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"Project Formulation Survey" under the  
Governmental Commission on the Projects  
for ODA Overseas Economic Cooperation  
in FY2012

【Summary Report】

Malaysia

「ODA Project Formulation Survey  
aiming at improving maintenance  
management capability of social maintenance  
capital in Malaysia  
by Japan's high-tech survey instrument」

March, 2013

Kansai Construction Survey/Accenture Japan

Joint Venture



This report is a summary of a project formulation survey conducted by the contractor, under the Governmental Commission on the Project for ODA Overseas Economic Cooperation, commissioned by the Ministry of Foreign Affairs of Japan in Fiscal Year 2012. It does not necessarily represent the official views of the Ministry of Foreign Affairs of Japan.

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## Introduction

### I . Description of the current situation and development needs of the concerned development issues in the surveyed country

Malaysia, a country which has been achieving the stable economic growth, implements the policies to join the ranks of developed countries by 2020 under the “Vision 2020”. As the volume of infrastructure construction grows, the system of asset management has been enhanced. However, the awareness for aging infrastructures still needs to be deepened.

With regard to the construction industry, new construction cost is made up of a majority of construction cost due to a rush to build new infrastructures with the economic growth. However, the maintenance cost is growing as well recently. Also, as the accident of cracks on the bridge in Kuala Lumpur, 2004 has grown the risk awareness of the bridge safety, the system of asset management, such as inspection guidelines and the database to manage infrastructure information in an integrated fashion, has been improved. However, in advanced developed countries like Malaysia, the majority of bridges are quite new and the risk awareness of the aging concrete is still low.

Recently, deterioration of infrastructure has gained much attention in Japan, the US and other developed countries through the experience of very serious collapse accidents which even killed people. It is analyzed that the appropriate precaution against the aging infrastructure is significant to prevent those collapse accidents.

Malaysia is facing the rapid increase of infrastructures such as bridges and the situation is very likely to what Japan used to be during the postwar high development era. It is obvious, based on the experience of Japan, the US and other developed countries, that the accurate measurement, the accurate prediction of deteriorations and the appropriate precaution for infrastructures are required from the early stage of their life-time in Malaysia in order NOT to repeat the same mistake that the developed countries made.

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## II . Possible applicability of the SME's products and technologies, and prospects for future business development

Our remote crack inspection system, “KUMONS” is the world’s first system to measure cracks of structure from a safe distance and to generate the drawing with positional coordinates automatically..

There are various causes for structure deterioration, however, what always appears as a sign of deterioration is a crack. Cracks are relatively easy to inspect but also cracks enables the deterioration and the cause to be identified. Furthermore, by measuring the growth of cracks as time goes by, the future progression of damages can be analyzed. Hence, cracks are the most significant sign of deterioration and the crack inspection plays a critical role in the asset management for infrastructure.

While on the other hand, the conventional method for crack inspection is to contact to a crack, measure it with a scale and draw the sketch by hand. This method requires the scaffold for the work that exposes inspectors and also passers to danger. The cost for scaffolding is not low. Also, there are some parts of structures that cannot be reached so that the measurement has to be given up with a conventional method. Furthermore, human errors are often observed in sketching of a conventional method. When an inspector gets switched from the previous inspection, the comparison with the past measurement cannot be accurate and it prevents identifying the progression of deterioration.

KUMONOS enables:

- To measure cracks quickly and accurately from a safe distance
- To record crack deterioration digitally with positional coordinates so that sketching cracks and transforming the data to CAD drawing for further analysis are no longer necessary
- To enable inspectors to measure cracks in untouchable places which they have no choice but to give up measuring in a conventional method
- To analyze the progression of damages such as cracks’ growth quantitatively that enables to assess the tendency of degradation and predict how the structures will deteriorated in the future, which can objectively determine the proper timing and amount for repairs or refurbishment and prevent future tragedies

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KUMONOS was awarded as the beneficial and recommended technology in the New Technology Information System (NETIS) which is managed by the Ministry of Land, Infrastructure, Transport and Tourism of Japan and has been used more than 1,000 projects of infrastructure, both in public and private, in Japan.

Kansai Construction Survey believes that KUMONOS is surely applicable and can be beneficial in Malaysia where the number of infrastructure is growing and the importance of asset management for infrastructure is significantly increasing.

### III. Expected development impact and effect on business development of the proposing SMEs in the surveyed country through proposed ODA projects

In order NOT to repeat the same mistakes that the developed countries made, Malaysia is required “the accurate measurement of structures”, “the accurate prediction of deteriorations” and “the appropriate precaution for infrastructures”. Regarding this, KUMONOS can contribute as follows:

- It is found that the conventional method, human eye sight checking and sketch drawing, is applied to measurement in Malaysia through the research. Human errors are often observed in a conventional method. According to the study we conducted, KUMONOS can improve the accuracy 10 times compared to the conventional method.
- It is found that there are some cases in Malaysia that measurement has to be given up because some parts of structure are untouchable with the conventional method. KUMONOS enables inspectors to measure cracks in those untouchable places and improve the accuracy of the measurement.
- There are some concerns found through the interviews conducted that the accurate prediction of deterioration is difficult with the conventional method. KUMONOS helps here by providing the accurate quantitative data with positional coordinates and it enables to analyze the progression of damages and the tendency of degradation, therefore the prediction of how the structures will be deteriorated in the future and the determination of the proper timing and amount for repairs or refurbishment can be possible.

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We have received positive reaction and comments on the potential and the applicability of KUMONOS from related government agencies and inspection companies. However, since KUMONOS is quite new to Malaysia and there is no record of usage, there are some issues to solve in order to apply KUMONOS to Malaysia:

- The recognition and conviction by the institutions (governmental agencies, etc.) which place an order for infrastructure maintenance is important for KUMONOS to be applied.
- Not only the equipment but also the technology and know-how should be transformed in order to have KUMONOS utilized.

Regarding the business scale and resources of Kansai Construction Survey, it is not easy to work alone with the issues above and also to invest. There are positive impacts that ODA project can bring:

- ✓ By involving the governments of Malaysia and Japan, the merit of KUMONOS can be broadly shared compared to the approach of B to B.
- ✓ Dialogue with the institutions which place an order for infrastructure maintenance can be smoothly conducted.
- ✓ Transfer the technology and know-how can be supported.
- ✓ Technologies like KUMONOS, which Japanese small-medium sized enterprises owns but not well-recognized and well-utilized due to the lack of resources and networks of the small-medium sized enterprises, can contribute to the development of partner countries and also to enhance the presence of Japan

#### IV. Proposals for formulating ODA projects

Our objective of the ODA project is to enhance the asset management capability in Malaysia through our remote crack inspection system of “KUMONOS” and therefore we propose the following three activities:

1. Conduct the pilot crack inspection with KUMONOS
  - Verify that KUMONOS is applicable to and beneficial for the characteristics /conditions of structures in Malaysia
  - Transfer the techniques/know-hows from Japan to Malaysia
2. Develop a Next-Generation Asset Management Method for Infrastructures using “KUMONOS”

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- Develop a Next-Generation Asset Management Method and a prototype computer program which can generate and optimize asset management plans for a set of infrastructures depending on the future budget conditions and management scenarios based on the accumulated inspection data with KUMONOS
  - Collaborate between Japanese universities and Malaysian universities
3. Promote activities and campaigns concerning the importance of the accurate assessment of degradation and the role which KUMONOS can play in the asset management for infrastructures

Depending on the budget and the time frame, we propose the following two options for the ODA project:

Option A: Activity 1 + Activity 3 (1-year-project)

- Approximate estimate: 0.11 billion JPY
- Apply the new ODA scheme which is to promote to utilize the technology/product of Japanese small-medium sized enterprises for the development of ODA partners

Option B: Activity 1 + Activity 2 + Activity 3 (3-year-project)

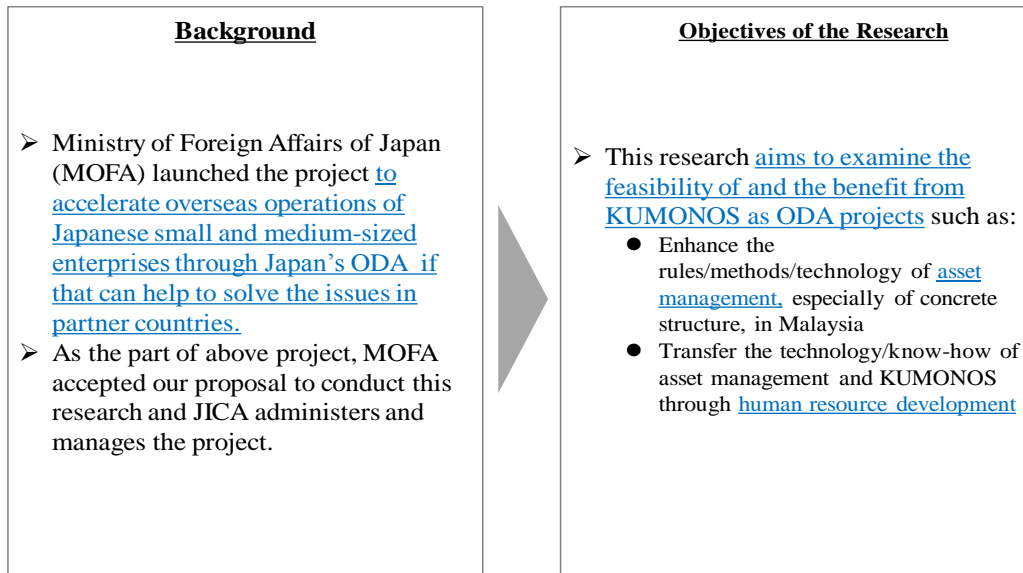
- Approximate estimate: 0.22 billion JPY
- Apply the new ODA scheme which is to promote to utilize the technology/product of Japanese small-medium sized enterprises for the development of ODA partners  
OR JICA Partnership Program for Activity 2 OR Technical Cooperation

We also plan to deploy the KUMONOS project to other developing countries since KUMONOS can be applied to anywhere if a country owns the infrastructure and the base to accept the idea of asset management for infrastructures.

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## Attachment: Outline of the survey



<Figure 1>Outline of the survey in Malaysia



## <Project Formulation Survey> Malaysia, Enhance the Asset Management of Infrastructure with Remote Crack Inspection System

### SMEs and Counterpart Organization

- Name of SME : Kansai Construction Survey Co.,Ltd.
- Location of SME : Osaka-fu, Minoo-shi, Funabahigashi 2 chome, 1ban, 15 go
- Survey Site ▪ Counterpart Organization : Malaysia (Kuala Lumpur), Universiti Teknologi Malaysia (UTM)

### Concerned Development Issues

- As the increase of bridge construction, in order to prevent future collapse accidents, it is urgently needed to take preventive measures in the early stages based on accurate inspection and deterioration prediction.
  - Breakaway from experience-dependent inspection method
  - Expansion of measuring range while ensuring safety
  - Development of inspection method which need no or short-time traffic control

### Products and Technologies of SMEs

- Remote crack inspection system ,”KUMONOS”, ensures the accurate, safe and efficient asset management by these following superiorities
  - A crack’s shape and width can be measured quickly and accurately from a safe distance
  - Digital recording eliminates the need for sketching
  - Automatic drawing can shorten the time to draw figures
  - The quantitative growth of cracks over time can be monitored

### Proposed ODA Projects and Expected Impact

- To make KUMONOS widely known and highly evaluated and to verify its applicability through a pilot use
- To contribute to enhance asset management of construction by the collaborative research such as a construction’s deterioration prediction and the research will be undertaken among university research institutes in Malaysia and Japan based on KUMONOS’s measured data
- To contribute to enhance asset management of construction by awareness campaign to the necessity and the importance of the accurate construction’s cracks measure

### Future Business Development of SMEs

- KUMONOS and its value will initially be broadly recognized in Malaysia and be used (promote KUMON’s sales) in the fields of asset management.

