

# A BRIDGE Model of University-industry Cooperation to Develop Skills of Practical Engineers for Small-medium Companies

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## Abstract

A university-industry cooperation model (BRIDGE\* model) of co-prosperity between small-medium companies(SMCs) and major enterprises(MEs) to develop skills of practical engineers is presented. As a best practice, a case of university (Korea University of Technology and Education ; KUT) and major industries(Samsung Electronics etc.) cooperated re-training model for the human resources of small partner companies is showed. The actual result and expectation of the practice is presented as a positive view, and it shows how this model to spread to national wide.

-BRIDGE : Bi-polarization Relief through Innovation of Developing Globalized Employee

## Introduction

In recent days, with the rapid growth of knowledge based on high technology industries such as semi-conductor, display, IT, new renewable energy etc., the close partnership between major enterprises and small-medium partner companies is eagerly required. Especially, with the Korean enterprise culture such as technology leading structure, enterprise globalization etc., and the importance of co-prosperity cooperation system structure for small-medium partner companies from technical development stage is widely issued in the society. After 2002, the profitability, worker income, vocational ability development investment scale and participation ratio (employment insurance returning rate for major enterprises is 78%, while for small-medium companies is around 8%)[1] are shown in Fig. 1 and Fig. 2. So we could see that the bi-polarization becomes serious, therefore the effectively support from major enterprises and government for small-medium partner companies is strongly required.

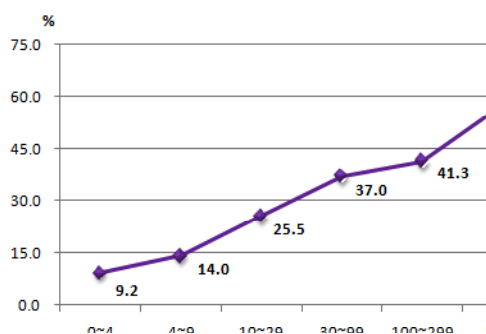


Fig. 1 Participation ratio of employee ability development according to enterprise size[2]

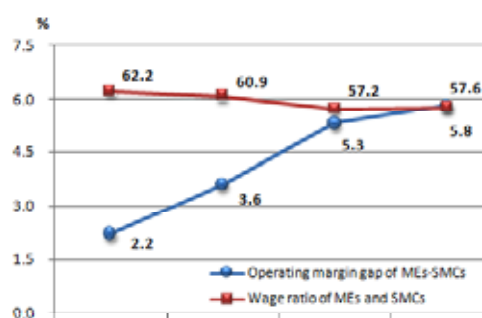


Fig. 2 Bi-polarization ratio of major enterprises and small-medium companies[1]

From 2001, “small-medium companies’ vocational training consortium program” piloted by the Ministry of Labor of KOREA has been ongoing regularly. But in fact it is very difficult for small-medium companies and small-medium

partner companies to deal with a variety of request at any time, so the necessity of new employee ability development model, which is originally settled by the major enterprise who lead the technology, is proposed here.

In this paper, the healthy co-prosperity cooperation between major enterprises and small-medium companies is induced. In order to build an effective employee ability development model, the main feature, achievement, national spreading status and other properties of “BRIDGE Model”, which is integrated by “small-medium companies’ vocational training consortium program” and “KUT employee ability development program”, will be introduced.

### The basic direction and modeling of BRIDGE program

BRIDGE Model starts to change in some small visual angles. Since the small-medium companies’ vocational training consortium program has been operated by KUT from 2005, due to some limitations of implementation, we have to face a lot of difficulties, such as low participation ratio, customers-centric technical equipment set-up, industry oriented course design and so on. According to the investigation and analysis of distribution, infrastructure and training demand for neighboring enterprises, we recognized that in order to positively promote co-prosperity cooperation between major enterprises and small-medium partner companies, it is necessary to reflect the Korean enterprise culture in this model. The meaning of BRIDGE is shown in Fig. 3 and the tree structure of major enterprises (Samsung Electronics) and small-medium partner companies is shown in Fig.4. Now there are totally 7 BRIDGE trees, such as Hyundai-Mobis, etc., being built and operating.

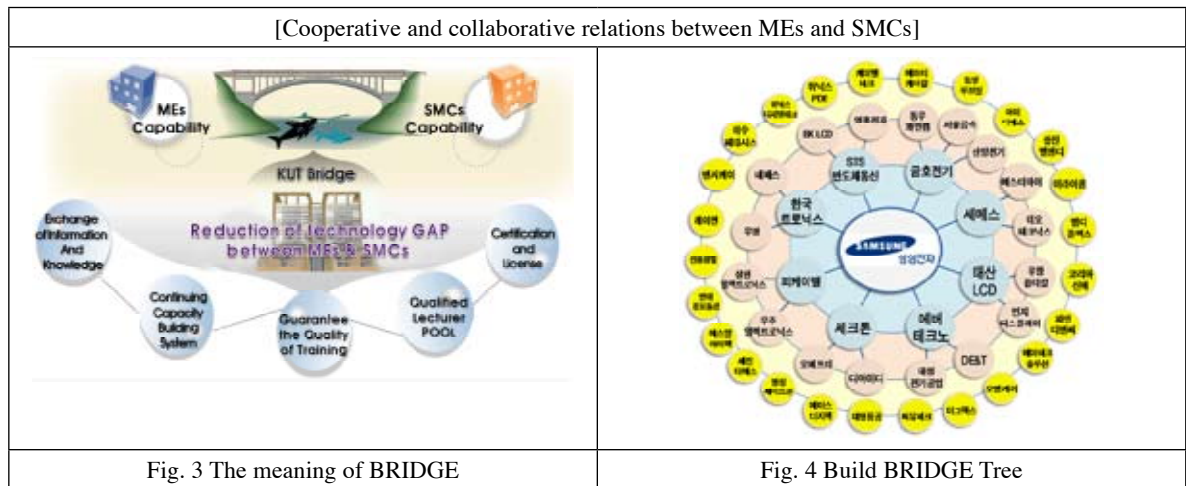


Table 1 Promotion progress

Date	Content
2005.07	Be chosen as operation institution for[small-medium companies’ vocational training consortium program] (supported by the Ministry of Labor)
2005.09	MOU with Samsung Electronics for ‘Industry cooperation agreement’ (Joint technical training)
2006.01	MOU with Samsung SDI for ‘Industry cooperation agreement’ (Joint technical training)
2006.03	Establish <b>KUT-Samsung Electronics[Advanced Technology Education Center]</b> on new second campus as industry
2007.03	During Korean president visiting our school , <b>The BRIDGE Model</b> was reported MOU with Rockwell Automation Korea for ‘Industry cooperation agreement’ (Joint technical training)
2008.02	BRIDGE Model started to spread and propagate all over the country by the Ministry of Labor (11 universities are operating now)

On the basis of built BRIDGE Model which is “Advanced Technology Education Center (ATEC)” established by

our school and Samsung Electronics, the operation of ATEC is led by university, where basic training infrastructure is supported, needs survey, course design, training equipment set-up, and others are prepared by co-work of KUT and major enterprises, sharing employee re-training program know-how from major enterprises, special training equipments and lecturers provided by major enterprises are operated as the basic guidance.

### The differentiation of BRIDGE Model as a best practice

The differentiations of BRIDGE Model with other training model are as follows.

1. In order to ensure the training quality, course design and operation process are designed with field oriented according to the initial demand.

Table 2 Training system comparison between KUT and other institutions

Classification	KUT system	Other institutions' system
Respond to technological change	Course selected according to real-time survey of industry need	Lecturer-centric course selected
Training course	Customers-centric course design	Provider-centric course design
Course operating	Director Prof.&PM system	General staff system
Equipment set-up	Field-centric equipment now in use	Provider-centric general equipment
Lecturer POOL	Nationwide excellent lecturer	Institution internal lecturer

- (1) Therefore, field investigation (business visit, survey of demand and in-depth discussion) about training demand is carried out by KUT and Samsung Electronics together. Based on sharing the accumulated know-how technical training by Samsung group, practice-centric education course is established.

Table 3 Training program and course design according to demand survey

<b>Training objective</b>	Cultivating individual capability to improve core technical skills and build integrated system in order to design basic training courses in area of industrial infrastructure such as display, semi-conductor and automobile etc.
<b>Training technique</b>	Theory by excellent university professors, while personal project practical training by more than 5~10 years practical experience lecturers
<b>Training time</b>	According to the condition of enterprises, 5 days (35 hours) ~ 30 days (210 hours) industry site visit training is operating parallel.
<b>Develop material</b>	In order to reflect the rapid development of enterprises, teaching materials are updated twice a year - Samsung practitioner, KUT principal PM, director professor, external expert → Demand-centric materials development

- (2) All the developed courses are organized by director professors who are in charge of different courses correspondingly and national wide practical-centric excellent lecturers are invited as lecture POOL primarily, which are shown in Table 4.

Table 4 Lecturer status according to the positions

Classification	Number of lecturer[people]	Component ratio[%]
Number	159	100.0
KUT professors	18	11.3
Other university professors	19	12.0

Samsung experts	17	10.7
SMCs and research institutes	45	28.3
Others*	60	37.7

\*Others: Manufacturing enterprises of training equipment and industrial facility

## 2. Complete and objective training evaluation management system

(1) Entrance and achievement evaluation management system is operated to check trainees' abilities in different courses. Varieties of satisfaction survey and analysis are operated, such as satisfaction about course/lecturer/training environment by trainees and training environment/trainees' evaluation by lecturers, for the reflection in next course as feedback system.

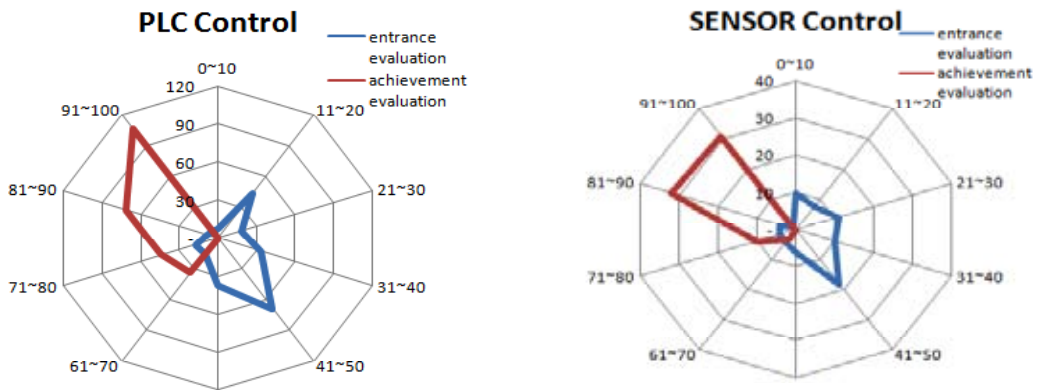


Fig. 5 Level distribution map of before and after training courses

- (2) If the evaluation score is less than 3.5/5.0 twice, the lecturer is ruled out from the lecturer POOL, such “struck-out” lecturer hierarchy is operated parallel with giving incentives to excellent lecturers
- (3) Training materials are available to trainees and lecturers through web page. Especially for trainees who have completed their courses, e-learning based Before/After training system which is provided for continuous learning is shown in Fig. 6 and Fig. 7. And for those who complete their courses, their productivity contribution, consciousness and working attitude is carefully surveyed.

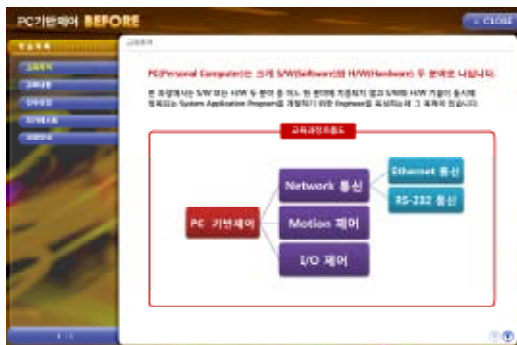


Fig. 6 Before learning frame



Fig. 7 After learning frame



Fig. 8 Equipment Competitive Contest



Fig. 9 View of KUT attending students

3. Finally, employee training and university education for undergraduate students are connected together. Therefore, varieties of filed experiences and technologies could be reflected to university to improve the completeness of field practical-centric technology education model of KUT. Equipment Competitive Contest is opened by Samsung Electronics, Samsung SDI and Samsung Corning Precision Glass with KUT. Meanwhile, practical field education for undergraduate students of KUT has been ongoing and developing now by participating in the Contest.

### The results of successful operation

Table 5 shows the quantitative results of BRIDGE Model during formal operation from 2006 to 2008, where we could tell the increase trend every year.

Table 5 Operating results of BRIDGE Model

Classification	Year	Number	Small-medium companies	Major enterprises
Attendance enterprise (Company)	2006	214	212	2
	2007	258	255	4
	2008	181	173	8
Course number (Number of times)	2006	183	105	75
	2007	265	157	108
	2008	270	169	74
Total number of training man-days (People)	2006	15,827	9,739	6,088
	2007	17,133	8,526	8,607
	2008	23,132	15,310	7,822

Comparing with using their own training infrastructure and internal lecturers, cooperating with universities can give more help to major enterprises who join the BRIDGE Model smoothly solve the difficulties such as professional training program development, lecturer POOL structure, sustained training infrastructure investment and etc. Viewing from the standpoint of small-medium companies, they have co-prosperity cooperation with major enterprises, therefore the field status could be instantly reflected by learning the know-how technology from major enterprises, so we can make a conclusion that participants and CEO's satisfaction and productivity contribution are performing better than other trainings. The necessity of new advanced technology and the problems of filed technology bottleneck could also be solved by re-training. In Fig. 10 and Fig.11, we could tell that an average score of 4.35/5.00 is obtained both at excellent course satisfaction and lecturer satisfaction survey.

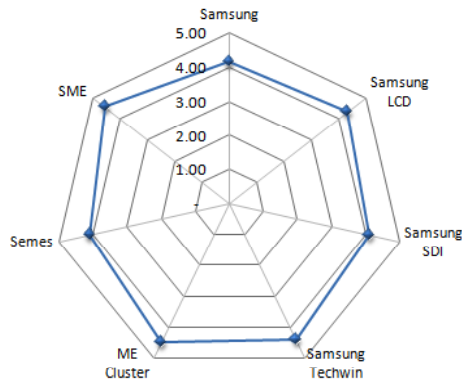


Fig. 10 Course satisfaction

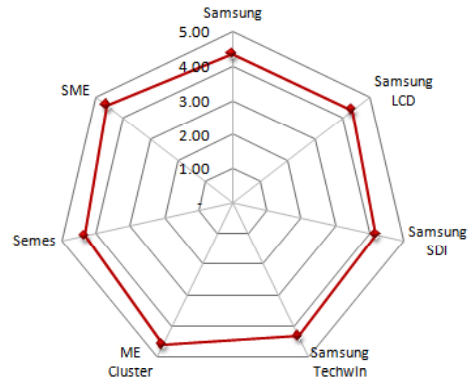


Fig. 11 Lecturer satisfaction

The attendance of courses which the affiliates and related partner companies of participated enterprises take is enlarging. Also, the technology training for intern engineering as well as the internal skill certification of enterprises is derived from the BRIDGE Model.

### The spreading and propagation of BRIDGE Model

Due to the successful result of BRIDGE Model, the Ministry of Labor revised partial guidance for small-medium companies' vocational training consortium program in 2008. Then Bi-polarization Relief through Innovation of Developing Globalized Employee (BRIDGE) type is established and spread all over the country. Now there are 11 universities who are operating this model in the fields of shipbuilding, architecture, IT, automobile, energy, steel, mobile telecommunication etc., where major enterprises and small-medium companies are all involved. In July 2008, in order to make the new model propagate quickly and support the program harmoniously, consortium HUB bureau was established by the operating agency of small-medium companies' vocational training consortium affiliated with the Ministry of Labor.

Table 6 Propagation status of BRIDGE Model

<ul style="list-style-type: none"> <li>A. Kyungil University</li> <li>B. Gwangju University</li> <li>C. Tongmyong University</li> <li>D. Mokpo National University</li> <li>E. Shinheung College</li> <li>F. Yeungnam University</li> <li>G. Osan College</li> <li>H. Inha University</li> <li>I. Changwon National University</li> <li>J. Chungkang College of Cultural Industries</li> <li>K. Korea Maritime University</li> </ul>	
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### Conclusions

Conducted by university, BRIDGE Model is a new employee ability development model, which can solve the bi-polarization and co-prosperity issues between major enterprises and small-medium companies. Now BRIDGE Model is propagated to 11 universities and highly expected for human recourse development in the future. Meanwhile, BRIDGE Model is also being planned to be an international brand.

## **References**

01. The Ministry of Labor (2007), basic planning materials for life ability development.
02. The National Statistical Office (2006), census of economic activity.