

Chapter 6 Opportunities and issues involved in setting up a new business from the viewpoint of demand development¹

In Japan, there are growing expectations that new businesses and new markets should be developed to cope with the swiftly changing economic environment—globalization and industrial “hollowing out,” the urgent need for creating job opportunities, and the rapidly graying population. In reality, however, new business- and market-development efforts have yet to produce results satisfactory enough to meet expectations. There are various reasons for this. For example, it is not known how to develop and create new demand and markets, and the existing systems and business environment are still poorly prepared to

cope with the needs on the demand side.

In the following discussion, I would like to focus on the hardware equipment associated with health and welfare, medical care, and the environment as potential areas expected to offer new business and market opportunities. Specifically, I will make a basic survey of these areas, identify the key factors as well as challenges involved in creating new businesses from the viewpoint of the demand side, and explain how to respond to these requirements to help ensure that new businesses and markets are created.

6.1 Present status of the three areas and supply-side challenges

(1) Present status of prospective business areas and potential opportunities

Health and welfare, medical care, and the environment are segments closely related with end users or beneficiaries, including social systems and public sectors as well as individual people. These segments have been under the heavy influence of regulations and legislation. In recent years, it has been greatly hoped that the expanding availability of various business alliances and networks would help create and develop new markets and businesses.

Each of these business segments is still in the embryonic stage in Japan, they have a long history. Therefore, the first thing to do is to cultivate domestic demand through sensible market development efforts. However, because of today’s borderless economy with relentless globalization, no business or market can confine itself to one country. In Japan, too, it is essential for any business or industry to take up the challenge of gaining international competitiveness. (See Chart 6-1 for an overview of the development factors and market characteristics of each segment.)

Chart 6-1 Development factors and market characteristics by segment

Health and welfare equipment	Medical equipment	Environmental equipment
The enforcement in 1993 of the Welfare Equipment Law* set the stage for subsequent rapid market growth. There are areas in which Japan’s hallmark technologies can help. Entry into this market segment is relatively easy because of a wide variety of niche areas.	This segment is strongly promoted under a national strategy. International competitiveness is still low, but there exists areas in which Japan’s hallmark technologies can help. Entry into this market segment is difficult because of demanding technology requirements.	This market segment is expanding because of imminent environmental problems, the need for new social systems, and other reasons. Entry into this market segment is relatively easy because of social needs and a wide variety of niche areas, among other reasons.

* Formal name: Law for Promotion of Research, Development, and Distribution of Technical Aids and Equipment

(2) Challenges and issues associated with market entry

In an effort to identify the challenges and is-

ssues associated with new market development and/or new business development for the supply side, we examined specific cases by surveying

¹ This section is based on the following reports:

Opportunities and issues involved in setting up a new business from the viewpoint of demand development, the Economic Research Institute, Japan Society for the Promotion of Machine Industry, March 2004, and *Expectations for new markets and issues associated with supply—Health care and welfare, medical care and environment segments*, ditto, March 2003.

product areas and notable companies that are likely to grow in the future. (For detailed information, see “Expectations and Challenges for New Markets,” the Economic Research Institute, Japan Society for the Promotion of Machine Industry, 2003.) As a result, various challenges and issues in each market segment were identified. Based on this data, the challenges and/or issues common to all three market segments were classified broadly into five categories as explained below. (See Chart 6-2 for an outline of challenges/issues by segment.)

In each segment, we picked out areas that are likely to grow in the future, extracted challenges and issues associated with market entry, and organized them as follows: (1) There exists only a small number of startup companies that would take the lead in the creation of new markets and

new businesses; (2) There exists seed (technologies) but they are yet to be capitalized on to help create new markets; (3) Existing products have only limited uses; (4) The requirements on the demand side are not fully incorporated; (5) Existing systems and old practices sometimes become obstacles.

As measures to cope with these, we propose, respectively: (1) Promote, and help create favorable environments for the development of VBs (venture businesses); (2) Encourage intellectual alliances and foster university-affiliated VBs; (3) Help reform the conventional product line systems and concepts; (4) Identify the demand-side needs (beneficiaries, users, household individuals); and (5) Push for deregulation and reform by means of the provision of supply-side environments such as special economic zones.

Chart 6-2 Challenges/issues associated with market segment entry

Health and welfare equipment	Medical equipment	Environmental equipment
Product deployment in conformity with market (demand) structure. Expansion of beneficiaries including elderly and disabled people (from barrier-free to universal design). Deregulation to help expand sales channels. Building of information exchange systems.	Aggressive entry into new areas. Use of IT systems for improved security and efficiency. Cooperation between government, industry, and academia. Fostering of technology seeds in universities and development of original products through academia-industry alliance. Prompt product approval and highly reliable evaluation systems. Development of agile VBs.	Expansion of product lines and related services. Application of existing systems and building of new systems. Consideration of the cost to the environment. Tightening of regulations if necessary.

6.2 Response to challenges/issues with focus on the supply side

Now let us have a look at the key success factors in new market creation and/or new business development with emphasis on three major requirements:

(1) Creation of “intelligence” and strategic alliance

Various kinds of new technologies have been emerging through the development of state-of-the-art technologies, combinations of stand-alone technologies, and other efforts. These technologies are primarily the fruits of basic research efforts taking place at universities and other research institutes. But there exist a lot of challenges to overcome before these technologies will

be put in to commercial use. For example, it is necessary to examine their technological feasibility, reliability, cost justification, etc.

It is expected that the creation of basic research-focused VBs would help quickly translate leading-edge technologies into commercially available products. That is, they could be the bridge that allows technologies developed at universities and research institutes to reach a point of commercialization. The higher the level of technology, the more effective the alliance between VBs and research institutes, including universities, becomes. Strategic alliance on the basis of “intelligence” developed in this manner would

help pave the way for new markets.

The existing industry-academia alliance system has these major problems: (1) Businesses and universities and other research institutes and businesses do not fully understand the other parties' standpoint; (2) The propriety right, and the beneficiary infrastructure, for the fruits of research efforts on the academic side has not been solidly established. (It is necessary to apply for a patent for any research result before presentation at a conference or other such public announcement by clearly defining business purposes and business feasibility); and (3) Licensing for the propagation of research results is inadequate. To cope with these problems, it is necessary to (1) secure and develop human assets, (2) secure research funds on a priority basis, (3) grant the propriety right for the fruits of research efforts, (4) promote licensing, and (5) create products and technologies on the basis of research results and customer needs from a long-range perspective.

(2) Enhancement of existing products and getting of demand

Enhancement of existing products expected to lead to increased demand can take place through adding to the value of products as well as in a variety of ways: converting the product concept from barrier-free to universal design for wider deployment; switching from specialized-purpose products to general-purpose products; moving to packaged products/bundled services; and expanding the scope of product offering (e.g., inclusion of software services).

At the same time, it is necessary to improve the product creation environment as well by taking into consideration such factors as the need for sustained product supply, alliance with businesses in diverse fields, the building of networks, and the sharing of know-how from an overall per-

spective.

In addition, analysis should be made of the demand side as well as the supply side. It would also be necessary to create new demand. To make this happen, it is important to transform the existing seed-type industry into a cross-market needs-oriented industry while precisely meeting the market demand and developing new markets. It is also necessary to build and deploy IT-based systems capable of ensuring that technology can be used to satisfy demand-side needs.

Creating new demand is important in the areas of leading-edge technology as well as in the area of end consumption commodities. Even a seed-driven industry may fail to grow into a full-fledged industry without close involvement in the market (demand-side) needs.

(3) Improvement of supply-side surrounding environments

Generally speaking, startups and VBs are forced to proceed with difficulty in Japan because of problems related to fundraising, market channel development, and manpower recruiting, plus the inadequacy of the surrounding business environment including nurturing entrepreneurship. In addition, while efforts are being made to build and deploy various support systems, there still exists only a limited number of startups and VBs that have solid business plans incorporating technology and services of their own. A combination of these factors prevents startups from grabbing at even available business opportunities.

For any type of business, whether a VB or a startup, in order to create a new market, it is necessary to build a certain supply structure. After such a structure has been built, it is necessary to establish a setup to keep the business up and running.

Startups and VBs naturally encounter various problems in the course of business operation after launching. For any budding VB, it is necessary to have the ability to transform large corporations, which exist as either (1) competitors or (2) alliance partners or joint developers, into something utilizable for growth through market competition.

For a budding VB to grow its lines of operation, it is also necessary to improve the environment (e.g., systems, regulations, and business practices) surrounding the supply side from inside and outside the industry to which it belongs. The industries we surveyed have, to some extent, benefited from regulations and other legislation implemented by the government for their development and expansion. But there are causes where existing registration hinders the development and expansion of new businesses. Furthermore, regulations and legislation that provide support for certain industries may become detrimental to other industries. Also, since the development of regulations and legislation regarding the government of the supply side has been taking

place rather quickly, there exist some quarters that are lagging behind because they cannot shed their old practices and way of doing business.

In recent years, specific deregulation and special economic zone initiatives have been gradually implemented in an effort to cope with the situation by reforming the old systems.

Some leading-edge industries such as medical-care equipment are positioned as national strategic fields, and the government is active in beefing up its promotional setups (e.g., the creation of a headquarters for the consolidation and coordination of the government offices involved, the promotion of industry-academia alliance, the prompt approval and highly reliable evaluation of new products, etc). To succeed in building a supply structure that helps create and vitalize a new market open to free competition, it is essential to sort out systems, regulations, and practices that could become detrimental to the supply side and take the appropriate remedial measures. This may require both tightening some legislation and loosening others.

6.3 Case examples on the demand side and some considerations

(1) Standpoint for viewing the demand side

We have discussed the supply side and supply-side-related challenges and issues involved in new market creation in three specific market segments. Next, we shall examine the other side of the coin, that is, the demand side and demand-side-related challenges and issues with a focus on how the demand side is related to the supply side, together with specific measures to be taken.

It is expected that understanding and capturing the needs of the demand side (household con-

sumers in particular) and reflecting them in products and systems would result in new markets being created, the existing markets being expanded, and the industries involved being vitalized. In view of this, let us examine what measures are taken by suppliers to capture the needs of end beneficiaries, that is, household consumers, via intermediary beneficiaries (intermediary users) as well as the needs of intermediary users and reflect the information in their products and services in each of the health and welfare, medical-care, and environmental market segments.

Specifically, (1) If new patterns have been established in the existing needs and their reflection in products and systems (information distribution) or if there exists a certain system capable of incorporating the voice of the end user, we will discuss the possibility of future market creation and expansion on the basis of the status quo, and

(2) If such a new system is yet to be established, we will discuss what measures should be taken for future market creation and expansion.

In our discussion, focus will be on the supply-demand relationship. Chart 6-3 can be used by both supply- and demand-sides as a vehicle to send/receive information between them.

Chart 6-3 Table for supplier/consumer information sending/receiving (□□)

	Benefits	Criteria (Evaluation items)	Information sending	Information receiving
[1] Information relaying beneficiaries :○○○	Benefits for [1]	Criteria of benefits for [1]	↑ Information to be sent by [1] upward	↓ Information to be received by [1] from above
			↓ Information to be sent by [1] downward	↑ Information to be received by [1] from below
[2] End beneficiaries :○○○	Benefits for [2]	Criteria of benefits for [2]	↑ Information to be sent by [2] upward	↓ Information to be received by [2] from above

[Source] "Survey on Standardization of Robots for Elderly People," 2003, Japan Robot Association

[1] Information-relaying beneficiaries include intermediary users, intermediary beneficiaries, intermediary consumers, intermediary users, interpreters, intermediary information gatherers, and intermediary information senders, among others.

[2] End beneficiaries include end users, end consumers, and household users, among others.

The products and systems we selected for our survey are: mobile equipment including vehicles (welfare vehicles), walking frames, and wheelchairs and watching systems in the health and welfare segment; health-care (preventive inspection) systems and medical and welfare robots in the medical-care segment; and waste-processing and wind power generation systems as "green" power generation in the environmental segment. We will discuss one case study for each business segment.

(2) Health and welfare segment: Mobile equipment (Electric three- and four-wheel cars)²

<Present status of electric three- and four-wheel cars>

Electric self-propelling three-wheel and four-wheel cars are classified into the category of wheelchairs in the health and welfare segment. Unlike standard-type electric wheelchairs, various names are given to electric three-wheel and four-wheel cars such as a handlebar electric wheelchair, an electric scooter, an electric cart, a senior cart, and an electric car.

According to the Ministry of Economy, Trade, and Industry's estimation, the market for electric three-wheel and four-wheel cars has been expanding year after year since 1997. In 2001, the market size reached as large as ¥8.4 billion.

² *Opportunities and issues involved in setting up a new business from the viewpoint of demand development*, the Economic Research Institute, Japan Society for the Promotion of Machine Industry, March 2004, A summary prepared by Mizuno.

Environmental improvement efforts are being made to facilitate and promote the use of electric three-wheelers and four-wheelers. On the other hand, according to the National Police Agency's 2004 report, the number of traffic accidents involving electric three-wheelers and four-wheelers has been on the rise. To cope with the situation, the National Police Agency distributes safety manuals and conducts seminars for electric three-wheeler and four-wheeler users and instructors.

<Information sending/receiving at the supply- and demand-sides>

Chart 6-4 is used for the sending/receiving of relevant information. Users are general consumers

(mostly elderly or disabled people). In the table, therefore, those falling under category [2] are consumers.

Those falling under category [1] include dealers ([1-1]) and independent product safety evaluation organizations ([1-2]) as with the case of caster walkers if product owners (or borrowers) are individual consumers. If products are lent out under a nursing care insurance program, nursing care managers are also included in this category. Electric three-wheelers and four-wheelers are also used by town mobility services. In such cases, town mobility service offering companies are also regarded as information-relaying beneficiaries.

Chart 6-4 Electric three-wheel and four-wheel car related information sending/receiving

	Benefits	Criteria (Evaluation items)	Information sending	Information receiving
[1-1] Information-relaying beneficiary: dealers	Pecuniary benefits, etc.	Revenues, etc.	↑ Feedback on consumer needs	↓ Gathering of product information
			↓ Offering of product information	↑ Absorption of consumer needs
[1-2] Information-relaying beneficiary: independent product safety evaluation organizations	Consumer safety, etc.	Reduced accidents, etc.	↑ Offering of information about product uses by consumers, feedback of opinions and complaints about products	↓ Gathering of information about product safety, etc.
[1-3] Information-relaying beneficiary: town mobility services (if electric three- and four-wheelers are used for town mobility purposes)	Revitalized local communities, improved citizen mobility, etc.	Improved sales of local retailers and improved satisfaction of community citizens	↑ Feedback on consumer needs	↓ Gathering of product information
			↓ Offering of product information	↑ Absorption of consumer needs
[2] End beneficiaries: Consumers (elderly and disabled people)	Improved level of ADL* and QOL, etc.**	Physical and mental capabilities, etc.	↑ Offering of product-related opinions, needs, etc.	↓ Receiving of product information

*ADL= Ability of Daily Life

**QOL=Quality of Life

The supply side (manufacturers) focuses its information offering and gathering activities on the promotion of product safety. For example, the Electric Wheelchair Safety Promotion Association cooperates with the Japan Police Agency to work out safety measures and provide information about safe uses of electric wheelchairs

through its homepage.

Manufacturers of electric three-wheel and four-wheel cars are likely to use various means to gather information about consumer needs and provide information to consumers.

The demand side (consumers, intermediaries) is not active in providing information to manufac-

turers of electric three-wheel and four-wheel cars. As with the case of caster walkers, independent organizations are responsible for providing information about the safety of electric three-wheel and four-wheel cars to both manufacturers and consumers. For example, the Japan Consumer Information Center conducts tests of electric three-wheel and four-wheel cars and comes up with advice to consumers and requests to the industry and the administrative authorities concerned.

Town mobility services can often serve as an information sender and receiver. For example, there are reported cases in which information about the consumer's use of town mobility services was fed back to manufacturers, which in turn used the data to improve their products. Also, the existence of town mobility services itself helps local residents obtain knowledge of, and learn how to use, electric three-wheel and four-wheel cars.

<Challenges and future outlook>

(1) First of all, it is necessary to build a mechanism to determine consumer needs. Manufacturers of electric three-wheel and four-wheel cars are making efforts to capture the market needs by means of surveys addressed to consumers and dealers. In the past, caster walkers have been used almost exclusively by women. Considering this fact, manufacturers have developed prototype models for men and are trying to reflect the obtained data in their product development efforts.

There is a general tendency for consumer needs in the field of welfare equipment, not just electric wheelchairs, to be slow to be conveyed to manufacturers. One reason for this is that elderly people, who account for a significant portion of the users of welfare equipment, are less inclined to express their opinion about the products they use. In view of this, it is necessary to build some system or mechanism to hear the voice of such a silent majority.

(2) Second, the consumer's attitude should be reflected in products. Consumers have some

sense of resistance against using a caster walker, an electric wheelchair, or the like. This is because elderly people are less willing to use products designed specifically for the old. In view of this, having the users get rid of their sense of resistance is another challenge in the area of welfare equipment, not just electric three-wheel and four-wheel cars. When it comes to product development, further considerations should be given to product design and functionality as well as safety. Efforts should also be made to expand the scope of users from the elderly and/or disabled to general consumers by, for example, employing the concepts of barrier-free and universal design, as illustrated by the case of a caster walker for men.

(3) To further expand demand, manufacturers, too, should provide relevant information to consumers. Generally speaking, the consumer is not given adequate information about welfare equipment, which in turn makes it difficult for the consumer to select and use equipment properly. It is advisable that opportunities for consumers to receive explanations be increased and that they be able to get hands-on experience with products at dealers and exhibitions.

When it comes to information to be provided to the consumer, special importance should be attached to information about the safety of electric three-wheel and four-wheel cars. Information should also be provided to general consumers, not just users of the products concerned. For example, since few people are aware that electric wheelchairs are treated in the same category as pedestrians under the Road Traffic Law, there still arise cases in which those moving in a wheelchair are looked at coldly. To prevent such situations, it is essential to encourage the general public to have adequate knowledge about welfare equipment.

(4) Electric wheelchairs are equipment designed to be used in public space. In view of this, it is also necessary to improve the existing environment to facilitate the use of such equipment. For example, the Land, Infrastructure and Trans-

portation Ministry and other organizations involved are taking action to allow electric three-wheel and four-wheel cars to be used in train stations. Also, with the implementation of the Barrier-free Transportation Law, efforts have been expedited to improve the overall road and traffic environments, making it easier to use electric three-wheel and four-wheel cars. For welfare products to find a wider audience among consumers, cooperation should also be obtained from the administration as well as businesses in the related field. At the same time, manufacturers should make efforts to develop products that harmonize with the environment.

(3) Medical-care segment: Medical-care and welfare robots³

<Present status of medical and welfare robots>

This section discusses next-generation robots for non-industrial uses (robots expected to coexist with human beings in human society), not industrial robots, which account for almost 60 percent of the world's robot population. An interim report from March 23, 2004 for the New Industry Promotion Strategy says that in the robot market there exists a need for human labor alternatives in such fields as care support, disaster relief, and safeguarding while pointing out challenges in such fields as market creation, R&D, and regulations, though technology competence being nurtured. In the robot market, there exist both needs (demand) and seeds (technology), but at the same time there are barriers and restrictions that may become an obstacle to market mechanism-driven development. To cope with the situation, an overall strategic action program should take place through joint efforts between the government and the private sector.

According to the Japan Robot Association, it is estimated that the size of the robot market will be as large as ¥3 trillion (the medical and welfare segment will be ¥260 billion) in 2010. (A Survey Report on Technology Strategy for the Creation of Robot

Society in the 21st Century, published in May 2001.)

<Information sending/receiving at the supply- and demand-sides>

Robots for medical-care and welfare uses are characterized by these factors: (1) They are used in direct contact with an elderly or disabled person or a patient; (2) Their tasks are not uniform but vary in different situations; (3) In real life, no trial is allowed and their operations cannot be resumed afresh; (4) It is necessary that they can be operated easily even by nonspecialists. These factors are associated with risks unique to medical-care and welfare robots.

The Japan Robot Association suggests that when it comes to medical-care and welfare robots, the development and employment of standardized risk assessment procedures be a condition for market creation, pointing out that in newly emerging business areas such as welfare, robots are slow to be introduced partly for lack of safety criteria and associated laws.

At the same time, the users and recipients (end beneficiaries) of medical-care and welfare equipment have been getting polarized and stratified. This tends to complicate the risk assessment of equipment. In the case of medical care, for example, the benefits of a robot for patients (e.g., improved QOL), who are end beneficiaries, are different from those for doctors and nurses, who are users. They evaluate the benefits of a robot using different evaluation items (Chart 6-5). It is, therefore, highly possible that patients and doctors/nurses differ with respect to risk assessment of a robot.

To eliminate this kind of assessment gap between the user and the end beneficiary, some objective criteria for trade-off between benefits and risks is required. However, if the government is to assume responsibility for the implementation and use of such criteria without any social mechanism

³ *Opportunities and issues involved in setting up a new business from the viewpoint of demand development*, the Economic Research Institute, Japan Society for the Promotion of Machine Industry, March 2004. A summary prepared by Mizuno.

responsible for determining trade-offs between benefits and risks, it is understandable that the industry government-based permits can not be easily obtained, as suggested by the Japan Robot Association. Expanding the scope of safety measures can reduce the scope of risks. But this may push up the cost of product development and marketing. Further, reducing the scope of socially

acceptable risks can add to the cost of product development and marketing. To create and expand markets for medical and welfare robots, therefore, it is necessary to reach social consensus as to the minimal safety criteria. Various attempts to reduce the distance between robots and humans should also be assessed accordingly.

Chart 6-5 Medical-care-robot-related information sending/receiving

	Benefits	Criteria (Evaluation items)	Information sending	Information re- ceiving
[1] Information-relaying beneficiary: doctors, nurses	Reduced physical burden, improved success rate, avoidance of contagion and/or exposure to radiation	Clinical treatment performance, working hours, contagion rate, working conditions, dosage	↑ To manufacturers	↓ From academic circles
			↓ Informed concept	↑ Clinical trials
[2] End beneficiaries: patients	Low invasiveness, early recovery	QOL, ADL, period of hospitalization or rehabilitation, expense	↑ Clinical trials and medical examinations	↓ Informed concept

<Challenges and future outlook>

It is no exaggeration to say that in Japan the market for operation support robots has yet to reach even the dawning stage. Under the existing health insurance system, demand for operation support robots is very limited. This explains the fact that although robotics research has shown good advancement at the laboratory level, there is little sign that robots will be put into full-scale commercial production. While it is generally established that endoscope operation support robots can reduce the period of hospitalization with satisfactory postoperative recovery as reported by many users, they are yet to be accepted widely because of problems with the existing health-care service system and response to risks involved in medical-care robots.

To cope with the situation and encourage robot-assisted/remote operations with a focus on the safety of patients, it is desired that independent organizations for approval of the use of robots and guidelines for research and development be estab-

lished by taking into consideration the problems associated with health-care services and risk distribution as well as technological progress.

The use of Special Healthcare Expenditure programs may help operate these mechanisms in harmony with the existing health-care service systems. It is expected that the creation of a market for medical-care robots will be accelerated by employing reliable indices to determine the level of QOL realized by robot-assisted operations, specifying the use of robots as advanced medical technology under the Special Healthcare Expenditure program, and expanding the scope of specified approved health and medical institutions. If the advanced medical technology program is widely applied to robot-assisted operations, it is likely that insurance companies develop health insurance products intended to cover expenses beyond insurance benefits.

Another important factor is that medical and welfare robot technology is encouraged as part of local industry promotion policy. There are not a few

local areas that have an accumulation of robot and robot-related technology businesses though differing in size, including Fukuoka Prefecture and Kobe City. Many robotics researchers work in universities and technical colleges across the country. In Osaka City and Gifu Prefecture, where RoboCup 2005 will take place, a number of projects are already in place aiming at promoting the next-generation robot industry. On the other hand, the inevitable small manufacturing scale of medical and welfare robots makes it rather difficult for large corporations to enter the arena. Medium and small businesses are therefore expected to take the lead in development and manufacturing efforts in this market segment. This can easily translate into instant vitalization of local industries.

To create a new market for medical and welfare robots, however, it is necessary to establish (1) a mechanism that ensures that social consensus is reached as to minimum safety criteria and (2) a mechanism which gives the users of robots, that is, doctors, nurses, and hospitals, as well as welfare service institutions, incentives to introduce robots under the existing medical service remuneration (or nursing care insurance) system.

As for (1), Fukuoka City and Kobe City are highly praised for their robot development efforts taking place in an open environment for the purpose of realizing coexistence between robots and humans. But it is feared that their efforts could end up in mood creation in view of the fact that the government is slow to install minimal robot safety criteria. It seems necessary to discuss the possibility of empowerment to permit implementing safety criteria in the site of robot development while satisfying the local residents' right to know in conjunction with clinical applications(translational research) of medical-care and

welfare robots.

As for (2), it is necessary to develop a scheme that can help expand the scope of application of advanced medical technology under the Special Healthcare Expenditure program such as the one proposed by Fukuoka City. If local municipalities are to take the lead in the promotion of the medical-care and welfare robot industry, physicians working at local core hospitals should participate in their translational research projects to help expedite the accumulation of know-how and expertise about how to use robots, which in turn can be fed back to development efforts. If the use of medical-care and welfare robots spreads, information about the resulting improvement of QOL can propagate in the local area concerned. This will in turn have a favorable impact on the creation of social consensus about minimum safety criteria.

(4) Environmental segment: Green power and wind power generation⁴

<Present status of green power and wind power generation>

The term "green power" means electric power utilizing renewable energy. In a broader definition, it means a social system operated in direct linkage to, and supported by, the consumer and/or the tax payer for the purpose of promoting renewable energy-based power generation. There are various types of green power, including solar power generation (solar light panels) and small-scale hydraulic power generation (without using a dam) as well as wind power generation (together with a windmill for power generation), which is the most typical green power generation method and is discussed in the following pages.

⁴ *Opportunities and issues involved in setting up a new business from the viewpoint of demand development.* the Economic Research Institute, Japan Society for the Promotion of Machine Industry, March 2004. A summary prepared by Yamada.

In Japan, large-scale, concentrated, exhaustible-resource-dependent power generation plants have been built in areas that are remote from power consumption centers. Under the government's atomic power policy, emphasis has been placed on atomic power generation, which involves difficulty in waste disposal. On the other hand, people who oppose the promotion of atomic power generation are pushing for green electric power as a counterstrategy. Their movement carries with it a message that citizens (end beneficiaries) can produce a reasonable amount of energy on their own instead of depending on atomic power generation.

In recent years, wind power generation has been attracting the general public's attention in Japan. In Europe and the United States, power generation has been established as a major trend with a lot of wind power plants having been installed in the 1990s. On a global basis, the use of natural-energy-dependent power generation has been accelerating in the past five years. As of September 2003, the total capacity of wind power electric generation facilities in place reached about 34 million kW, about 70 percent of which was accounted for by European countries. It is also said that about 80 percent of the wind-generation capacity installed in 2002 was accounted for by European countries.

<Information sending/receiving at the supply- and demand-sides>

It seems that no markets are less selective than the energy market from the viewpoint of the consumer. Nowadays, electric power has been partly deregulated. But previously, electric energy was something supplied by electric companies alone and it was impossible to generate and sell electric power freely. No alternative power supplier was available to the consumer. A system had been well established in which the consumer had no choice but to enter an agreement with a design-

nated electric power company, use the electric power supplied by the company and pay the bill to the company. As a matter of fact, the consumer was out of the picture with respect to the quality of electricity, the method of generation and other relevant things. And the consumer rarely questioned the situation. Following Y. Funahashi, we use the phrase "a structured alternative" to denote a state in which end consumers can use only designated products and/or services. That is, while individual consumers are supposed to select from purchase options freely, the scope of options is in fact tightly limited due to political, economic, and/or cultural conditions.

Green energy, alternative electric power, was one of the most suitable social strategies proposed to cope with the existing situation. A relatively well-known case is the wind farm initiative launched by Tachikawa Town of Yamagata Prefecture. Strong winds have been a major source of trouble for Tachikawa Town. In an effort to exploit this source of trouble, the town has been pushing for its wind farm initiative. This has made it possible for the town to profit from strong winds. Moreover, it contributed toward enhancing the interest of its residents in windmills, leading to the revitalization of the town. Inspired by this success story, people in various parts of the country are now actively creating energy alternatives of their own. At the same time, a number of companies have been created for the purpose of doing power generation business on a commercial basis. Some of them were reported in the media. Hokkaido Green Fund (HGF), an NPO, is one such organization.

The demand-side characteristics of wind power electric generation can be summarized as follows. In the table, if the term "benefits" is construed as "principles of behavior," it is possible to understand the meaning of action taken by each individual agent and of the information exchanged between them.

Chart 6-6 Wind power generation related information sending/receiving

	Benefits	Criteria (Evaluation items)	Information sending	Information receiving
[1] Information relaying beneficiary: Hokkaido Green Fund	Profit on the sale of electricity, generalization of natural energy, avoidance of nuclear power generation, less radioactive waste and less disposal sites, realization of safe, secure society	Increased membership of NPO, increased stakeholders, increased windmill installations, increased power generation capacity, reduced non-green energy	↑ Clarification of the consumers' standpoint against electric power companies (breaking with nuclear power generation), demand to windmill manufacturers (overseas and domestic), policy proposals (to the government and local municipalities)	↓ A system allowing electric companies to purchase NPO-generated electricity, academic-circle-related information (technology, natural and social sciences), relevant organizations' information
			↓ Enlightenment of members (information about natural energy)	↑ Study meetings, seminars, gathering of member information
[2] End beneficiaries: Members of HGF <u>General consumers</u>	Environmental preservation, less radioactive waste and less repository sites, promotion of green energy, dividend on investment, simple and convenient mechanism	Green fund 5%, 5% reduction in electricity (target), increased windmill installations, increase in natural energy-based electricity generation, dividend	↑ Addition of members, payment of amount equal to 5% electricity fee (a new proposal for breaking with nuclear power generation), anonymous member fundraising	↓ Newsletters, lectures, study meetings, study tours, stakeholder information

<Challenges and future outlook>

A major change in the environmental market is the fact that the end user (consumer) has begun to shift orientation with respect to the environment. Against this background, consumers (end beneficiaries) have been forming, though gradually, opinions opting for the preservation of the environment. Intermediate beneficiaries have led and taken up consumer opinions through some appropriate "alternatives" and have caused it to be reflected in the market. We have examined the present status of green electric power as a part of the environmental market.

What characterizes this kind of market creation model is that the key to marketability is structural changeover (breakaway from structured alternatives). The market orientation discussed here, in particular, involves making the market opacity associated with the consumer's interests transparent (visible). In this process, intermediate beneficiaries serve as the interface between end beneficiaries and technology and merchandise sets available on the market, and the interface it-

self represents the common thread of the benefits of suppliers, intermediate beneficiaries, and end beneficiaries. In other words, the business rationality and interests of the individual parties concerned are linked through the interface and combine to form and develop new markets in a creative manner.

In the process of new market creation, what is important for businesses is to focus not only on the sets of technology, merchandise and prices, but also on alliance with intermediate beneficiaries capable of translating and conveying the opinion of the end beneficiary. It will become possible for businesses to collect appropriate information by proposing technological and merchandise alternatives desirable to intermediate beneficiaries. This will in turn help build new business models. That is, success in new business model building depends on whether or not appropriate information can be provided to intermediate beneficiaries. It is important for suppliers to positively propose such alternatives.

In the structured market system, there have been few cases of chain processes in which multidirectional exchanges of existing technology (conveying merchandise and technology to the market via intermediate beneficiaries) and through which new technology sets (new technology and new merchandise) emerge. What is called for in the future is an attempt to build market systems involving processes that can help break the existing structured mechanism and thereby make it possible to select new alternatives.

Conclusion

The following is a list of some of the major issues discussed above in connection with the specific market segments that we selected for our survey:

- (1) Health-care and welfare segment (mobile equipment)
 - Lack of a system to respond to the voice of the silent majority of end users
 - Inadequacy in reflecting what end users think in products and systems
 - Lack of a system to send information on the part of suppliers
 - Inadequate environments for use of products and systems
- (2) Medical-care segment (medical-care/welfare robots)
 - A wide gap between intermediate beneficiaries and end users
 - Lack of communications between suppliers and intermediate beneficiaries
 - Lack of objective judgment criteria
 - Ensured safety—the largest challenge
 - Difference between products/services and what the end user actually wants and needs
 - Less-than-satisfactory understanding of the importance of the end user's needs

On the other hand, local cooperative efforts are being made to promote the use of medical-care and/or welfare robots to respond to the needs of residents.

- (3) Environmental segment (green electric power and wind power electricity generation)
 - Need for changing the current system
 - Discussion of how to change the existing consumption structure (structured alternatives)
 - Emergence of different responses to the environment and other related matters
 - Changes coming out with the constituents of demand structure
 - Need for responding to demands in a specific manner

On the other hand, the positioning of, and possible business opportunities with, intermediate beneficiaries are becoming increasingly visible.

Against this background, patterns of market (=demand) development efforts emerge. Broadly speaking, there are three patterns of market (=demand) development:

- (1) Demand expansion: This pattern is applicable where there exists an established market and systems for information distribution between the market and the consumer. It is possible to establish new demand expansion patterns or capture user needs and reflect them in products and services within the existing framework. The typical segment is that of health care and welfare.
- (2) Demand creation: This pattern is applicable where a market for the products and/or services concerned is yet to be established and no system for information distribution between the market and the consumer is in

place. Or the existing market is obsolete and cannot satisfactorily function to respond to newly emerging situations. It is also necessary to discuss ways to capture market needs. The typical segment is that of medical care.

- (3) Demand replacement: This pattern is applicable where there exists a well-established system for information distribution between the market and the consumer but its constituents are changing. The typical segment is that of the environment.

By way of a conclusion, I would like to summarize how to respond to each of these market- and demand-creation patterns:

- (1) Demand expansion (the health-care and welfare segment in particular): In this segment, product/system renovation efforts are called for on the supply side. It may be possible to augment product/system concepts (incorporation of barrier-free and universal design) and expand the targeted user base. The market needs should be fully satisfied. This involves reviewing the existing information distribution system.
- (2) Demand creation (the medical-care segment in particular): In this segment, institutional reform, among others, is essential. Other

key factors include the need for incentives for intermediate users, a new mode of thinking about products and systems on the part of end users, and the formation of social consensus. Since this is a newly emerging market segment, comprehensive measures are required to cope with it.

- (3) Demand replacement (the environmental segment in particular): A new mode of thinking about existing systems is called for on the part of the end user. At the same time, the role of intermediate demand should be considered from the viewpoint of alliance with suppliers.

In this article, we discussed in what manner the needs on both the supply and demand sides can be determined and incorporated into product and system development and what setups are required, with a focus on the selected market segments of health care and welfare, medical care, and the environment. Market expansion means demand expansion. On the basis of this recognition, it is necessary to get an accurate picture of the present status of the market and demand and implement appropriate measures to cope with it. To do this requires active information distribution between the supplier and the consumer with a satisfactory supportive mechanism.