a big issue. Systems become banal so that innovative business by PSS doesn't fit inside the shell of existing systems. To further promote PSS, in addition to systematic structures, cultural backgrounds such as consumer behavior, will be major issues. Could we get Prof. Yoshida to say something about the importance of expanding one's sights and researching PSS models with these kinds of thoughts?

Yoshida:

I think it would be difficult to gain the social consensus to build new systems for promoting new PSS. In that regards, I would like to hear what Dr. Stoughton has to say. He introduced an NPO by the name of Chemical Strategies Partnership in his talk about CMS. How can such as organization prove itself useful towards plotting new social values on a table and demonstrate to society the new benefits of building the legal base? Would you explain a bit more about how an NPO such as CMS can play a part.

This may be a bit hasty, but when considering a labeling system for organic farm products, since these products don't use fertilizer, the system basically cannot be socially promoted within today's organizational frameworks of selling fertilizer in Japan. If you have anything to comment as to whether or not a flexible organization such as an NPO can prove useful to PSS by encouraging social consensus, please share your thoughts.

Stoughton:

OK. I will try. I guess there are a few important things to know about the chemical management model and then also this NGO, the Chemical Strategies Partnership.

Regarding the Chemical Management Services model in general, a large part of the reason that there is a market for Chemical Management Services is the existence of environment regulation that makes the use of chemicals much more expensive than it would be otherwise. Regulations create or increase costs related to disposal, to reporting, and also to storage and special handling requirement. If those costs did not exist, the market for CMS would be much less.

And regarding how a non-profit got involved with promoting a business or industry. Before CSP existed, Chemical Management Services was reasonably well-established in the automobile sector. The question was “Did it have applicability outside the auto sector?” CSP was basically created to try to address that question through some applied research with willing companies. And the idea was that with the provision of some technical assistance, companies would be willing to be more experimental, or take on slightly more of the risk than they would otherwise.

Once the feasibility of CMS was proven in certain other sectors, CSP really turned to addressing some market barriers. These are mostly related to lack of information about CMS in the market. In other words, potential customers who did not understand the CMS concept, who did not understand how to evaluate their internal business case for CMS or how to create a request for a proposal so that they could actually initiate the chemical

services program. So, CSP's hope is that when the market is well enough established, CSP will no longer have a reason to exist.

So the CSP case is rather different than the idea of a non-profit entity forming the permanent administrator of a PSS. Whereas the example of municipalities which hire coordinators for car-sharing schemes is a "permanent administrator" model. CSP is definitely oriented around a business to business PSS that is adopted for and perpetuated for economic reasons. We became interested in CMS because the largest cost-savings under the Chemical Management Systems are also directly linked to the largest environmental gains. So, it is the situation in which the environmental and economic incentives and benefits are aligned nicely. I do not think that is always the case for other models.

Gunjima：

So, one PSS model is working not by just business doings but by collaboration with other types of organization. Though slightly different from a PSS model, Mr. Bessho presented a program that Sagawa Express has to reduce environmental load via collaboration with the WWF. I don't suppose we could hear a little more about that?

Bessho:

That was the Climate Savers Program where NGOs and businesses work together to reduce CO2. The reason why we are taking part in such a program is that, amidst the trend of interjecting third party opinions into performance reports and environmental reports, we are working with NGOs in order to gain greater transparency and trust than they have today. Our collaboration with the WWF involves having the WWF, a third party, announce the activities of Sagawa Express. There is no actually transfer of objects or anything; it is addressed as one way to improve brand image.

Gunjima：

Thank you. The reduction of environmental load is tied to CSR in some ways. The PSS model presented by Dr. Stoughton creates a win-win situation for the involved organizations. There are many cases of collaboration with NGOs in European programs such as EcoProfit and Energy+. Mr. Bleischwitz, would you elaborate on that a bit?

Bleischwitz:

Yes, an interesting thing that we observed from the case studies is that they can be characterized as driven by private companies, because they have an interest in selling their products or related services. But they see the information gap for instance, therefore they ask for public participation, and they ask for NGOs participation for two reasons. One is reputation which has been mentioned already. And the second reason is that these NGOs have kind of an outreach. They have members and they have people reading their magazines etc. So many companies hope that at least the members of those NGOs would be among the first customers and this gives an additional impulse to emerging markets beyond those niches.

Wong:

When we look at the issue of marketing PSS solutions, consumers tend to take with a slight pinch of salt company publicity: they are slightly suspicious about their environmental claims. If these claims could be backed up by NGOs which have a good reputation such as Friend of the Earth or Greenpeace, then these claims will often have greater weight in the market place.

Bleischwitz:

There is perhaps another striking reason why such a cooperation is essential. We have in mind a fifth dimension of innovation which is called "systems innovation". So far PSS is not yet really capable of addressing systems innovation for several reasons. But, when you assume that at least some of the NGOs or the green NGOs are among the forethinkers, whatever that means, then you could think that any cooperation prepares a system change which then would take place later on. The exchange of thoughts could be essential, but this is a different level. One is the daily business level where different people are involved. And other one is more long-term-oriented strategic cooperation where, most likely, different actors from the NGO and company-side would participate, but it also is one element of cooperation between NGOs and firms.

Gunjima:

In a certain sense, one of the problems in collaborating with an NGO is the community or, in other words, the readership community. IT offers the possibilities of development within a virtual community, but the real development takes place in the local community. If anyone has anything to say about the relationship between PSS models and community businesses and social enterprises, in the sense that they enhance the sustainability of the local community, or whether or not is would be a good idea to evaluate PSSs by their relationships with small and medium size companies as Mr. Bleischwitz suggested, please speak up.

Bleischwitz:

My simple comment would be "keep it as simple as possible". Because small-and-medium-size enterprises do not have resources to hire expensive consultants or to undertake ISO procedures. Therefore, what the call is for is a simple procedure. In many cases it needs some external expertise to carry out that kind of assessment. This is partly what researchers of publicly financed agency are good for who do not ask for high fees like McKinsey and other consultants.

Wong:

Looking at the sources of firms which have taken part in my research, most of them are large firms. However, there were one or two small firms that had implemented sustainable PSS solutions. As Dr. Bleischwitz has mentioned, they were supported very much by NGO-type, consultancy-type organizations, who helped them develop their solutions. But I believe there is a great role for small-and-medium-sized companies because they are often flexible enough, so they can move faster than larger companies to fulfill particular market niches which perhaps PSS solution is best adapted to.

Mont:

We see now the role for housing organizations or real estate companies in providing PSS solutions. They are looking for extending their service range to tenants. and are looking for additional services, which can be provided by small-and-medium-size enterprises at the community level, close to where people live, starting from bicycle repair shops and other small activities. I guess this is also one way of approaching the local community, but also providing business case for SMEs.

Stoughton:

Let me say something regarding SMEs, as customers for PSS services. In the B to B market, a lot of purchasing or buying is done by SMEs. And as with larger manufacturers and enterprises, SMEs have the potential to improve their efficiency significantly in terms

of the use of inputs and production of waste. This is certainly true in the area of chemicals and it is true in the area of resource efficiency (that is, waste production).

We have seen one difficult problem in the SME market for BtoB PSSs. This problem arises when the PSS requires to transfer of certain functions that previously we were done inside the firm to an outside provider.

You can look at the total cost to a SME of managing chemicals or the total cost of an SME performing a particular logistics function. In theory, an outside provider could do the job for less. But in most SMEs, one person is doing multiple functions. So shifting one of their functions to an outside provider may not really transfer the associated cost. For example, if one person spends 15% of their time purchasing chemicals, that person will still exist after you have a CMS program. So, you are paying the CMS provider and you are paying your own employee.

This problem makes it difficult to get a sufficient economy of scale for SMEs to purchase certain types of PSSs. The problem seems to fundamental to certain PSS models and we are not sure what to do about it. For other types of PSSs like energy services, this problem does not seem to arise.

Gunjima:

Thank you. I'd like to move on to the next question. Prof. Yoshida, if you have a question, please ask it.

Yoshida:

I've learned about the organization and roles of NPOs today. The circumstances are a bit different in Japan, but I'd like to hear about the roles played by governments. In the talk about car-sharing before, there were some examples of government's roles in supporting basic elements of PSS such as providing parking lots. In the case of ESCO, an energy servisizing project talked about earlier, energy efficiency is improved by sharing without requiring any capital. Despite the serious financial woes of the Japanese government, they play a specific part in ESCO by subsidizing the project. In a certain sense, the government is a core actor in forming a PSS market within the ESCO project, but some say they should leave it to the businesses. I would like to hear about any cases in Europe, if there are any, in which the government supports basic elements of the project or contributes to forming a market.

Gunjima:

Does PSS support end with the local government or does support go as far as creating PSS market to some degree? So, the question is “up to what stage does the government provide its support?"

Yoshida:

In Japan, the government leads up a wide variety of projects and has helped create markets. For example, with green purchasing, in order to create a market for using recycled paper made from 100% used paper, the government was first to promote green purchasing. Certainly, the market is created, but up to what point should the government spend energy to recycle used paper? The government continues to stimulate demand without letting the market decide. In some cases, private sector markets are messed up for reasons like this. With PSS, what kind of governmental involvement would be good? I imagine the situation is quite different according to the country. It seems to have something to do with governance, but if you have any suggestions that might be of reference to Japan, please let me know.

Bleischwitz:

I can perhaps make a few remarks on it. First, I think one should really be careful with government interventions. I have seen two innovative firms delivering eco-efficient services, running into insolvency because of environmental policies. This is indeed a tragedy. One was because of misleading waste policies and other one was because of misleading subsidies to bio-fuels which then have contributed to running forestry-based insulation material producing firm into insolvency. So, one should be careful a bit. But I think the main thing about European policies is that they have become clever in that regard. Look at, for instance, the setting of an energy agency in Germany which provides information on energy-saving potentials. This is not directly funded by public taxes, but by money from privatization plus support from electric utilities. One formerly state-owned company was privatized and part of that money was used to set up such an agency. I guess such model can also be applied to other areas. Public tasks do not have to be financed completely by public money. Often, such tasks also coincide with active employment policies pursued by local governments. Local governments actively search for options where environmental relief and PSS can be pursued simultaneously. This kind of policy integration is essential because it saves money and it avoids too many conflicting targets. In terms of what could be done, I could imagine that it also would be important to look at the legal frame for small-and-medium-size enterprises were, for instance, standardized contracts or a simple liability law could be one essential reform which does not cost really money but would encourage small-and-medium-size enterprises to go into the market of services. Because then they would have the lower cost for legal advisors etcetera.

Gunjima：

I'd like to go back to the original problems of the market. I have two questions for Mr. Imai of Matsushita Electric Industry. One is from Yuji Kimura of Osaka University, who asks “what promotional factors and impediments are there to establishing a market for the “Light and Trust Service”, which differs from the conventional sales system, without governmental support?” Mr. Imai, if you would please.

Imai:

I spoke earlier about the background to the Light and Trust Service. We make fluorescent light fixtures and the fluorescent bulbs themselves, but our share of the fluorescent bulb market is dropping. The fluorescent light fixtures are made by group company Matsushita Electric Works, who maintains an extremely high share of the market. With prices for fluorescent bulbs falling markedly because of internet sales and internet auctions, we lost share of the fluorescent bulb market. The conventional sales approach is no longer viable. So, we thought it might be possible to sell fluorescent bulbs at overall higher prices and regain market share by giving the fluorescent tubes some kind of added-value. We thought we might gain the understanding of customers by properly treating waste and thus the Light and Trust Service was born.

Gunjima：

When conceptualizing this business model, where was resistance the strongest, inside the company or outside?

Imai:

We first ran into resistance within the company. We started this business model as B-to-B, because some people felt more thinking was needed to deal with the effects of B-

to-C. Outside the company, since a dealer contracted by Matsushita handles the Light and Trust Service, there was a problem in that the capital configuration changed. Normally, when a fluorescent bulb is sold, money comes in right then and there, so capital is easily collected. However, in this business model, the fluorescent bulbs are rented, and payment comes back at a fixed rate. Because of that, the sales company that had previously made the sales and collected the money had to change over to managing rental and lease payments. Matsushita made up any cash flow gaps during the transition period.

Gunjima:

With this Light and Trust Service, making the bulbs longer lasting would mean less bulbs would have to be provided. If this PSS model lasts, the idea and desire to make the bulbs more durable will emerge as a strategy, won't it?

Imai:

We initially started the project to regain market share, so we haven't gone as far as to redesign the fluorescent bulbs themselves. It is necessary that our engineering teams start thinking about extending the service life of our products.

Gunjima:

Thank you. Are there any questions about Matsushita's current activities?

Yoshida:

You just said that it was necessary to start thinking about B-to-C. One of the big differences between B-to-B and B-to-C is that the market can change greatly because, in market creation, much depends on how consumers accept the service. I'd like to briefly introduce a case we are researching. Mr. Gunjima presented a PSS model in which used refrigerator parts were salvaged and used to extend product service life a little. It's a case of “m aking assets more durable”, but our investigations into the possibilities of this kind of business model showed that consumer acceptance of this previously nonexistent business of used parts was extremely low. However, after visiting a recycle plant and understanding how those used parts are put to use, consumer acceptance improved markedly. Nevertheless, for a business, it is a question as to whether there is a market right now or not. As consumers become more aware of the environment, a market will certainly grow, but that is where the big risks lie. I imagine you faced the same risks with Light and Trust Service. What criteria did you use to move forward? What is the judgment of the project leader or was some kind of quantitative figure necessary? With B-to-C, it must be particularly difficult. How did you evaluate a market you could not see? I'd appreciate any thoughts or comments you might have.

Imai:

Matsushita, too, is studying B-to-C applications. This is just my personal opinion, but PSS is closely related to how mature a culture is. Even at Matsushita, our product design group has many young engineers who are researching the possibilities of PSS-like products, but one's sense of values differs with every generation. Japan's population has many people today age 55 who were born just after WWII. This generation treasures their “possessions” and finds value in them. However, their children's generation is not that into ownership; it is a generation that prizes “activities” such as events and communications. So, for that kind of generation, the possibilities of B-to-C PSS should increase.

Gunjima:

What is the situation overseas? Here, we had a B-to-B PSS that took ownership of "so mething" as a pretext and changed it to an ownership configuration that did not insist on owning "anything", but PSS trends would likely differ according to the cultural aspects of a nation. So, what is the situation like in Europe and the USA? Even if promoting B-to-B that does not depend on ownership, what thoughts do you have about "ownership" in promoting B-to-C? Dr. Stoughton said that there wasn't much B-to-C PSS in the USA, but Dr. Mont, what is the situation like in Sweden and North Europe in general? Is there a generation gap?

Mont:

I am thinking now: what is our goal? Is the goal to undermine ownership or is it to really reduce lifecycle environmental impact? If our goal is the second, then we should not probably restrict ourselves by leasing or sharing ideas if they contradict cultural context or history of the country. Then we should probably avoid leasing and sharing, but instead, develop systems, which would make take-back process easier and introduce supporting remanufacturing and recycling facilities. So, whatever works depending on context is fine. Also regarding ownership, cars became member of families basically in many countries and yet we see increasing number of members in car-sharing organizations. So, on the one hand, we have the symbol of ownership and status in many countries and on the other hand, there are people who go into membership of car-sharing organizations. So first of all we should be flexible enough to have systems, which work for different context, but, then also in each country there are different consumers as well. Some are prepared to working in flexible and mobile market. They do not need all the goods, which other people really think they need to own. So these are the two different approaches. I think if the ultimate goal is to reduce lifecycle environmental impacts, then we have options and companies should develop different solutions for different customers. Customers should be given information about what options there are. Suppose I come to a shop to buy a drill, which I use once a year. I should be told by the sales personnel that "what do you need this drill for?", "how many holes do you want to drill?", "are you professional or not?" Based on that information they may suggest not to buy a drill, but to rent one or to buy a handyman service all together. If you are semi-professional, they can talk about different options, different product levels, because products are also different in the level of their sophistication. Sometimes people pay a lot for quality, but they use the product very seldom, it is also a sort of waste of money and materials which goes into high level products. I guess the diversity of alternative as well as access to the information, knowing what options are there, is very important for private consumers. It is not only to buy the "product", but it may be to buy "service", and go into leasing or sharing system in place.

Stoughton:

And more than that, I think there are situations where it is actually not desirable to have PSSs that have the effect of increasing the durability of certain kinds of goods. I do not want a refrigerator to last 20 years. I want a refrigerator to last five years, with energy efficiency standards for new refrigerators increasing each of those five years. For "dur able products," where the largest portions of impacts are in use, the persistence of much older products in the population of products in use is actually a big environmental problem.

Mont:

I totally agree. That is a very important point. Some research about refrigerators shows that we buy more efficient refrigerators, but they grow in total volume. So, basically the consumption of energy from refrigerators is growing. In Sweden we have community-based washing centers provided by producers of washing machines through third-party service organizations. The service organizations support and maintain the washing centers and we see washing machines replaced every three years since they wear out fast due to high frequency of use by many households and since more efficient models are coming to the market.

Wong:

I think that it is fair to say that when we are comparing the B-to-B and the B-to-C market, the B-to-B market is typically more rational. Decisions are made for more functional reasons whereas the B-to-C market is often more irrational, where decisions are made on emotional reasons. However, there is a danger that what we are discussing here all the time is looking at the consumer as a very rational sort of being. Perhaps we are discussing issues like ownership: whether ownership is a good thing or a bad thing in terms of how much it's going to cost, when perhaps we should be looking at the consumer psychology behind their behavior. For example, there is very little rational reason for owning a large off-road car which runs 10-15 miles per gallon and the owner is driving that car in the city. Perhaps what we could be looking at is to accept that the consumer is going to be emotional and irrational about a lot of these decisions but still change the way they think towards greater sustainability. And for example, in a study which was carried out in terms of car-sharing, it showed that a lot of people who are involved in the car-sharing scheme, because they are now more environmentally aware of their situation, are more likely to make environmental choices over other aspects of their life. They are also more likely to take part in other sharing, other social and neighborhood schemes. This is perhaps an example of accepting that the consumer will be irrational but, by using a sustainable PSS to introduce them to issues of general sustainability, we may address the underlying issue of modifying customer behavior.

Bleischwitz:

I have a brief academic remark because it coincides with what has been analyzed in research as difference between private goods and collective or public goods. Now we know that there are goods in-between like club goods. What you mentioned here seems to indicate that consumers are not only interested in their private ownership but also in membership in club, such as car-sharing initiatives. These clubs can be provided as a service from firms meaning that their customers then are members of a club, the Matsushita Customer Club, if you wish.

Mont:

I would like to defend private consumers on a point that they are totally irrational and only emotional. I guess we count the money we spend on whatever we buy. First it is also important to remember that each company or organization has a professional buyer who spends hours on making the purchasing choices. Some studies show that private consumers have three to five seconds for making purchasing choices when they come to shop. So, having this time in mind, consumers probably make very rational choices. Secondly, it all depends on what type of information consumers have as well as how much

time they have to handle it. Electrolux is now introducing an interesting way of selling products because they are developing environmentally sound white goods which are bit more expensive than other brands. They have been thinking how to persuade consumers to buy more expensive, but also more environmentally sound products. They come up with an idea of showing to consumers lifecycle costs together with environmental label. In this way they show that in case of a refrigerator the energy that consumer pays throughout product life is a considerable cost. The company shows that although the initial investment for product is larger than for other brands, in the lifecycle of the product, consumers save money. So, in that way they are giving information to consumer, helping them being rational about their money and selling environmentally sound technology at the same time.

Stoughton:

We also talked about the ownership ethic of the consumer being a real problem. But sometimes in the choice of goods, it is actually lack of ownership that poses a problem. For example, in the U.S., the expectation is that if you rent an apartment, it comes with all the appliances, refrigerator, air conditioner, heating. You do not own those appliances as a renter. The person making the purchasing decision and the service decision is in fact the property owner. The property owner is not inclined to decide on the bases of the lifecycle cost. They are inclined to decide on the basis of the size of capital investment required up front. So, the larger lifecycle cost for inefficient appliance is transferred in fact to the renter who often-but not always-has less disposable income than the landlord. So for product service systems where the purchaser is in a way different from the user (which is true in many housing situations), you have a different set of problems.

Imai:

I share the exact same opinion as Dr. Stoughton with regard to replacement purchasing. As I explained earlier, the annual power consumption of a refrigerator is one-fifth that of ten years ago. If thought of in terms of lifecycle, it's a Factor 5 product because power consumption during use accounts for more than 90% of the total consumption. Now we are targeting consumers who are smart about replacement purchasing, and we are making proposals to governments. Of course, the customer owns the product, so we are just advocating. If they have already changed over to PSS, then there is a different approach. It is necessary to prepare environmental labels and catalogs further evolved from the current type 2 environment labels as Dr. Mont mentioned so as to make lifecycle energy consumption and environmental load appealing product attributes..

Gunjima:

Prof. Yoshida, have you any questions for those who presented reports today?

Yoshida:

I will have to organize everything I learned today, but there is one last thing I would like to know. Mr. Bleischwitz spoke of Sustainable Impact Assessment (SIA) as a PSS evaluation tool in his report. I myself believe it is important to assess PSS with a tool such as that. Since businesses undertake PSS as a social responsibility, SIA and accounting tools are important because they prove environmental load has been reduced. Already the Wuppertal Institute is recommending a quantitative method, but like Mr. Gunjima said, after resource productivity, there is need to make

services efficient and quantify the efficiency. First, I'd like to ask if any advanced research is being done into that. Though this is true with tools for making self-evaluations of the social impact after implementing a business model, is there any development underway on evaluation tools for improving PSS that would newly rework additional profits of ongoing business models and hidden costs that are internalized by environmental load, or that identifies new value chains that lead to profits? I would appreciate any comments you might have about those evaluation tools.

Bleischwitz:

Thanks. Regarding resource productivity, I guess the measurement can be done, because you can measure resource intensity. There are different schemes but, there is now harmonization going on how the material intensity can be measured. This is done under European Environmental Agency. It is going to become harmonized both in the EU and OECD. So, this is done more or less. Service efficiency is quite more complicated. Don't you think that the only way of measuring it is to ask questions to the consumers? Because this is not a statistical exercise but a question of market response ultimately if consumers are satisfied to buy a certain goods or not. This is perhaps an economist's view. But, I truly believe in the freedom of choice. Among those questions, there should be some questions which are all related to public issues such as sustainability of a region or the pubic goods such as some environmental things, not only the satisfaction of private consumers with private needs. This mixture of handling private needs and public needs makes service efficiency evaluation somewhat more complicated. But, I guess that many evaluation tools are on the road and it is up to us, the researchers to compare and improve these evaluation tools over time together with case studies of likeminded companies.

Gunjima：

Are there any questions from the floor after hearing what has been said up to this point? Dr. Mont said that whether something is consumed or not is one option when information is made available. On that point, I would like to ask something of Mr. Yoshimura: Do you recommend renting as a club with memberships? Or, do your customers prefer selling to renting?

Yoshimura:

Customer needs vary. It is important in the business world for a business to supply what the customer needs. Within that, we look at recommending something to a customer as added-value.

Gunjima：

Thank you. We've been talking for about two hours so we have little time remaining. If there are any more questions from the floor, let us take one last question. I would like to ask Mr. Matsuo, who is an IGES researcher and does research also into the situation in Europe, to say something about his impression of today.

Matsuo:

It was a very interesting day listening to the talks from various countries. When I did my MA thesis, I wrote about car-sharing as a PSS. My impression after studying PSS is, like everyone today pointed out, “does it really reduce environmental load” and there are still a lot of unsolved issues. It is a future topic, I think, to clarify the environmental load reducing effect of PSS. Also, the rebound effect is a problem. When looking at a single specific service, efficiency has been improved and load

has been reduced, but when looking at the overall system, sometimes environmental load increased. In Japan, cars and many other products have progressed far with fuel efficiency and electrical efficiency, but Japan on the whole has increased its CO2 emissions, some say. In that regards, I am very curious as to how PSS should be carved and shaped, and I feel it is an important part of any research project. Because research is promoted with this understood as the problem, it was very meaningful today to - for example - analyze the examples presented by the participating companies.

Gunjima：

Thank you. Today, we heard reports from the morning and have just spent a considerably long time in discussion. I would like to call for a round of applause for the presenters and Prof. Yoshida who provided his comments on everything. Thank you very much.

A guide to the research group of this project has been passed out to everyone. This research group plans to meet every other month in 2005 with today's workshop being the kick-off meeting. I would like to invite all businesses, organizations and researchers on the IGES network and anyone who is interested from the general public to join in. If anyone here today is interested or has information on PSS, please make yourself known to us. We want to promote this research group in cooperation with all stakeholders.

Thank you for such a long time today.

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