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Competency Assessment:
Korea's Official Development Assistance in Higher Education*

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| Contents |

| Abstract |

This study provides an empirical framework that hardly measurable competency can be estimated based on the confirmatory factor analysis and also assess the effectiveness of overseas higher education, more specifically evaluate competency assessment for one of higher education official development assistance (ODA) programs, Masters in Korean Economy and Development Cooperation (MKE) at Kyung Hee University, in order to provide positive career achievements and access to better job opportunities. Moreover, we are able to split the overall competency factor into four different types of dimension (initially six dimensions) which will find a way to analyze strength and weakness of specific higher education ODA program in terms of competency dimensions. This also implies that donor countries

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need to invest their resources efficiently to ensure that their students' competency profiles align with their ultimate goals. By putting competency assessment processes in place, donor countries are able to analyze critical competencies and take steps to address fields that need more development. In the long run, the analysis of competency assessment will be helpful to address the changing context and the multiple actors involved for the development of any higher education ODA programs.

▪ Keywords: Official Development Assistance, Confirmatory Factor Analysis, Higher Education, Competency Assessment, Maximum Likelihood Estimation

I. Introduction

The main purpose of this paper is to provide an empirical framework to evaluate competency assessment for one of higher education official development assistance (ODA) programs, Masters in Korean Economy and Development Cooperation (MKE) at Kyung Hee University. Using a confirmatory factor analysis with unobserved competency factors, this paper will provide a direction of positive career achievements and access to better job opportunities in favor of the graduate students.

Many practitioners and scholars of ODA have long claimed that foreign aid to higher education is widely recognized as a vital contributor for socioeconomic development and growth. Every year significant resources are devoted to funding on international training and education programs. Worldwide estimates propose that several billions of US dollars are spent on educational programs supported by different donor countries (Pearson 2010; World Bank 2008).[1] However, the assessment for effectiveness to check whether the mechanism of capacity development is being executed

to its full potential has been scarce. Also, the construction of capacity development or competency building has been frequently seen as too elusive and complex to be measured because both capacity and competency are an intangible asset (Pearson 2010; UNDP 1997; Morgan 1997).

Despite the considerable amount of international cooperation resources devoted to building capacity in developing countries, several authors have acknowledged that few studies have examined the effectiveness of donor support (Pearson 2010; World Bank 2008; Gosling 2008; McGrath 2002). This also applies when evaluating the effectiveness of postgraduate scholarships to educate potential young leaders in universities in donor countries (Gonzalez 2013; Acevedo & Arreola 2011; Schraven et al. 2009).[2] There are also a scarcity of studies that examine the theoretical foundations, awarding process, program delivery and impact of international cooperation support for educational mechanisms to build capacity in developing countries (Moral & Pombo 2011; Day et al. 2009; Gilboy et al. 2004; Eley et al. 2001).

A few studies have shown that scholarship programs contribute to the development of capacity by providing access to new knowledge and good practices. Eley et al. (2001) reported the impact of the postgraduate program on building capacity in sub-Saharan Africa. This study covers 60 graduate fellows from Kenya and Ethiopia who undertook the research component of their degrees at the International Livestock Research Institute (ILRI) between 1978 and 1997. Graduate fellows are staff members of national agricultural research systems who registered for a graduate degree (MSc, MPhil or PhD) program in their home countries or elsewhere. The tools used in this study combined both participant

1) USAID (2012), "Human and Institutional Capacity Development," http://www.usaid.gov/policy/ads/200/201maf.pdf. (accessed on April 15, 2019)

2) Goyzueta, J. M. (2013). "La Leyenda Urbana de las Becas en Guatemala [The Urban Legend of the Scholarships in Guatemala]." https://www.plazapublica.com.gt/content/becas-en-guatemala. (accessed on May 2, 2019)

questionnaires and an interview process for them. The depth of the questions and the identity of the respondents include many impacts of various aspects as well as evaluate the training program. According to the finding of their study, the cooperation was offered to build capacity through long-term degree training and there was an indeed direct contribution of the postgraduate education program by the acquisition of new knowledge and the development of skills. However, this study does not consider what specific factors constitute the impact and how to separate the effect of ILRI's training with that obtained elsewhere. Similarly, Gilboy et al. (2004) published an interesting report on the impact of a USAID long-term university training on African development from 1963 to 2003. This research highlighted that the long-term university training can provide both career and performance developments of trainees. Although this study emphasized a special comment on "individual career advancement of training (master and doctoral training) beneficiaries measured by tangible outcomes such as job promotions, publications and self-reported training application in the work place", a detailed assessment of organizational improvement and societal gains from the education remains challenging. Moreover, Riddell & Nino-Zarazua (2016) also found that educational outcomes are profoundly influenced by a range of critical and hardly measurable factors, such as the nature of the curriculum, the effectiveness of training, the appropriateness of learning materials, the mentoring, and so on.

The review of previous literature reveals that both theoretical framework and consolidated empirical methodology are still being underdeveloped. Kotvojs (2009) suggests that it is still necessary to find the simple and clear framework to examine the capacity building or competency development initiatives in international cooperation because in many cases what is measured is at an output level rather than at an outcome level and primarily serves an accountability function. For such a

reason, the quality of capacity building was often evaluated poorly (Watson 2006; Bollen et al. 2005; Forss & Carlsson 1997). Therefore, it is helpful to develop strong empirical tools especially when we examine and analyze the international mobility of graduate students from developing countries to developed countries, to efficiently pursue their academic programs overseas, which has become a recurrent mechanism, supported by donors (Pearson 2010; Schraven et al. 2009). This international cooperation approach is indeed attracting and growing interest from the academic community while few sources exist to help understand the effectiveness of the donor support, except a multi-stakeholder perspective (Gosling 2008).

To fill the gap between the limitation of previous literature and the importance of capacity building evaluation, this study presents an empirical framework for estimation of competency development activities, which is called a competency assessment model. The competency mapping focuses on how well students are performing the required job skills in relation to specified performance standards after completing the program. Despite the importance of this theme in the education literature, empirical research about competency assessment for higher education is almost nonexistent. The purpose of this study is to assess the effectiveness of overseas higher education through our proprietary empirical method in order to provide positive career achievements and access to better job opportunities in favor of the graduates. By doing so, we are able to answer our research questions; can we verify achievement of capacity development after completing the higher education program? If so, how can we specify several factors constituting the individual, organizational/institutional level of capacity to assess the effectiveness of overseas higher education programs? We also reports initial steps to develop a competency assessment scale of higher education ODA that could be used for systematic research. As a first step, we discuss the

theoretical dimensions of competency assessment identified in the ODA literature. We then review the procedures that were used for translating the theoretical dimensions into a scale. The scale's reliability and validity were assessed with survey data from 164 respondents using confirmatory factor analysis. We conclude the study with a discussion of the validity of the theoretical construct and future steps to refine the scale.

Ⅱ. The Competency Assessment Construct

To measure human resource building through the MKE, we first conduct our survey data based on the theoretical competency assessment construct. The development and maintenance of human and social capital represents an important factor for societies to not only generate prosperity, social cohesion and peace, but first and foremost to manage the challenges and tensions of an increasingly interdependent, changing and conflictual world. To date, major impetus in OECD countries for efforts in the area of key competencies has come from the business sector and from employers.[3] From a purely economic viewpoint, competencies of individuals are as seen as important because they contribute to boosting productivity and market competitiveness, minimizing unemployment through developing an adaptive and qualified labor force, and creating an environment for innovation in a world dominated by global competition.

According to OECD definition and selection of competencies (DeSeCo),[4]

3) OECD (2019), "Definition and Selection of Competencies (DeSeCo)," http://www.oecd.org/edu/skills-beyond-school/definitionandselectionofcompetenciesdeseco.htm. (accessed on April 15, 2019)

4) Ibid.

knowledge, skills and competencies are important from a broader social perspective, because of their contributions outside the domain of economics and work. They contribute to increasing individual participation in democratic institutions, social cohesion and justice, and strengthening human rights and autonomy as counterweights to increasing global inequality of opportunities and increasing individual marginalization. The increasingly interconnected and interdependent global society mandates that students are educated to develop habits of the mind embracing tolerance, a commitment to cooperation, an appreciation of our common humanity, and a sense of responsibility. Thus, key elements of global competence includes the following factors (NEA 2010):

① International Awareness: This constitutes the knowledge and understanding of world history, socioeconomic and political systems, and other global events. This awareness includes the understanding that local and national events can have international implications. An individual who is aware of the broader world environment also recognizes that an individual's actions can affect others beyond one's own borders.

② Appreciation of Cultural Diversity: This entails the ability to know, understand, and appreciate people from other cultures along with the capacity to acknowledge other points of view about pressing world issues. Awareness and appreciation of cross-cultural differences, and the willingness to accept those differences, opens doors for opportunities to engage in productive and respectful cross-cultural relations.

③ Proficiency in Foreign Languages: The ability to understand, read, write, and speak in more than one language enhances cross-cultural communication skills. The knowledge of additional languages opens doors to the understanding of other cultures and people who speak those languages.

④ Competitive Skills: The ability to compete globally entails the acquisition of extensive knowledge of international issue. To be able to

compete, students need high-level thinking skills that enhance creativity and innovation. Students who gain a thorough understanding of the economic, social and technological changes taking place across the globe enhance their ability to compete in the worldwide marketplace.

Competency assessment is generally defined as the measurement of an individual's competencies. Measures include a combined test of practical and theoretical knowledge, cognitive skills and attributes utilized to improve performance. In our paper, attributes indicate personal characteristics, traits, motives, directions or ways of thinking that affect an individual's behavior. Thus, competency assessment is the test whether the state of quality is indeed adequately or well qualified, having the superior ability to perform a specific job or role.

In the fields of education, Dreyfus & Dreyfus (2010) introduced nomenclature for the levels of competence in competency development. The four general areas of competency are as follows: meaning competency, relation competency, learning competency and change competency. They first proposed the model in an influential report on their research at the University of California, Berkeley. Afterward UC Berkeley has developed and defined core competencies, and adopted the competency-based human resource management system to develop the appropriate talent for the right jobs, obtaining the best outcomes based on the Dreyfus model. It contains the following six dimensions: *communication and interpersonal skills, client service and liaison with group and constituents, research conduction, organizational and management skills, leadership and ability to coach and develop the work group, and managing change.* As this is well known and often adopted by scholars in competency development we use the Berkeley HR-created competency assessment construct to measure whether our Master students of Korean Economy and Development Cooperation (MKE) had a high or low competency assessment.

The central purpose of the present study is to translate the theory about competency assessment into a measurement scale to facilitate research. By doing so, we are able to assess the effectiveness of higher education programs in order to provide positive career achievements. Several design considerations are important in developing the competency measurement scale. To construct validity, that is the correspondence between the conceptual and operational definitions of competency assessment, is paramount. Another priority is to make uni-dimensionality of the component constructs that made up the scale. A final consideration was parsimony in the sense that the more concise the measurement instrument, the more easily and frequently it could be used.

Given the importance of construct validity, the scale was developed starting with the conceptual dimensions identified mainly in the competency-based human resource management system from UC Berkeley Human Resources. Likert-type items were written for each of the six dimensions. The wording of items initially was based on how various writers had described motivations associated with competency assessment. A focus group of students in the Master of Korean Economy and Development Cooperation (MKE) program convened to discuss about their competency assessment. The twenty-one items were created based on the literature and the input from the focus group. These items were administered to MKE students. Responses were provided on a three-point Likert-scale (ranging from 1=not true to 3=very true).

Ⅲ. Methods: Survey and Confirmatory Factor Analysis

The original competency assessment (hereafter CA) construct includes 21 indicators split across six latent variables as shown in <Table 1>: communication and interpersonal skills, client service and liaison with group and constituents, research conduction, organizational and management skills, leadership and ability coach and develop the work group, managing change.

<Table 1> Characteristics of MKE Program Students

Region (Country)	# Students Enrolled in MKE Program	# Survey Responses	Response Rate
Sub-Saharan Africa	36	16	0.44
CIS (Former USSR)	27	15	0.56
Eastern Europe	4	2	0.50
Latin America	30	23	0.77
Middle East & Northern Africa	31	19	0.61
Northeast Asia	18	13	0.72
South Asia	34	26	0.76
Southeast Asia	85	50	0.58
Total	265	164	0.62

To focus on ODA higher education, we surveyed Master students and alumni in Korean Economy and Development Cooperation (MKE) at Kyung Hee University. According to Choi & Sung (2018), this program is one of 16 degree-granting programs intended for developing country students sponsored by the Korean International Cooperation Agency

(KOICA) under its scholarship program. KOICA, which is a branch of the Republic of Korea's Foreign Ministry, aims to nurture talented students from developing countries and provide professional and systematic knowledge that will play a key role in their home country's development through its Human Resource development program. The MKE program in specific is intended for students from developing countries who seek advanced training in economics and business in preparation for entering or continuing industry or governmental employment. There were 265 unique MSc students and alumni who have enrolled in the MKE program from 2002 to 2015. First, we sent an emailed notice letter informing them about the study and requesting their cooperation in completing a questionnaire. The survey questionnaire was posted on the online google document so that both MKE students and alumni were able to access it at their convenience. The accompanying cover letter outlined the project objectives, indicated the voluntary nature of the study, requested participation, and provided project director contact details for further information needs and clarifications. Our final 'n' was 164 for a response rate of 62% shown in <Table 1>.[5] Again, all students and alumni were reminded of the survey's voluntary nature and of their right not to answer one or more questions, utilized where 1=Not True and 3=Very True. Respondent anonymity was maintained by submitting a survey online. More than half of respondents were from Asia, such as Sri Lanka, Vietnam, Philippines and Bangladesh. Further, reflecting societal trends which suggest the educational underachievement of Asian females, 64 percent of surveyed students were male and 68 percent respondents were currently or formerly employed Government of their countries' civil servants.

5) More detailed descriptive information about MKE students is in Appendix.

<Table 2> Competency Assessment Items by Subscale

Communication and Interpersonal Skills (4 items)	
CA1	I appreciated my ability to convey information and ideas.
CA2	I appreciated my ability to receive and understand information and ideas.
CA3	I appreciated my ability to facilitate group discussion.
CA4	I appreciated my ability to represent the group.
Client Service and Liaison with Group and Constituents (3 items)	
CA5	I appreciated my ability to provide advice and assistance to constituents on more complex issues.
CA6	I appreciated my ability to make representations on behalf of my community and interest group.
CA7	I appreciated my ability to deal effectively with senior officials in government departments of organizations.
Research Conduction (3 items)	
CA8	I appreciated my ability to conduct work-related research activities.
CA9	I appreciated my ability to monitor the situation and inform to the superior.
CA10	I appreciated my ability to research and draft material for speeches; press releases or parliamentary questions.
Organizational and Management Skills (4 items)	
CA11	I appreciated my ability to organize own work.
CA12	I appreciated my ability to actively participate in identifying and meeting personal development needs.
CA13	I appreciated my ability to be open to and act constructively on, personal feedback.
CA14	I appreciated my ability to implement project or resource plans and apply resources to achieve required results.
Leadership and Ability to Coach and Develop the Work Group (3 items)	
CA15	I appreciated my ability to implement principles of equity and non-discrimination in all aspects of work.
CA16	I appreciated my ability to develop and maintain a cooperative work group.
CA17	I appreciated my ability to develop staff competencies.
Managing Change (4 items)	
CA18	I appreciated my ability to identify opportunities for changes and assess the impact of change.
CA19	I appreciated my ability to explain reasons for change and associated implications.
CA20	I appreciated my ability to assist with the implementation of changes, and to assist others in adapting to change.
CA21	I appreciated my ability to handle organizational changes effectively and resiliently.

▪ Dreyfus & Dreyfus (2010)

Descriptive and reliability statistics were computed for individual items and the twenty-one item scale. The descriptive statistics and item-total correlations are presented in <Table 3>. For reader convenience, the first column is our survey's question-order. For the mean value as in the second column, most respondents positively appreciated the MIKE program regarding six dimensions (communication and interpersonal skills, client service and liaison with group and constituents, research conduction, organizational and management skills, leadership and ability to coach and develop the work group and managing change). That is, a majority of students answered 'somewhat true' or 'very true' to the question whether they indeed improve the targeted skill especially during the period of MIKE program. These positive answers are not varied among students as we see the third column. The standard deviations are between 0.522 and 0.683, implying that these values are not big enough to represent heterogeneous answers.[6] However, MIKE students may have different ideas on each indicator in the sense that they generally come from various countries, such as Asia, Middle East, Africa and so on. To check sample homogeneity, we conducted an item-total correlation test to check if any item in the set of tests was inconsistent with the averaged

6) To investigate the potential for selection bias, the likelihood of a student responding to the survey was estimated using a logistic regression model, as a function of several factors expected to be relevant. This model included geographic region of origin, the number of years elapsed since the graduation year, age and gender, GPA, and whether the student received a prize from the MIKE program. Technical details such as model specification and the estimation techniques employed are developed by Klinenbaum & Klein (2010). The table in Appendix reports the odds ratios for each variable and the ratio between the likelihood that someone with a given characteristic would have responded to the survey, versus the likelihood that an otherwise identical individual who lacked this characteristic would have also responded. The only statistically significant factor is the number of years elapsed since the graduation year, with each additional year elapsed reducing the response rate by 19 percent. Moreover, other factors are not significant, implying that selection bias does not represent a serious contaminant of the analyses conducted on the sample of survey respondents.

behavior of the others. Based on inspection of these results as shown in fourth column in <Table 2>, two items (CA13: I appreciated my ability to be open to and act constructively on, personal feedback, CA19: I appreciated my ability to explain reasons for change and associated implications) were dropped from further analysis because they had low variances and were weakly correlated with the overall scale. The item-total correlations for these items ranged from 0.339 to 0.383, well below the average (0.076) for other items. The deletion of two items left nineteen items for the next stage of analysis.

1. Confirmatory Factor Analysis

Factor analysis is a useful tool for investigating variable relationships for complex concepts. It allows researchers to investigate concepts that are not easily measured directly by collapsing a large number of variables into a few interpretable underlying factors. The key concept of factor analysis is that multiple observed variable have similar patterns of responses because they are all associated with a latent variable. There are two types of factor analysis in general, an exploratory factor analysis and a confirmatory factor analysis. The exploratory factor analysis aims at exploring the relationships among the variables and does not have a priori fixed number of factors. We may have a general idea about what we think, but we have not yet settled on a specific hypothesis. Unlike exploratory factor analysis, confirmatory factor analysis (CFA) assumes that we enter the factor analysis with a firm idea about the number of factors we encounter and about which variables most likely load onto each factor. Our expectations in confirmatory factor analysis are based on published findings of a factor analysis. Statistical tests are also applied to assess whether the substantive model is confirmed. The scale construction problem addressed in the present study is well suited to confirmatory

factor analysis.

The general expression for the confirmatory factor model is

$$X = \Lambda\xi + \delta$$

Where X is a vector of observed variables; ξ is a vector of latent variables; Λ is a matrix of loadings that gives the magnitude of the effects of ξ on X; δ is a vector of measurement errors.

CFA is hypothesis driven and helps test hypotheses about a particular factor structure (Brown 2006). According to Coursey & Pandey (2007), standard Maximum Likelihood Estimation (MLE) in CFA assumes a sample covariance matrix from a multivariate normal distribution. Since our sample is ordinal based on discrete, non-continuous distribution, it is not suitable to the standard ML estimation.[7] The alternative approach is to generate the correlations between two ordinal variables and apply weighted least squares (WLS) to their inverted asymptotic covariance matrix, suggested by Joreskog (2001). However, the WLS estimation still has the problem of unclear necessary sample size in the sense that it varies on the number of categories on each indicator, dimension and so on.[8] To further improve our model, we used a Diagonally Weighted Least Squares (DWLS) procedure. This technique is useful for ordinal-level variables. Recent simulations, including the study from Flora & Curran (2004), have found that DWLS performs well at far smaller sample sizes, such as 100 to 200. Moreover, the DWLS procedure produces a more accurate result if the model has 10 to 20 indicators and

7) Flora & Curran (2004), and Muthan & Kaplan (1985) explain that the resulting chi-square measures are inflated, parameter estimates and undervalued, and standard errors are biased downward.

8) Flora & Curran (2004) explain that WLS is likely to inflate chi-square and negatively bias standard error estimates without a sufficient sample size (above 1,500). They also found that WLS performed poorly in sample sizes below 1,000 for a 10 indicator model.

minimum 'n' of 100 to 200 (Brown 2006, 389-413). Others suggest a "sample size of 150 for models with three or more indicators per factor" (Anderson & Gerbing 1984, 171). In our analysis, we estimated the CFA with the DWLS approach using LISREL 9.1 (Albright & Park 2009).

We first checked whether or not our initial measurement was an acceptable fit. Our initial model (M_0) specification included ① six dimensions with each dimension correlated with the other dimensions; ② nineteen indicators, each loading only on one latent dimension; and ③ uncorrelated error terms. The χ^2 is 1988.6 with 210 degrees of freedom (p=0.00), implying a poor model fit. Given disconfirmation of the initial model, we estimated an alternative model (M_1). We discarded indicators associated with multiple dimensions since this violated our goal of having each observed indicator loaded only on a single latent factor. The modification indices showed that since CA 6, 9, 14 loaded on another dimension *(Client Service and Liaison with Group and Constituents to Communication and Interpersonal skills, Research Conduction to Leadership and Ability to Coach and Develop the Work Group, Organizational and Management Skills to Research Conduction),* they were deleted. Our alternative MLE model (M_1) had sixteen indicators.[9] After removing the three variables, the correlation between two latent variables *(Communication and Interpersonal Skills and Client Service and Liaison with Group and Constituents, Organizational and Management Skills and Leadership and Ability to Coach and Develop the Work Group)* exceeded 0.90. We combined both measures, respectively. With four factors and sixteen indicators, we ran the final CFA.

Our final MLE model (M_2) had four latent variables: Research Conduction, Managing Change, a combined Communication and Interpersonal

9) We omit the result of the previous two MLE models because they performed poorly based on our results.

Skills/Client Service and Liaison with Group and Constituents, a combined Organizational and Management Skills/ Leadership and Ability to Coach and Develop the Work Group. <Table 3> indicates our DWLS estimates, t-values, and R-squared statistics for our DWLS model (M_2). The coefficients explain how well they measure the latent factor. That is, the specific ability indicated by each coefficient supports more the associated skill (one of six dimensions) as the coefficient value is greater. The coefficient factor loadings range from 0.564 to 0.737. This implies that the ability regarding first dimension (communication and interpersonal skills/clients service and liaison with group and constituents) increases by 0.687, 0.564, 0.714, 0.566, 0.702 and 0.579 when respondents appreciated their ability, to convey information and ideas (CA1), to receive and understand information and ideas (CA2), to facilitate group discussion (CA3), to represent the group (CA4), to provide advice and assistance to constituents on more complex issue (CA5) and to deal effectively with senior officials in government departments of organizations (CA7), by one unit, respectively.[10] For research conduction as the second dimension, this ability increased by 0.683 and 0.589, when MIKE students and alumni appreciated their ability, to conduct work-related research activities (CA8), and to research and draft material for speeches (CA10), by one unit, respectively. For the third dimension (organizational and management skills/leadership and develop the work group), these skills increase by 0.600, 0.680, 0.737 and 0.717, when both students and alumni appreciated their ability, to organize own work (CA11), to actively participate in identifying and meeting personal development needs (CA12), to develop and maintain a cooperative work group (CA16) and to develop staff competencies (CA17), by one unit, respectively. For final dimension (managing change), the

10) We interpret the unit measure to indicate confidence level of MIKE students in the targeted dimension.

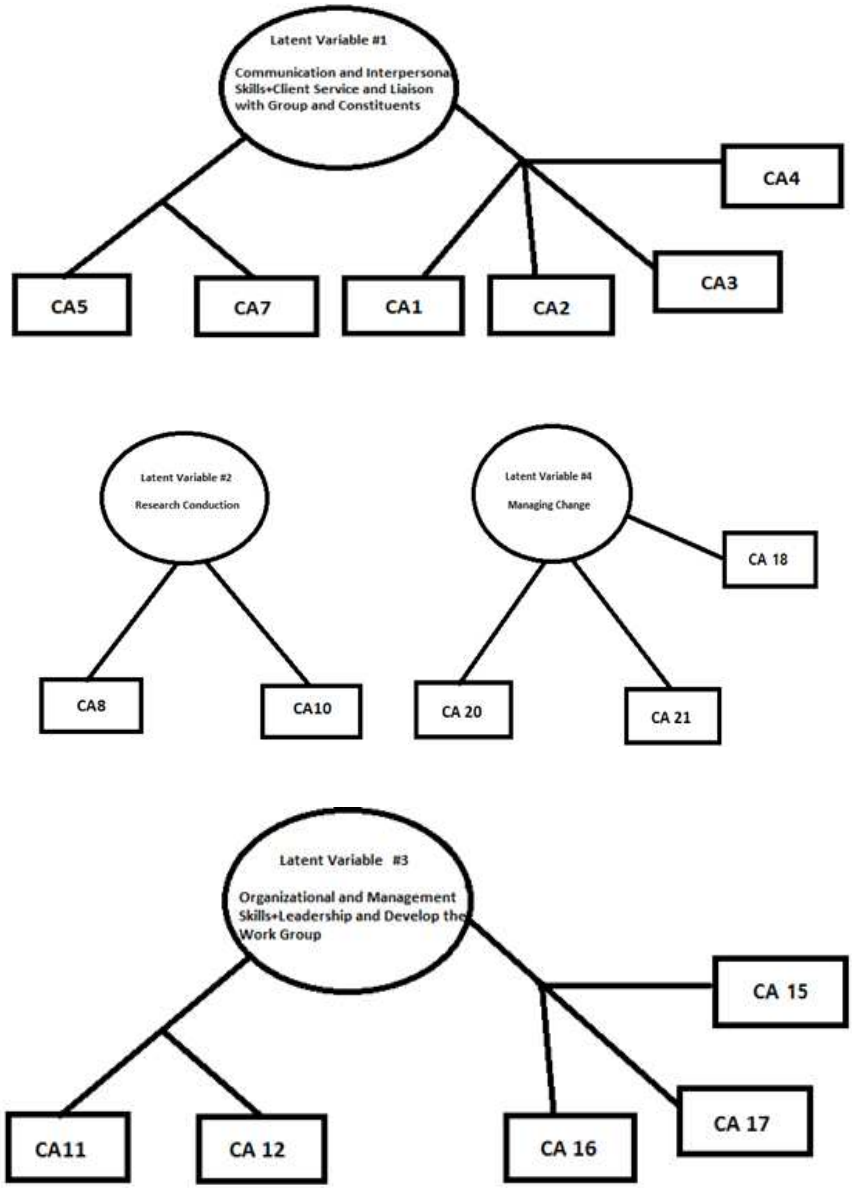
skill of managing change increases by 0.623, 0.707 and 0.625, when both MKE students and alumni appreciated their ability, to identify opportunities for changes and assess the impact of change (CA18), to assist with the implementation of changes, and to assist others in adapting to change (CA20) and to handle organizational changes effectively and resiliently (CA21), by one unit, respectively. These results imply that our MKE students become to have more strong communication and interpersonal skills, as well as the client service, especially when they appreciate their ability to convey information and ideas (0.687), to facilitate group discussion (0.714) and to provide advice and assistance to constituents on complex issue (0.702), than when they appreciate their ability, to receive and understand information and ideas (0.564), to represent the group (0.566), to deal effectively with senior officials (0.579). Their research conduction ability improves when students are more confident about conducting work-related research activities (0.683) than confident about researching and drafting material for speeches (0.589). Our students also have superior organizational management and leadership skill with a great ability, to actively participate in identifying personal development needs (0.680), to implement principles of equity and non-discrimination in all aspects of work (0.727), to develop and maintain a cooperative work group (0.737) and to develop staff competencies (0.717), rather than to organize own work (0.600). Moreover, MKE students are able to manage some changes more flexibly with excellent ability, to assist with the implementation of changes and to assist others in adapting to change (0.707), rather than to identify opportunities for changes and assess the impact of change (0.623), and to handle organizational changes effectively and resiliently (0.625). All standard errors are significant. This implies that our observed indicators are valid measures of the dimensions. The t-values of the parameter estimates are significant at the 0.05 level. The R^2 is a measure of

reliability which indicates how consistently the observed variable measures the latent dimension. The R^2 range is 0.38 to 0.71, implying that reliabilities are variable. Our goodness of fit (0.91) and adjusted goodness of fit (0.92) were an acceptable fit of 0.90.

<Table 3> Descriptive Statistics

	Mean	Standard Deviation	Item-Total Correlation
Communication and Interpersonal Skills			
CA1	2.595	0.584	0.651
CA2	2.436	0.522	0.672
CA3	2.626	0.599	0.741
CA4	2.626	0.599	0.666
Client Service and Liaison with Group and Constituents			
CA5	2.736	0.597	0.712
CA6	2.675	0.607	0.620
CA7	2.626	0.658	0.631
Research Conduction			
CA8	2.638	0.637	0.646
CA9	2.638	0.617	0.718
CA10	2.761	0.683	0.624
Organizational and Management Skills			
CA11	2.515	0.632	0.677
CA12	2.607	0.633	0.729
CA13	2.589	0.626	0.383
CA14	2.650	0.643	0.741
Leadership and Ability to Coach and Develop the Work Group			
CA15	2.497	0.571	0.628
CA16	2.479	0.570	0.658
CA17	2.626	0.629	0.700
Managing Change			
CA18	2.650	0.594	0.684
CA19	2.638	0.607	0.339
CA20	2.620	0.621	0.730
CA21	2.693	0.660	0.705

<Figure 1> Final Confirmatory Factor Analysis Model for Competency Assessment



V. Discussions

We found that UC Berkeley defined six latent competency dimensions (communication and interpersonal skills, client service and liaison with group and constituents, research conduction, organizational and management skills, leadership and ability to coach and develop the work group, managing change) are reduced to four dimensions: ① a combined communication and interpersonal skills & client service and liaison with group and constituents, ② research conduction, ③ a combined organizational and management skills & leadership and ability to coach and develop the work group, ④ managing change in this study. This implies that MIKE students are likely to treat their communication skill identical with contacting ability among groups. Moreover, their management skills are equally considered as leadership ability to MIKE students. According to the result of factor analysis, students tend to be more confident about communication and group contacting especially when appreciating their ability of conveying information (0.687), helping group discussion (0.714) and advising assistance on complex issues (0.702). Students also think that they are good at research conduction when enjoying their ability to conduct work-related research activities (0.683). They are positive to their management and leadership skills when appreciating their ability to implement principles of equity and non-discrimination in all aspects of work (0.727) and to develop a cooperative work (0.737) and staff competencies (0.717). Finally, they tend to adjust managing changes when they appreciated their ability to assist others in adapting to change rather than any other situations (0.707). The factor analysis results show that some specific ability indicated by competency assessment framework supports the associated skill better because of student perception. For example, our students may have better communication and interpersonal skills when they learn more about facilitating group discussion and

providing advice and assistance on more complex issues rather than developing other abilities because they perceive that these issues are highly related with the communication and interpersonal skills. Furthermore, we interestingly found that all three competency assessment skills in leadership and ability to develop the work group (CA15, CA16 and CA17) have high correlation to increase leadership skills. This implies that MKE students are very positive to all three abilities, which can increase their leadership skills. This result is quite intuitive in the sense that most MKE students were selectively working for governments and influential institutions in their countries so they must be highly qualified as a leader. On the other hand, they have relatively low coefficient values especially in communication and research conduct skills, implying that they are lack of representing their ideas and/or accepting other ideas, and conducting research activities. This is also intuitively understandable if we consider the unique characteristics of MKE students that most students are Asian who are likely to be shy in general, especially when presenting their ideas and asking any questions. Moreover, they may have a difficulty to accept other opinions and to adjust changes because they are likely to have a high-class background in their country, being treated as an arbitrary figure.

This study has some research limitation although it provides an interesting result of competency assessment construction through an empirical analysis. Our result may not be used in general since the data we used in this study is limited to MKE students at Kyung Hee University. Thus our result may be only applicable to restricted students who have similar backgrounds with the MKE students. It would be an interesting future research project if we apply our empirical model to a more general data set and compare the result to ours.

V. Concluding Remarks

According to the UN's My World Survey, education was voted as the issue that mattered most by 6.5 out of 9.7 million voters. UNESCO has also shown the importance of education for achieving non-education development goals. Although significant resources are devoted to funding on international training and education programs, it is hard to evaluate their effectiveness of the donor support. This is because educational outcomes are profoundly influenced by a range of critical and hardly measurable factors, such as the nature of the curriculum, the effectiveness of training, the appropriateness of learning materials, the mentoring, and so on. To solve this problem, we introduce a factor analysis method to describe relationship between observed and unobserved (unmeasurable) factors. By doing so, we are able to analyze competency assessment for both students and alumni in the international cooperation program (MKE program) at Kyung Hee University.

This study provides an interesting result that hardly measurable competency can be estimated based on the confirmatory factor analysis. Moreover, we are able to split the overall competency factor into four different types of dimension (initially six dimensions) which will find a way to analyze strength and weakness of specific higher education ODA program in terms of competency dimensions. This also implies that donor countries need to invest their resources efficiently to ensure that their students' competency profiles align with their ultimate goals. By putting competency assessment processes in place, donor countries are able to analyze critical competencies and take steps to address fields that need more development. In the long run, the analysis of competency assessment will be helpful to address the changing context and the multiple actors involved for the development of any higher education ODA programs.

| Appendix |

MKE Program Population Characteristics

Country/ Region	N	Ave. Year of Birth	Ave. Year of Graduation	Proportion of Female	# Survey Responses	Response Rate
Sub-Saharan Africa	34	1974.9	2009.8	0.15	16	0.47
CIS	25	1980.4	2008.3	0.44	15	0.60
Easter Europe	4	1976.5	2006.0	0.25	2	0.50
Latin America	30	1921.1	2009.3	0.53	22	0.73
MENA	20	1977.7	2010.2	0.30	15	0.75
NE. Asia	18	1973.4	2006.6	0.61	13	0.72
S. Asia	42	1972.3	2008.1	0.07	30	0.71
SE. Asia	85	1974.2	2006.7	0.47	50	0.59
South Asia	8	1973.8	2008.0	0.13	4	0.50
Total	258	1968.7	2008.6	0.36	164	0.63

▪ Choi & Sung (2018)

Logistic Model Estimates for Sample Selection

Covariates	Odd Ratio
Sub-Saharan Africa	0.33
CIS/Former USSR	0.84
Eastern Europe	0.76
Latin America	1.68
Middle East/N. Africa	0.89
Northeast Asia	1.58
South Asia	1.20
Distance from Korea(km)	1.00
Per Capita Income	1.00
Internet Users	1.00
Years Since Graduation	0.80***
Age Over 25	1.02
Female	0.67
Number of Credits	1.01
GPA	1.96
Awarded Prize from MKE	1.25
N	258
Chi-Squared LR	29.88
Pseudo R-Squared	0.09

▪ *p<0.05; **p<0.01; ***p<0.001, Southeast Asia is the reference category.

▪ Choi & Sung (2018)

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| 국문초록 |

역량 분석:
한국의 고등교육에 대한 정부 개발 원조

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이 연구는 확인요인분석을 바탕으로 측정하기 어려운 역량을 추정할 수 있는 실증적 체계를 제공한다. 전반적인 역량 요소를 4가지 유형의 차원(처음에는 6가지 차원에서 시작 및 분석)으로 나눌 수 있는데, 이는 역량 차원에서 특정 고등교육기관 공적개발원조(ODA) 프로그램의 보다 구체적인 강점과 약점을 분석할 수 있는 방법을 찾아준다. 이와 같은 방법론과 경희대학교의 한국 경제 및 개발협력 석사과정(MKE, Masters in Korean Economy and Development Cooperation, Kyung Hee University) 프로그램 데이터를 이용하여 실제 프로그램에 참여한 학생들의 역량 평가를 위한 실증적 틀을 제공해 준다. 이러한 분석 결과는 원조 국가들이 학생들의 역량 프로필을 그들의 궁극적인 목표에 부합하도록 자원을 효율적으로 투자하는 데 도움을 줄 수 있으며, 더 나아가 긍정적인 직업 성취의 방향과 대학원생을 위한 더 나은 직업 기회를 제공할 수 있도록 해준다. 따라서 역량 평가 프로세스를 제정함으로써 원조 국가는 핵심 역량을 분석하고 더 많은 개발이 필요한 분야를 찾아낼 수 있다. 이는 장기적으로 역량 평가 분석이 고등교육 ODA 프로그램의 개발과 관련되어 변화하는 맥락과 다양한 문제점들을 해결하는 데 도움이 될 것으로 보인다.

▪ 주제어: 공적개발원조, 확인요인분석, 고등교육, 역량 분석, 최대우도추정