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# WHAT DRIVES THE FORMATION OF "VALUABLE" ACADEME-INDUSTRY PARTNERSHIP: THE CASE OF HEIS AND COMPANIES IN THE CALABARZON

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***Abstract:*** *"Valuable" academe-industry (A-I) partnerships are those that would ensure new knowledge and innovation from the academe. They are shared with industry and together produce benefits that will be felt and utilized by people from all walks of life. The study intends to obtain modes of existing A-I interaction in CALABARZON (Cavite, Laguna, Batangas, Rizal and Quezon) and the factors that would drive formation of valuable partnership involving 873 respondents from the academe and industry sectors. Simultaneous relationships between and among variables were examined using Structural Equation Modeling (SEM). Results revealed that academe-industry interactions are limited to course requirements. Additionally, strongly indicated is the significant role of the Government in the attainment of community development which also confirms the Triple Helix concept. These suggest the need to strengthen academe-industry partnership through government policies and programs for economic growth and community development. Factors that drive the formation of valuable A-I partnership are congruent goal, structure, process and shared vision of social change within the partnership, sustainable partnership and strong support of government and non-government agencies.*

***Keywords:*** *Collaboration, Social Change, Development, Partnership*

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## Introduction

Historically, the concept of Triple Helix of university-industry-government stated in 1990s is a shift from a dominating industry-government dyad in the Industrial Society to a growing triadic relationship between university-industry-government in the Knowledge Society. Over the last two decades, the concept of Triple Helix Systems of innovation (Ranga and Etzkowitz, 2013)

was recently introduced that synthesizes the key features of Triple Helix interactions into an 'innovation system' format which led to the growing prominence of universities among innovation institutions. Since 1990s, regional development has gained recognition as most appropriate for sustaining innovation learning economies. Strong government support strengthens the university link with the society especially the industry. For example, the US Federal Government played an important role in developing Silicon Valley contributing significantly to the country's economy. In the 1930s, Frederick Terman, a Stanford engineering professor, founded the Stanford Industrial Park to cross-fertilize research between Stanford and businesses (Idowu, 2013). Then in 1971, the name Silicon Valley was used.

***"Valuable" Academe-Industry Partnership***

New knowledge, innovations, discoveries generated from the University are transferred to the industry for development needed for industrialization and economic growth. However, the benefits that can be derived from such innovation are yet to be felt by the poor before our country become really progressive (Rodriguez, 2011). Addressing consumer demands and high technology utilization are key factors for national development. Thus, the present study, intends to identify factors that would drive the formation of "valuable" academe-industry partnership. "Valuable" academe-industry partnerships are those that would ensure the new knowledge and innovation from the academe and are shared with industry, produce benefits that are felt and utilized by people from all walks of life.

***Academe-Industry Partnership in the Philippines***

In 2014, Vea describes the experiences of local and foreign schools in A-I collaboration. The school's concerns transfer knowledge to industry through its graduates; imbues with the requisite understanding, knowledge, skills and values to be able to work in industry. Such transfer occurs during the course of the school's performance of its mission. In the industry-academe, a linkage activity which involves undergraduate students are as follows: (1) on-the-job training (OJT); (2) summer student apprenticeships; (3) plant visits; (4) industry scholarship grants to students; (5) career talks job fairs; (6) student leadership camps; and (7) industry-sponsored design contests. With reference to some linkage activities involving senior-year and graduate students along with faculty members, are as follows:(1) industry technical seminars for academics; (2) academe technical seminars for industry people; and (3) fora to share information on R&D needs and capabilities. The areas with issues on A-I linkages activities include (1) Joint or collaborative research; (2) Sponsored or commissioned research; (3) Technology licensing of the school's intellectual property rights; and (4) Creation of spin-off companies by university faculty, researchers or students.

The Philippines' experience showed that the academe has preference for spin-offs over technology licensing because of the lack of companies that have the capabilities to commercialize upstream technologies from the universities, except for Japan and Korea. Some of the hindering factors in the formation of spin-offs according to Vea were: (1) Lack of early-stage angel investor and venture capital; (2) Lack of sophisticated lead-users in the domestic economy to serve as customers; (3) Lack of entrepreneurial drive and business skills among university faculty and students; (4) Lack of models and mentors; and (5) Fear of failure as a cultural trait.

In 2000, the University of the Philippines (UP) undertook a big leap to establish dynamically linkage with industry. This followed the success of international universities such as Stanford University's Silicon Valley, Massachusetts Institute of Technology's Route 128, Tsukuba University's Science City and the Indian Institute of Science, Information Technology and

Management's Bangalore. The UP utilized industry-academe partnership to maximize resource and wealth generation and bolster academic and research programs. The partnership was formed with the Ayala Foundation, a leading conglomerate in the Philippines that established the Science and Technology Park (STP) in the university's idle lands (UP- Ayala Foundation Technology Business Incubator. TBI. A8, B8. UP-Ayala Technohub. THB. G2, G3, H2, H3, H4, I3, I4).

In general, the present study intends to contribute to the better understanding of "valuable" academe-industry partnership through the modes of academe-industry interactions and explain them in the case of private (Higher Education Institutions) HEIs in the CALABARZON.

**Research Problem and Hypotheses**

Addressing the research gaps, the study focuses on the academe- industry linkage activities in CALABARZON towards social development. Thus, the study intends to identify factors that would drive the formation of "valuable" academe-industry partnership. Specifically, the study tested the hypothesized model that considers three factors, the Partnership basic components, the academe-industry partnership sustainability and maintenance and the role of the Government and Non-Government agencies in the successful formation of valuable partnerships, and the desired social change as dependent variable (Figure 1).

***Academe-Industry Partnership Basic Components***

The basic components of partnerships such as goal, structure, process and shared vision are found in the Memorandum of Agreement (MOA) between the partners. It has been said that goals, structure and process within the partnership need to be congruent with the shared vision to be successful. However, negative results happen when these are not compatible. The case of the American Institute for Medical and Biological Engineering (Transfer Meeting Summary, 2014) reported that the existing obstacles in the area of technology transfer usually begins in university laboratories, where research projects are executed, and discoveries are made. The resulting innovations are first sent to the university technology transfer office, then the patent protection offices, and ultimately to the corporate sector for development into products benefiting patients. However, basic differences exist between the missions of the research-oriented university faculty and the profit-driven corporations. As a result, these differences create obstacles, conflicting expectations, and misunderstanding, which may lead to the decreased commercialization of ideas or even stop these ideas from reaching the market. Industry expressed their desire for University representatives to appreciate their strategic financial plan and corporate missions. A consultant is needed. The adoption of a systematic approach to technology transfer was identified as best practice that could form better relationships.

The key factors for the success of academe-industry partnership relate to organizational and individual contexts, knowledge attributes and relational aspects (Schofield, 2013). It is important that by explicitly recognizing each partner's varying motivations for forming partnerships, compatible goals and expectations are needed to ensure that the relationship operates at a level congruent with the mission-vision.

According to Bernarte (2014), the higher education institutions in the Philippines are greatly involved in formal, mostly continuing and long-term academe-industry partnership in the fields of business, ICT, education and medical/health science. However, the HEIs shoulder mostly the funding for such partnership. The benefits of A-I partnership are limited to areas of establishment of linkages for internship or on the job training of the students that may lead to job placements of their graduates. And the problems encountered by HEIs on their A-I partnership engagement primarily center on the organizational, administrative and management aspects of partnership.

H1: The more congruent the goal, structure and process of partnership organization with the shared vision of economic growth and inclusive growth, the more valuable and stronger the Academe-Industry.

***Sustainability and Maintenance of Academe-Industry Partnership***

The study of Jadranka Švarc (2014) noted perspectives of developing Triple Helix systems in the Western Balkan countries (WBCs) based on the level of maturity and performance of the main components of their innovation systems (research potential, R&D and non-R&D-based innovation, and innovation governance) despite their current problem due to the global economic restructuring that requires a novel type of industry based on R&D-driven innovation and advanced technologies, where universities could have a leading role.

A framework for industry-university partnership demonstrates how sustainable manufacturing can be implemented. Governments must support collaborative work with industrial entrepreneurs and academia to aid the introduction of technologies that are significantly favorable to the interests of humanity and to future generations. There is a possibility that the technology might not yet exist in an industrial form and it may be risky to speculate early return to the business (Kornfelda and Karaa, 2015) and so support from government and non-government is a must to sustainable valuable partnership.

H2: The better the Academe-Industry Partnership is maintained and sustained, the stronger the partnership will be and the higher the chance of realizing the shared vision.

***Roles of Government and Non-Government Agencies***

At the core of successful collaborative partnership is the role of the Government and the private sector in providing opportunities and support in sustaining and maintaining the operation of the partnership toward attaining its shared vision. The Commission on Higher Education (CHED) and Department of Science Technology (DOST) scholarship programs contribute to the professional development of trainees and professionals as well as developing a research culture so as able to enable practitioners to engage in critical disclosure and dialogue as they linked theory and their own practice. The academe-industry partnerships will enable the country's higher education institutions to be updated with the latest trends and keep up with the demands of both the private and public sectors (CHED K to 12 transition, PMU, 2017). The CHED provides financial support to college teaching and non-teaching personnel to conduct immersion work, commissioned research, and extension activities with CHED-approved partners nationwide.

The study of Eom and Lee (2009) reported that the size of the firm and the R&D intensity are not significant determinants of University-Industry-Government (IUG), while the participation in the national R&D projects is significant in both modes of cooperation. Additionally, the

cost-sharing motives are more important for the industry-university mode, while the risk-sharing is more important for the industry-government.

In Japan, the Kosen College of Technology was first founded in 1962 in response to a strong demand from the industrial world for engineers to support Japan through its period of high economic growth starting in the mid 50's, and cope with further development of science and technology (Harden, 2014). The use of donations as the preferred form of industrial support is a product of Japanese Law; faculty members use these donations to conduct research work in their laboratories.

The World Bank policy brief on Promoting University-Industry Collaboration in Developing Countries noted the challenge for governments to select policy instruments that best serve national needs, in consultation with key stakeholders (Guimón, 2013). The policy brief offers a review of the main policy options available on the success of specific policy programs to support university-industry partnership. In the light of limited budgets, governments and firms must make choices and universities to make complex choices between collaboration in education or in research or between university collaboration with established firms or new firms for spin-offs and incubators or providing grants or developing science parks.

H3: The higher the support and opportunities provided by the Government and the Non-Government agencies, the more the partnership is maintained and sustained.

### *Social Change toward Community Development and Inclusive Growth*

There is an existing academe interaction with its community, the community extension service. Every educational institution has three basic functions and one of them is the community extension service. Likewise, the industry has also an existing interaction with the community and that is the Corporate Social Responsibility (CSR) defined by the World Business Council for Sustainable Development (Baker, as cited in Holme and Watts, 2005) as the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.

According to Ahmadabadi (2016), an Entrepreneurial University is relevant to the wider community serving many economic, societal, environmental and entrepreneurial roles. Selective community-based strategies in education, research and outreach in universities such as Technopreneurship with collaboration of Universities and Community Development agencies would produce desired economic and inclusive growth.

H4: The higher the support and opportunity provided by the Government and the private sector, the greater the social change for economic and inclusive growth.

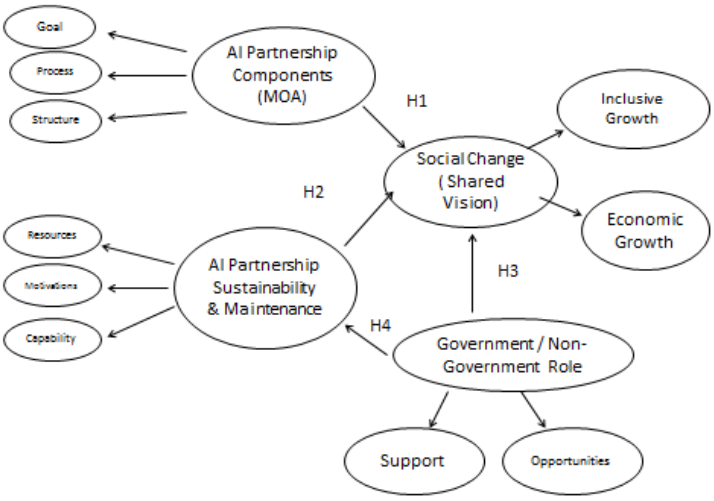



**Figure 1: Hypothesized Model**

## Method

### *Subjects and Study Sites*

The Philippines is composed of 17 regions and CALABARZON is one of them. This region got its name from its five provinces. Cavite, Laguna, Batangas, Rizal and Quezon. Eight schools from these provinces participated in the study. Each participating school gathered data from their neighboring schools and industry partners. The study included for the academe only the deans, faculty members and other school officials involved in partnership and community extension while for the industry sector only the managers.

The 415 respondents from the academe were from 96 Higher Education Institutions in the CALABARZON, while the 462 respondents from the industry sector were from the 79 companies in the same region. The five provinces that participated in the survey were Cavite, Laguna, Batangas, Rizal and Quezon.

### *Instrumentation and Data Collection*

A six-part questionnaire was fielded to the respondents. The first two parts are about the demographic profile of the students; the third part deals with the research and technology involvement; the fourth part is about their academe-industry partnerships; the fifth part is the CHED status and ISO certification. The sixth part consisted of the four variables investigated which are Academe-industry basic components (Vision-Mission, programs and policies), the academe-partnership sustainability and maintenance, the role of the government and non-government agencies and the social change for community development and economic growth. Two sets of questionnaires were developed, one for each group, the academe and industry. After the questionnaires had been tested for reliability and validity, they were fielded in the months of August to December. A total of 1,000 questionnaires were fielded in the five provinces in CALABARZON. The data sets from the different private HEIs in this region were analyzed to obtain modes of AI interactions. Additionally, Structural Equation Modeling Analysis was used to explore factors that would favor the formation of valuable A-I partnerships which could serve as a Model of A-I partnership not only for CALABARZON but for other regions as well. Problems and concerns regarding formation of valuable partnerships were included.

The results were validated during the two Focus Group Discussions (FGDs) conducted in Laguna and Quezon which were participated by the two groups, while the crafting of policy recommendations was done during a multi-sectoral forum attended by representatives from CHED, DTI, DOST, presidents of the 8 schools (research team) and the business sector.

**Data Analysis**

Data were analyzed using frequency, percentage and factor analysis of the Statistical Package for Social Sciences (SPSS v 17). To determine the underlying dimensions of Academe-Industry basic components, sustainability and maintenance, role of government and non- government agencies and the social change simultaneous relationships between and among latent and manifest variables, structural equation modeling was employed using AMOS 19. Maximum likelihood estimation was also employed to determine parameters and fit indices that adjudge model fit and parsimony. Decision rule used to determine the acceptability of the model includes CMIN/df between 2 to 3, RMSEA $\leq 0.08$, and NFI, CFI and GFI $\geq 0.80$ (Ferron and Hess, 2007*).*

**Results**

Profile of respondents from academe and industry

**Table 1: Number of Respondents from The Academe and Industry Sectors of Each Province of CALABARZON**

| Province | Academe | | Industry | |
|---|---|---|---|---|
| | N | % | N | % |
| Cavite | 42 | 10.1 | 92 | 19.9 |
| Laguna | 212 | 51.1 | 196 | 42.4 |
| Rizal | 54 | 13 | 60 | 13 |
| Quezon | 60 | 14.5 | 46 | 10 |
| Batangas | 47 | 11.3 | 68 | 14.7 |
| **TOTAL** | **415** | **100** | **462** | **100** |

***Academic Sector***

Majority of the respondents from the academe were 40 years old and above (43.4%), female (56.6%), with length of service of 2 years and below (39.3%) and working in Laguna (51.1%).

Majority of the schools that participated in the survey were public (50.1%), having population of less than 1,000 (29.9%), existing for the last 16 years and above (65.1%) and offering Education (71.1%), Business (64.6%), IT (61.7%) and HRM (57.7%).

***Industry Sector***

Majority of the respondents from the industry were 21-35 years old (46.8%), female (56.9%), less than 10 years in service (42.6%), working in local companies (73.8%) in Laguna (42.4%).

Majority of the companies in the study have below 100 employees (39.4%), existing for the last 15 years and above (62.1%), with line of food business (24.5%) and service (22.7%) and ISO certified (54.3%).

Profile of respondents in terms of the following:

***Research and Technology Involvement***

Majority of the schools of the respondents from the academe were engaged in research (92.5%) while the companies of the respondents from the Industry are not (53.3%). The number of faculty/staffs engaged in research was less than 10 (47%) for the academe, while for the industry less than 5 (15.8%).

Majority of the schools of respondents from the academe were involved in technology (69.6%), in particular technology development (53.5%), while companies of respondents from the industry are involved in technology (80.1%), in technology development (43.9%) too.

***Academe-Industry Partnership***

Majority of the schools of respondents from the academe have A-I partnership (92.3%), while companies of respondents from the industry have established A-I partnership (66.2%). The schools have more A-I linkages (6 and above, 48.9%) than companies (3-5, 23.6%). The longest A-I for the schools in the study is mostly 9 years and above (34.2%) and for the companies also 9 years and above (23%).

***Academe – Industry Modes of Interactions***

**Table 2: Modes Of Interaction**

| Modes of Interaction | Modes of interaction your institution is engaged with at present | | | | Modes of interaction that will result to social change/ improve way of life | | | |
|---|---|---|---|---|---|---|---|---|
| | Academe | | Industry | | Academe | | Industry | |
| | N | Rank | N | Rank | N | Rank | N | Rank |
| **On – Job Training** | **376** | **1** | **319** | **1** | **150** | **1** | **93** | **1** |
| Apprenticeship | 109 | 10 | 52 | 7 | 4 | | 8 | 6 |
| Plant Visit | **258** | **2** | 142 | 4 | **5** | **3** | **23** | **2** |
| Industry Scholarship Grant | 92 | 9 | **32** | **2** | **5** | **3** | 12 | 4 |
| Industry-Related Seminar | **200** | **3** | 98 | 5 | 3 | 4 | 8 | 6 |
| Joint Collaborative Research | 145 | 5 | 32 | 6 | **11** | **2** | 10 | 5 |
| Commissioned Research | 82 | 6 | 30 | 8 | 1 | | 2 | 7 |
| Technology Licensing | 46 | 11 | **9** | **3** | 4 | 4 | 1 | 8 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Career Talk / Job Fair | 200 | 4 | 84 | 9 | 2 | 5 | **15** | **3** |
| Student Leadership | 98 | 7 | 13 | 11 | 2 | 5 | | |
| Industry Sponsored | 83 | 8 | 25 | 10 | | | | |

Table 2 shows the top three modes of interactions existing at present and the top three modes of interaction that will have an impact on social change. The most common modes of interactions according to the respondents from the Academe are On-the-Job Training (OJT), Plant Visit and Industry Related Seminar, while for the respondents from the Industry sector are OJT, Industry Scholarship Grant and Career Talk. However, the top three modes of interaction that will have impact on community development (social change) are OJT, Plant Visit and Collaborative Research for the Academe Group while OJT, Plant Visit and Career Talk for the Industry Group. In addition, other modes of interaction that will have impact on community are Industry Immersion and CSR Collaboration.

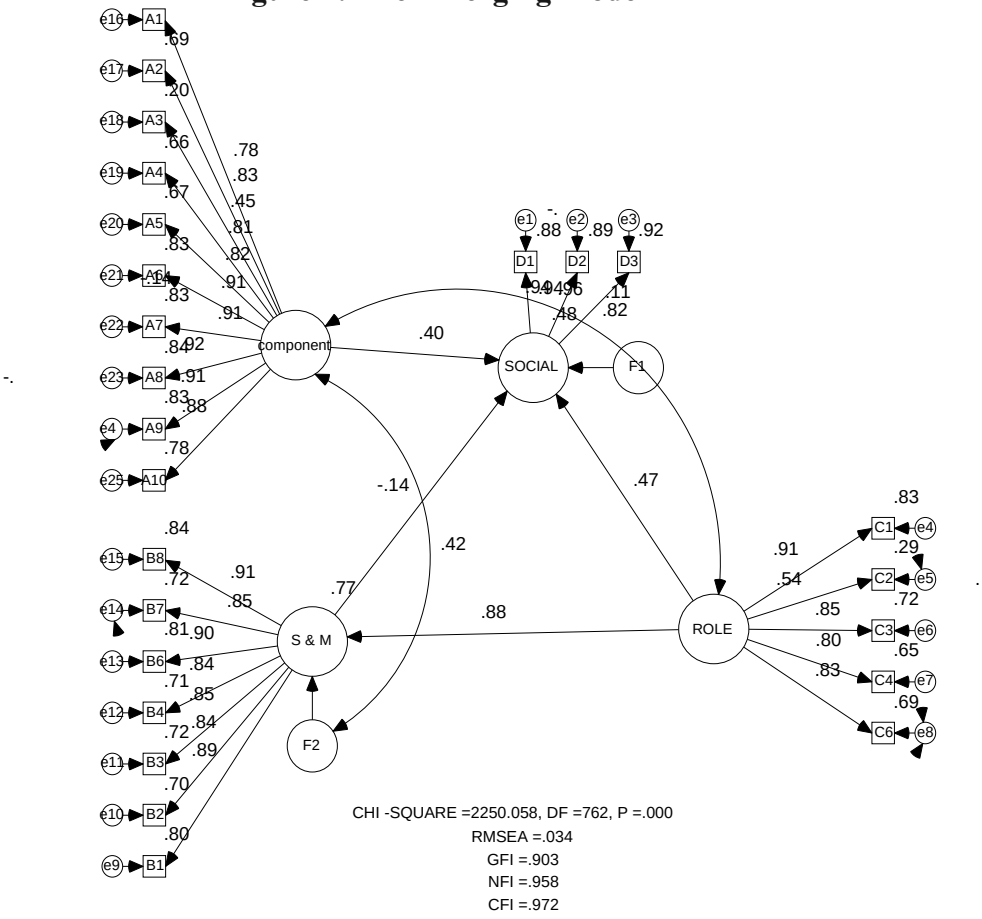
Factors that would favor the formation of valuable A-I partnerships

Exploratory Factor analysis of the variables in the sudy (Table 3) shows one component extracted for each of the variables. The component correlation matrices are very high ranging from 0.820 to 0.970.

**Table 3: Exploratory Factor Analysis**

| Factors | % Variance | Reliability |
|---|---|---|
| Partnership Basic Components (goals communication, management needs and activities) | 78.370 | 0.969 |
| Sustainability and Maintenance (resources, training, network, awards, image) | 83.126 | 0.971 |
| Government and Non-Government Roles (industry activity, scholarship, funding and CSR) | 82.807 | 0.958 |
| Social Change (economic growth, inclusive growth) | 92.936 | 0.962 |

**Figure 2: The Emerging Model**




The use of the structural equation modeling supported all the four hypotheses. Among the latent exogenous variables, the A-I Basic Components (H1) proved to have positive effect (β 1=0.4); likewise the Role of Government and Non-Government agencies (H3) proved to have positive effect (β3=0.47) on Social Change, while A-I Sustainability maintenance (H2) proved to have a negative effect (β 2= -0.14) on Social Change, however, the Role of the Government and Non- Government (H4) proved to have a positive effect (β4=0.88) on A-I Sustainability and Maintenance. This indicates that the more the basic components (goals, structure and process) are aligned to the shared vision of social change, the more valuable the A-I partnership. The higher the support given by the government/non-government agencies, the bigger the social change, however, the bigger the desired social change the lesser the A-I is sustained and maintained indicating the need for a bigger and continuous support to attain the shared vision of social change. Additionally, based on the maximum likelihood estimates there exists a significant strong correlation (r=0.812) between Role of government/ non-government agencies (H3) and the A-I Basic component.

Among the items in Role of Government and Non-Government dimension, the least manifested was increasing industry and CSR activity and the rest proved to have strong positive manifestation. All items in sustainability and maintenance proved to have strong positive manifestation except research culture and quality training which is not also evident. All items in A-I Basic Components indicated strong positive manifestations except the item responsive to the needs of both parties seems not to be evident, while all items in social change were positively evident among the respondents.

## Discussion

### *Emerging Model for Valuable A-I Partnership*

The emerging model in the study shows that the A-I basic components and the role of government/non-government agencies have positive effects, while A-I sustainability and maintenance have negative effects on social change despite the positive effect of role of government/non-government agencies on A-I sustainability. This indicates that without the support of the GOs and NGOs, the desired social development may not be attained by the A-I. Additionally, it implies that strong partnership must be between Academe- Industry – Government (A-I-G) This findings support the Triple Helix Research Group (2012) that the Triple Helix thesis has potential for innovation and economic development in a Knowledge Society with a more prominent role for the university and the industry and government for the production, transfer and application of knowledge. The overall function of Triple Helix is the generation, diffusion and use of knowledge and innovation (Ranga and Etzkowitz, 2013).

The significant strong correlation (r=0.812) between Role of government/ non-government agencies and the A-I Basic Component is mainly to comply with CHED course requirements, OJT and Plant Visit (Table 2). The more visible Government agency in the A-I partnership is therefore, CHED. This is also the findings of a study conducted in the same region a decade ago (Macapanpan, T., Marquez, E., and Rodriguez, S. et al).

Manifestation of the indicators of identified factors for the formation of Valuable A-I Partnership (Table 3)

Among the indicators of Role of Government and Non-Government, the least manifested were increasing industry activity and CSR. During the Multi-Sectoral Forum, the Department of Trade and Industry said, that they cannot dictate to the company the kind of CSR they should implement. During Focus Group Discussion with the Industry sector, they said that although CSR has been mandated by the Government, most of their CSR program is company scholarship for their employees' children.

Among the indicators of A-I Basic Components, responsive to the needs of both parties is the only item not evident. Since the mode of A-I interaction is mainly to comply with Commission of Higher Education (CHED) course requirement, then only the need of the academe is satisfied. Department of Trade and Industry (DTI) representative explained concern that companies will take more time and money to train students during OJT, the skills formation should be integrated in the curriculum.

Among the indicators of Sustainability and Maintenance, quality training and research culture are not evident. As indicated in profile of respondents, only the academe respondents are engaged in research and very few for industry sector. Additionally, the Academe respondents believed that Research has big impact on community development.

The thrust of the current Department of Science and Technology (DOST) leadership is on utilization of research output, however, they provide funding for research output but not responsible for its roll-out. A big portion of the budget is allotted for S & T scholarship programs.

## Conclusion

The results of the Structural Equation Modeling show that all the four hypotheses are supported. These four hypotheses identify the factors that would drive the formation of valuable A-I Partnership. These are the A-I Basic Components (goals communication, management needs and activities), Sustainability and Maintenance (resources, training, network, awards, image), Government and Non-Government Roles (industry activity, scholarship, funding and CSR), Social Change (economic growth, inclusive growth). One of the significant results of the study show that the A-I Basic Components and the Role of Government/Non-Government agencies have positive effects, while A-I Sustainability and Maintenance have negative effects on Social Change despite the positive effect of Role of Government/Non-Government agencies on A-I Sustainability. This is a strong indication of significant Role of the Government in the attainment of community development which also confirm the Triple Helix concept.

There exists a significant strong correlation (r=0.812) between Role of Government/Non-Government agencies and the A-I Basic Components. As shown in the modes of interaction between schools and industry, the most common is compliance with the Commission of Higher Education (CHED) course requirements such as OJT and Plant Visit. The CHED is the government agency that monitors schools which explains the strong correlation between schools and the Government thru CHED.

Among the indicators of the identified factors needed for the formation of valuable A-I Partnership, responsive to the needs of both parties for A-I Basic Components, the CSR and increasing industry activity for the Government/Non-Government Role and the quality training and research output roll- out for Sustainability and Maintenance are not manifested or evident. However, during the Multi-Sectorial Forum, it was revealed that none of the government agencies can improve these indicators since these are not part of their mandate. The findings of the study posed a big challenge in pursuing Valuable A-I Partnership.

## Recommendations

In the light of the challenges identified in the study, it is strongly recommended the empowerment of agencies both government and non-government related to academe- industry partnership to attain community development.

To attain a sustainable A-I Partnership that would drive economic growth as well as inclusive growth, it is recommended to have an agency solely for forming valuable A-I Partnership.

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## Research Collaborators

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