

英文要約

**Kingdom of Thailand
Feasibility Survey for Installing
Rehabilitation Program with Pedal
Wheelchair
Executive Summary**

February, 2018

TESS Co., Ltd.

Introduction

In Thailand, where the population is predicted to become an aged society, health promotion involving rehabilitation (hereinafter referred to as rehab) for elderly individuals etc. is becoming an issue. Although the Thai government is proceeding with the preparation of various legal systems to counter this, it is facing issues such as poor rehab equipment, a lack of personnel and skills to provide long-term care, and inadequate rehab program content. In light of this situation, we implemented this project to introduce a rehab program utilizing the pedal wheelchair “COGY,” a product proposed by TESS Co., Ltd., in the hope of promoting health in elderly individuals in Thailand by improving the quality and opportunities of rehab for elderly individuals and also contributing to rehab and health promotion for individuals with a handicap.

Through a total of five field studies and domestic investigations, we summarized basic information on insured medical care, support for elderly individuals, and systems related to supporting individuals with a handicap in Thailand. In addition, we confirmed the necessary procedures for the sale of the products and implemented a marketing study through visits and interviews of private hospitals, regional hospitals, and long-term care facilities for elderly individuals, etc. We also discussed with the Sirindhorn National Medical Rehabilitation Institute (SNMRI), a candidate counterpart facility, for developing an official development assistance (ODA) proposal.

The results confirmed that there is solid demand for pedal wheelchairs in Thailand mainly at private medical facilities in Bangkok and other major cities and among wealthy population, who are the main users of such facilities. Moreover, as we selected candidate local import agencies and had prospects for initiating the necessary procedures for various authorizations through such agencies, on-site preparations for starting the business are almost complete. Going forward, we will continue to expand our business base focusing on the wealthy population while monitoring future environmental changes resulting from the implementation of these projects. Then, in optimal stages, we will prepare for making an ODA proposal targeting the expansion to the middle and low-income groups.

1. Situation in Target Country/Region

Developmental issues faced by Thailand in the field of medical welfare include the increased number of elderly individuals due to the aging population, the existence of demographic groups that cannot receive high-level medical care (health disparity), and a lack of support for individuals with a handicap.

- **Aging Population**

The target country is expected to become an aged society in the near future. The demographic statistics is already showing a shift toward the elderly population, as the growth rate of the elderly population exceeds that of the overall population. As of 2015, there were already 7.11

million elderly individuals aged 65 years or older, accounting for approximately 10.47% of the target country's population. In 2025, the ratio is expected to reach 16.12%, making the country an aged society. Although long-term care (care for elderly individuals) is currently provided on a community basis, which includes families, it is expected that such community-based care will become difficult due to factors such as the declining birth rate, nuclearization of families, and population outflow to urban areas.

- **Rehab Environment Disparity**

As seen in the fact that Thailand is an advocate of “medical tourism,” when looking at the state of medical care in the target country, medical technology at some private medical facilities in cities such as Bangkok is considered to be of a high standard in the Association of Southeast Asian Nations (ASEAN) region. However, those who receive such medical care are limited to foreigners and some people in the wealthy demographic. While the rehab environment at these medical facilities is not inferior to that of developed countries in terms of the number of doctors and physical therapists and the devices and space available, the rehab environment at public medical facilities that are used by the general population and low-income population is insufficient even at provincial hospitals, which are the largest-scale public general hospital in each province.

- **Inadequate Services for Individuals with a Handicap**

The number of individuals with a handicap is approximately 1.47 million (all ages, 2012), of which approximately half have physical handicaps. It is expected that aging of the population will cause this number to continue to increase.

For legislation related to improving the quality of life in individuals with a handicap, the existing Rehabilitation of Persons with Disabilities Act was completely revised in 2007 into the “2007 legislation related to improving and expanding the quality of life in persons with disabilities” (commonly known as the “Persons with Disabilities Empowerment Act 2007, B.E. 2550”). Based on this act, approximately 1.55 million handicapped persons have been registered between 1991 and August 2014. However, it is estimated that there are over 1.9 million handicapped persons in the country. This act forbids unfair discrimination against individuals with a handicap, requires employers to employ individuals with a handicap, and lists requirements for improved convenience of public facilities and transportations. It also describes requirements for the use of services such as health care, welfare support, vocational training, education, and informational support. However, the foundations for such services are currently inadequate.

- **Frameworks for Training Workers in the Aforementioned Fields**

Services at these facilities for individuals with a handicap and elderly individuals, who have trouble walking, are still inadequate due to a lack of doctors and physical therapists and their skills. Also, facilities and equipment are not sufficiently secured. While there are 7.9 physical

therapists per 10,000 people in Japan¹, this number is only 1.3 in Thailand. Moreover, while 3.2 specialized care personnel are available to support each person requiring care in Japan,² long-term care is mainly provided by family members in Thailand, lacking specialized care personnel.

A significant amount of time is required to improve the skills and secure numbers of doctors and physical therapists and to train specialized long-term care and support staff. Moreover, attempting to solve these problems by providing equipment such as assistive walking devices to help the elderly and individuals with a handicap become independent is difficult as long as financial resources for social insurance are limited.

2. Outline of the Proposed Product and Overseas Marketing Plan

The proposed product “COGY,” a pedal wheelchair, has the following features that are not offered in conventional wheelchairs.

- Patients with hemiplegia can also use their paralysis side of the leg to pedal, allowing for comfortable rehab using both legs.
- Using the hands and feet to engage in operations and movement based on one’s own intentions stimulates the brain, leading to active rehab and enhanced rehab outcomes.
- Because the wheelchair has been designed with a human engineering, if users can move their legs even slightly, the pedals will move. Therefore, even users who have difficulty walking can move the wheelchair on their own.
- Even users with paralysis symptoms that make using a hand-operated wheelchair difficult can operate the pedal wheelchair with the pedals.



Figure i Pedal Wheelchair COGY

This is a world’s first product that offers improvement of lower limb functions with rehab together with the features and mobility of a conventional wheelchair. Because of these features, in Japan, users are elderly and young individuals who exhibit difficulty walking for various reasons (user examples: individuals with cerebral palsy, hydrocephalus, spina bifida, Parkinson’s disease, Guillain-Barré syndrome, dementia, disuse atrophy, disuse syndrome, cerebral infarction sequelae, osteoarthritis of the knees and hips, diabetes, etc.). One user, who had been bedridden for several years and had not been able to stand during that time, used a COGY to undergo rehab and subsequently became able to walk with a cane. In addition, patients, who were unable to move their legs since birth due to cerebral palsy etc., have become

¹ Public Interest Incorporated Association the 2013 Japanese Physical Therapist Association Survey

² The 2013 Ministry of Health, Labour and Welfare “Long-term Care Service Facility/Office Survey” (number of care staff) and “Long-term Care Insurance Status Survey” [number of people certified as requiring long-term care (requiring support)]

able to move autonomously using the pedal wheelchair. Thus, COGY has produced outcomes that could not have been achieved with conventional products or technology.

COGY is a world's first product that can improve lower limb functions through rehab together with the features and mobility of a conventional wheelchair. Because the same device can be used after undergoing rehab at a medical facility as a home rehab/mobility tool, allowing its application to both medical care and welfare, such functionality makes it useful not only in Japan, where it was developed, but in many countries around the world. In particular, in Asian regions, which will become aged societies in the near future, the health disparity between urban and rural areas could result in many elderly individuals suffering from severe disabilities due to inadequate rehab. In addition, a lack of welfare services and skills to support such individuals with disabilities could lead to even more serious problems.

In terms of the overseas marketing of this product, we hope that it will make it possible for many elderly individuals and individuals with a handicap including those from less developed to undergo/continue rehab, so that they can continue to move as much as possible using their own legs. We believe that this product will help maintain their health and live their lives with enjoyment and pride.

3. Results of Survey on Products and Technology Potentially Used in the ODA Business and Investigation of Possibilities

System and market research conducted over one year and four months revealed the following characteristics of the wheelchair/rehab device market in Thailand.

- Wheelchairs are provided as donations, and therefore, there is no likelihood of public subsidies to be allocated for high-priced wheelchairs.
- Rehab devices used in Thailand are very similar to those used in Japan. High-cost devices are also used in private hospitals. (COGY is not particularly high-cost for a rehab device.)
- COGY has definite novelty in the market, and it has a high likelihood of becoming popular if its effects are proven.
- Because the country advocates medical tourism, many patients at private hospitals are wealthy people from overseas.
- Rehabilitation departments at regional provincial hospitals are setup to receive guidance from the SNMRI, and high-cost rehab devices are distributed by the SNMRI. Therefore, the support from the SNMRI is crucial for expanding the market to provincial hospitals.
- There is a significant income disparity between Bangkok and rural areas.
- The road conditions in Thailand make it difficult to use wheelchairs for mobility outside.

During this survey period, candidate facilities were visited, and explanations were given on Japanese research and effects of pedal wheelchairs. In addition, patients at the hospital or

facility, who wished to test ride with an official from the facility present, experienced the actual effects. Furthermore, from July through November at Samitivej Srinakarin Hospital, which requested a loan of the device, one wheelchair was provided for test use. At a long-term care facility for the elderly in Chonburi province, one wheelchair was provided from April through June for test use. As a result, the following answers to a questionnaire survey were obtained.

<Results of Questionnaire for Users>

Questionnaires were returned by a total of five users. The users' attributes and questionnaire results were as follows. Users expressed mostly positive opinions regarding each item including product usage satisfaction, increased exercise amount, and operability.

Table i Attributes of questionnaire respondents (patients, elderly individuals)

User information	Responder (1)	Responder (2)	Responder (3)	Responder (4)	Responder (5)
Sex	Female	Female	Male	Female	Male
Age	20 years or younger	61 years or older	61 years or older	Unknown	61 years or older
Duration since the disease onset	2 weeks	1 year or longer	1 year or longer	1 year or longer	1 year or longer
Number of times the pedal wheelchair was used	2-5 times	5 weeks or longer (1-2 times per week)	5 weeks or longer (1 time per week)	5 weeks or longer (1-3 times per week)	approximately 1-3 times
Diagnosis	No response	Cerebral hemorrhage	Cerebral infarction	Cerebral hemorrhage	Cerebral infarction

Source: Japan International Cooperation Agency (JICA) survey team

Table ii Results of questionnaire for users (patients, elderly individuals)

Questionnaire items	Responses
2. Product usage	
Satisfaction (scale of 1-5 with 5 indicating the most satisfaction)	Mean: 4.8
Increase/decrease in the amount of exercise (scale of 1-5 with 5 indicating the greatest increase)	Mean: 4.6
3. Product operability	Simple (4 respondents), operation of upper limbs was difficult. (1 respondent)
4. Desire for continued use	Yes (all respondents)

5. Use for autonomous rehab	Yes (all respondents)
6. Comparison with other products (cycling machine)	COGY was superior (all respondents)
7. Aspects that were superior to other products (multiple responses allowed)	
a. Being able to use it autonomously	1 respondent
b. Not getting bored of it	0 respondent
c. Promotes motivation	2 respondents
d. No instability	1 respondent
e. Fun	2 respondents
f. Range of activities seemed to be expanded.	4 respondents
g. Other	0 respondent
8. Unsatisfactory points and problems occurred when using the product	The brakes were weak. It was frightening when the wheelchair moved during the transfer. (1 respondent)
9. Other points noted through riding in a pedal wheelchair	Wanting to use it for a longer period of time

Source: JICA survey team

<Results of questionnaire for doctors, nurses and physical therapists>

Questionnaires were returned by a total of four doctors, nurses, and physical therapists who used the device. The users' attributes and questionnaire results were as follows. Results indicated that all respondents considered the device to be superior to other products from the viewpoint of therapeutic exercise and wanted to continue use. This demonstrated sufficient basic applicability of the product. As for the product operation, a number of needs were addressed by the on-site users, indicating that these issues need to be dealt by preparing a user manual in Thai, offering lectures, etc. in the future.

Table iii Doctors, nurses, and physical therapists - attributes of patients in care

Symptoms	Number of patients
Cerebral infarction, cerebral hemorrhage, subarachnoid hemorrhage	3 patients
Spinal cord injury	1 respondent
Other	Spinal muscular atrophy (SMA): 3 patients Cerebral palsy: 2 patients Orthopedic disease, etc.: 3-4 patients

Source: JICA survey team

Table iv Results of questionnaire for doctors, nurses, and physical therapists

Questionnaire items	Summary of responses
2. Methods of implementing pedal wheelchair rehab	<ul style="list-style-type: none"> • Straight + curves, reversing • Perform 1-3 times per week for patients with central nervous system diseases and offer test rides on-the-spot to any other patients who express interest.
3. Comparison with other products (Ergometer, etc.) from the viewpoint of therapeutic exercise	COGY was superior. (all respondents)
4. Patient changes other than physical activities (multiple answers regarding any changes that occurred/were observed)	
a. More frequent smiles	2
b. Increased amount of conversation	0
c. Greater concentration	1
d. Greater motivation	2
e. More energetic	2
f. Improved coordination with other rehab	1
g. Other	Became active: 1
5. If f. from the previous question (4) applies, what kind of changes?	Improved balance maintenance during walking
6. About changes other than physical activities in the previous question (4) (evaluation of overall rehab including personal opinions) (5-point scale with the highest evaluation indicated by 5)	Mean: 3.3
7. About product use (5-point scale)	
Explanation to patients (5-point scale, 5 indicating the simplest)	Mean: 3.8
Patient comprehension (5-point scale, 5 indicating the highest)	Mean: 2.8
Assistance with transfer to/from the wheelchair (5-point scale, 5 indicating the simplest)	Mean: 2.3
Intervention for patients (burden on the staff) (5-point scale, 5 indicating the lowest)	Mean: 2.8
Application to rehab (5-point scale, 5 indicating the easiest)	Mean: 3.8
Overall evaluation (5-point scale, 5 indicating the best)	Mean: 2.8

8. Unsatisfactory points and problems occurred when using the product	<ul style="list-style-type: none"> • The brakes are weak, and the wheelchair easily moves during the transfer. • Hemiplegic patients had to pedal using their dangling foot on the paralysis side. • The wheelchair size did not fit pediatric patients (2 respondents). • It would be better if the height could be adjusted to fit the patient.
9. Continued use	Yes (all respondents)
10. Recommend to other people	Yes (all respondents)
11. Free response regarding the pedal wheelchair	<ul style="list-style-type: none"> • It would be much appreciated if the position of the pedals could be adjusted in the forward and backward directions because it will enable people with osteoarthritis (OA) (joint?) of the knee to use the wheelchair. • It would be better if the footrest height could be adjusted. • It would be better if immobilizing of the ankles was made simpler for better immobilization. • I am particularly interested in use for pediatric patients.

Source: JICA survey team

As a result of the test rides with COGY at the other public/private hospitals and support organizations for individuals with handicaps listed in the table below, strong interest was generated overall. Opinions included many questions related to whether the wheelchair could be folded up or its pedal length could be adjusted and many requests for an L size version. However, there were no major differences in usage between Japan and Thailand. Based on the results and opinions obtained regarding the test rides by patients, doctors, and nurses at a total of 16 facilities that were visited in this study and the long-term test usage at Samitivej Srinakarin Hospital and a long-term care facility for the elderly in Chonburi province, the applicability of COGY to Thailand was the same as that for Japan, proving that there were no particular

technological impediments to its introduction related to physique, customs, etc.

Table v List of facilities at which COGY was tested

Facility name	Category
Sirindhorn National Medical Rehabilitation Center (SNMRI)	Public hospital
Geriatric Medical Institute (Ministry of Public Health Geriatric Medical Institute)*	Elderly facility
Bumrungrad International Hospital *	Private hospital
Samitivej Srinakarin Hospital *	Private hospital
Phramongkutklao Hospital	Public (military) hospital
Phyathai 2 International Hospital*	Private hospital
Siriraj Hospital	Public hospital
Handicap International	NGO
Buriram Hospital	Public hospital
Surin Hospital	Public hospital
Baan Lamoon Elderly Life Quality Development Center *	Elderly facility
Ministry of Public Health	Government institution
Ministry of Social Development and Human Security	Government institution
Tampakan Elderly Social Welfare Development Center *	Elderly facility
Nakornping Hospital (Chiang Mai province)	Public hospital
Prasat Neurological Institute	Public hospital

*Facilities at which patients or facility residents engaged in test rides

Source: JICA survey team

4. Detailed proposal for ODA

In this study, we established and attempted to verify the following hypothesis: “the introduction of COGY and a rehab program utilizing COGY will contribute to solving one of the developmental challenges faced in Thailand, where aging of the population is advancing. This developmental challenge is to create a rich society through improving rehab and ease of transport for people who have trouble walking such as elderly individuals and individuals with a handicap.

First, technological verification of whether this product/technology could “improve the rehab potential in people who have difficulty walking such as elderly individuals and individuals with a handicap” indicated that, as stated above, the product has sufficient technological suitability. In terms of whether ease of transport can be enhanced, although some effects are anticipated indoors, effects outdoors may be limited due to the poorly paved roads.

In either case, positive comments have been received from Thai government-affiliated agencies, as well as doctors, physical therapists, etc. at public and private hospitals regarding the possible effects of COGY if it becomes popular amongst general population. Upon reporting the results of this investigation to the Ministry of Health Department of Older Persons (DOP), an official at the DOP commented, “It would be wonderful if this product became popular in Thailand, which is now an aged society.” In addition, the DOP offered a hospital under the DOP’s jurisdiction (in Chonburi province) to be used for the implementation of such rehab if the results need be verified. Unfortunately, since this hospital was small, empirical research to verify the feasibility of expanding the usage of this product was not conducted at this hospital. However, the DOP’s offer indicated strong anticipation of the Thai government.

To verify that the introduction of COGY contributes to solving problems, first, facilities and settings, where COGY may be used, are arranged by situations. As a result, the following situations from (1) through (6) are plausible.

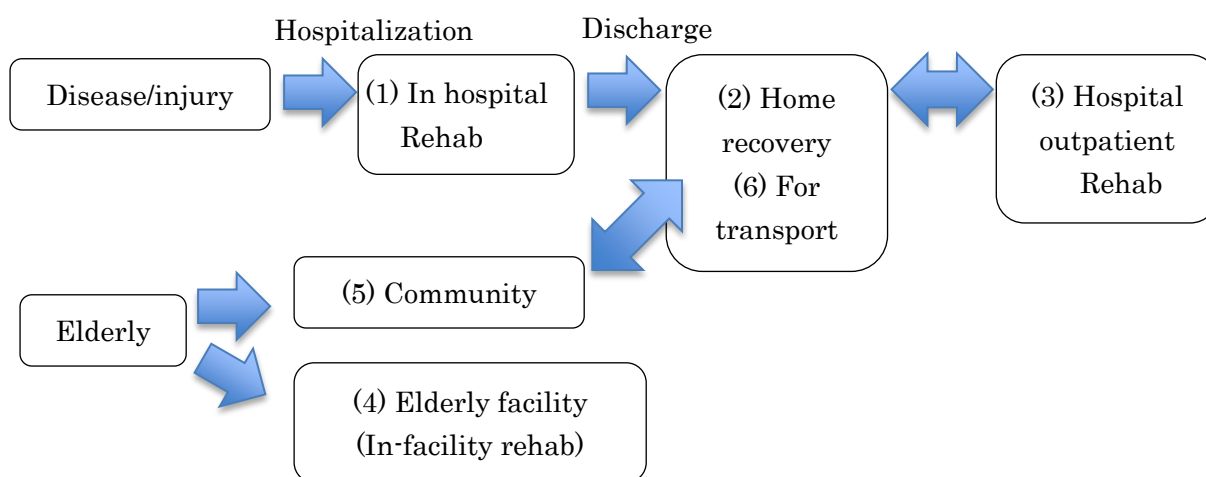


Figure ii Situations in which COGY could be utilized

Source: JICA survey team

Taking the expected sale price range of COGY into account, (1) through (6) were divided into wealthy population and others (general population), and settings for potential utilization and challenges were organized in the following manner.

Table vi COGY utilization potentials and challenges

	Wealthy population	General population	Challenges
(1) In-hospital rehab	○ (Private hospital)	○ (Public hospital)	<ul style="list-style-type: none"> Public hospitals have potential for utilization with SNMRI's approval/support and coordination with the health insurance system. The decision will be made by physicians at private hospitals.
(2) Home recovery	○	×	<ul style="list-style-type: none"> Strong possibility of expanding the usage through coordination with autonomous training (requires joint development with hospitals) Possibility of continued use for wealthy population at home and general population at community facilities
(3) Hospital outpatient rehab	△	△	<ul style="list-style-type: none"> Strong possibility of low importance in patient rehab in terms of hospital visit frequency and treatment details
(4) Elderly facility	○	○	<ul style="list-style-type: none"> For cases of long-term hospitalization, continued use within the hospital could offer strong effects. This product also has good usability because it is easier to operate than other rehab devices and can be used for autonomous transport. If the rehab effects are widely achieved at public/private hospitals, there could be strong possibilities for application. Achievements made at an elderly long-term care facility in Chonburi province could be used for promotional publication.
(5) Community	×	○	<ul style="list-style-type: none"> Although the product can be handled by staff members such as volunteers instead of doctors and physical therapists, education and training programs are needed.
(6) For transport	△	×	<ul style="list-style-type: none"> Mainly for transport within the home and space is limited.

Source: JICA survey team

For the wealthy population, if the effects of the pedal wheelchair are verified with private hospital physicians and physical therapists, there would be subsequent possibilities for spreading the use on a normal commercial transaction basis. However, this is expected to be difficult for the general population, which comprises the majority of Thai citizens, without subsidy schemes such as medical insurance and long-term care insurance coverages. Moreover, as wheelchairs used for transport are considered to be “donated items,” it would be best to brand COGY as a “rehab device” and select sales channels appropriately.

If COGY spreads among the general population in Thailand, it could contribute to solving one of the developmental challenges faced in Thailand, where aging of the population is advancing. This developmental challenge is to create a rich society through improving rehab and ease of transport for people who have trouble walking such as elderly individuals and individuals with a handicap. Therefore, based on the assumption that the effects of the device’s performance will be verified at SNMRI, we will continue to seek the possibility of utilizing SNMRI’s budget to promote the introduction of rehab programs using COGY at each provincial hospital under SNMRI’s jurisdiction.

Going forward, while expanding the usage on a business basis by targeting the wealthy population, we will aim for spreading the use on a national level to help solve the developmental challenge faced by Thailand. As for developing an ODA proposal, we will communicate well with the Ministry of Public Health and discuss the objectives and process of the proposal with management at SNMRI as well as on-site managers.

5. Business development plan

Taking the above investigation and analysis results into account, we decided that narrowing down the target segments for COGY business in Thailand to private hospitals used by the wealthy and similar populations and deploying it as a “rehab device” would be the best choice at least in the initial stages of the business. For marketing, we are going to implement indirect sales utilizing local agencies. We are engaged in the final adjustments to conclude a sales agency contract with AWB Co., Ltd. (hereinafter AWB), a small-scale specialized trading company, that handles industrial machinery and equipment wholesales. In the medical equipment field, AWB handles particle beam treatment equipment used for cancer treatment and has a network with medical facilities, including hospitals, within Thailand. Although it is small-scale company, because it offers a rapid response and has connections with the Thai royal family, it is anticipated to allow the deployment into local Thai markets. Moreover, as the sales agency agreement does not offer exclusive rights, in order to establish a wider network, agencies such as Japanese trading companies in fields other than those that AWB specializes in will be selected when expanding the agency network in the future.

Table vii Target segments for business expansion in Thailand

	Business expansion in Japan	Business expansion in Thailand
Target segments	<p><Individual></p> <ul style="list-style-type: none"> Individuals who have a certain level of income and need to use a wheelchair on a daily basis due to hemiparesis, etc. as a result of stroke or other causes (wide range) <p><Hospital/elderly facility></p> <ul style="list-style-type: none"> General hospitals with rehab facilities or elderly facilities, etc. (wide range) 	<p><Individual></p> <ul style="list-style-type: none"> Wealthy population who are undergoing rehab at a private hospital due to hemiparesis, etc. as a result of stroke or other causes (Thais and foreigners visiting the country for medical tourism, etc.) <p><Hospital/elderly facility></p> <ul style="list-style-type: none"> Private hospitals Top-level elderly care facilities
Provided benefits (advantages perceived by customers)	<ul style="list-style-type: none"> The transport function is offered along with rehab effects that facilitate autonomous walking. 	<ul style="list-style-type: none"> Rehab effects can be achieved at a relatively low cost. Brand value (stylish appearance, sense of superiority through ownership)

Source: JICA survey team

From the viewpoint of solving a developmental challenge, we recognize the importance of deploying this device to the middle- and under-class populations. However, from the viewpoint of business feasibility, we judged that it was more realistic to narrow down the target segments to the wealthy population, who have strong purchasing power, as our approach. In terms of approaching the middle- and under-class populations, once the business has been established to a certain level in Thailand, we hope to seek some type of scheme, such as utilizing the ODA business aided by the Japanese government.



Figure iii Business strategy in Thailand

Source: JICA survey team

Feasibility Survey for Installing Rehabilitation Program with Pedal Wheelchair

SMEs and Counterpart Organization

- Name of SME: TESS Co., Ltd.
- Location of SME: Sendai, Miyagi prefecture Japan
- Survey Site · Counterpart Organization:
Kingdom of Thailand (Bangkok, Chiang Mai, Buriram and Surin)
Sirindhorn National Medical Rehabilitation Centre



Concerned Development Issues

- Corresponding to the progress of aged society (aged population ratio will reach 16% in 2025, making the country an aged society)
- Reforming a rehabilitation environment disparity
- Developing consciousness in the rehab field
- Mechanism of training personnel in the rehab field

Products and Technologies of SMEs

<Pedal Wheelchair "COGY">

- Those who have walking difficulties can even pedal with one's own legs, as long as one leg slightly moves
- COGY is the world's first product that has both mobility and rehabilitation function

Proposed ODA Projects and Expected Impact

ODA Project : Verification Survey with the Private Sector for Disseminating Japanese Technologies
TESS will try to disseminate their product "COGY" to public hospitals throughout Thailand, through the Verification Survey of COGY at specialized hospital under MOPH. Dissemination of COGY will contribute to solve one of the Thailand's development issues : realization of affluent society through improvement of mobility and rehabilitation to people with walking difficulties (aged population, handicapped people, etc)

Business Plan of SMEs

TESS aims to sell COGY to public hospitals, private hospitals, and welfare facilities, after preparation of sales system through the selection of and negotiation with local partners (distributors etc.) and construction of support system (maintenance etc.).