STRATEGIC ALLIANCE OF ACADEMY-INDUSTRY COOPERATION ON AEROSPACE TECHNOLOGY EDUCATION, TAIWAN, R.O.C.

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Abstract—Aerospace technology is identified world-wide as the benchmark of national industry development. In Taiwan, there are departments of Aerospace set in universities and colleges. Nevertheless, plenty of related departments, such as mechanical engineering, electrical engineering, electronic engineering, and industrial engineering are widely established concerning about the field of aerospace technology. In order to stimulate the collaboration among relative departments in universities and colleges for energetic academy-industry cooperation, the Ministry of Education (M.O.E.) undertook the approaches to steer strategic alliance among academies and corporations, which will funnel and integrate all the relative efforts and resources for the target domains in aerospace industry. The alliances have three major attributes: reformation and revitalization engineering educational, potentially restructuring academy-industry partnership, and fitting all the related activities within the target domain technology. The suggestions from action research applied on developing industry/academy alliances on Aerospace technology education will be illustrated in this study.

Index Terms—strategic alliance, cooperation on education, leadership, partnership, entrepreneurship

INTRODUCTION

For decades, aerospace technology has been identified as the benchmark of national industry development world-wide. Reliability is what aerospace technology aims for. Should any country develop aerospace technology promisingly, the industrial and economic development must have met the international frontier. In light of the international aeronautic industry dominated by Boeing and AirBus companies, international cooperation has been deemed as the exclusive way to develop aeronautic industry. In Taiwan, the traditional industries of low value-added have been challenged vigorously recently. Aeronautic industry will be the best carrier to revitalizing national industry [1].

There are departments of Aerospace set in universities and colleges for decades. Ministry of Education (M.O.E.) has launched the revitalization programs of aerospace technology education since 1995. Aviation maintenance and aircraft components manufacturing were identified as major sectors for being needed in improving curriculum as well we teaching facilities in universities and colleges. Avionics and aerospace quality assurance were also identified as crucial disciplines, which should be strengthened in aerospace technology programs since 1998. Generally, these revitalization programs included developing integrated programs, planning curricula, compiling instructional multimedia, holding technological workshops and establishing specific theme teaching laboratories. Departments of Aerospace, as well as the relative departments, such as mechanical engineering,
electrical engineering, electronic engineering, and industrial engineering, all joined the programs. The annual budget allocated for the program ranged about US $1,500,000. How well did the revitalization programs contribute to aeronautic industry? Did the programs nail down the focus? Besides proving the outcome from these programs, what M.O.E. concerns about is how the academy/industry partnership developed through the programs. Since the life cycle of technical knowledge is getting shortened and much of it is under explorations, learning capacities of students should be strengthened rather than being infused with mountains of information. How to construct value-added knowledge flows challenges the revolution of industrial-academic cooperation. However, this collaborative task can not be accomplished within one college or university. M.O.E. had proposed to establish the inter-campus strategic alliances since 2000. The alliances were constituted to integrate and amplify the knowledge flows of engineering educational programs among departments. The ultimate goal for constituting strategic alliances is to build inter-campus learning communities for fostering human resources of core industrial development.

Retaining the excellent quality of human resource on aerospace technology only can be through the effective management and application of educational resources from energetic academy-industry cooperation. Cooperation among institutes and corporations is hard to be manipulated by rules or regulations. The tacit knowledge and experiences related to strategic alliance development should be further explored through the action research. How the alliance partners being selected? How they interact? How to motivate the partners? How to manage the teams? This study will propose some thematic thought and reflections.

**ACADEMY/INDUSTRY COOPERATION ON AEROSPACE TECHNOLOGY EDUCATION**

The cooperation between corporations and institute is well justified on the research and development projects. Currently, the “Knowledge Economy” drives the cooperation relationship ultimately. However, the cultivation of human resources can not be overemphasized through academy/industry cooperation. It is well recognized that technology education must be tailored to job opportunities as well as linked to an academic department. Therefore, the outcomes from academy/industry cooperation can not be over research-oriented.

The subject of revitalization programs on aerospace technology should be the student. How to provide students with a broad view of the aeronautic industry as well as lifelong learning attitude and ability are the themes of academy/industry cooperation on education. Both industry and education must keep the students at the center of all activities [2]. Students must be exposed to a broad view of the professions and have the opportunity to develop a career. The revitalization programs must be based on a pedagogic progression that allows students to discover all aspects of the profession by combining theoretical reflection and practical training. The current curricula of aerospace department seem in great need of being reshaped due to the lack of bridging between theories and practical training.

The strategic alliances should examine the curricula before developing relative revitalization activities. The paradigm set by ABET (Accreditation Board for Engineering and Technology) Engineering Criteria (2000), U.S. might provide some guidance for academy-industry cooperation on education [3]. Meanwhile, the dialogue
must be established between university authorities and the professions to measure hiring trend and establish the level of training needed for entry-level position. The program office, commissioned by M.O.E to be responsible for overall planning the strategic alliance programs, should dominate the tasks and bridge the alliances.

**STRATEGIC ALLIANCES**

Usually, those departments sharing the common interests on specific discipline seldom interchange across campus. There are about 15 universities or colleges joining the revitalization programs on aerospace technology education. The expenditure of the revitalization programs seemed less profitable since the educational resources was not interchanged among departments. Moreover, the cooperation between academies and industries was scattering alike. The systematic approaches were in lack to build multiple relationship. The paradigm of strategic alliances from industrial sectors indicated the possibilities to construct strategic relationship among departments. The figure 1 shows the relationship of alliances. The alliances on targeted industrial sector is to cluster the enthusiastic faculties from nationally relative departments for constructing integrated learning resources and environment. Meanwhile, the host manager for each alliance will interface the national practical training programs and match the opportunities and needs of practical training.

**Leadership in Alliances**

Human systems engineering (HSE) emphasizes the role of leaders who welcome risk, commit to achieving positive change and help others achieve change. Meanwhile, HSE also emphasizes the recognition and achievement of individual goals for collaborating partners [4]. The host manager of alliance faces the challenge when attempting to articulate the individual goals of participants as well as integral ones. The leadership of alliances plays critical roles in performing the cooperation projects. The host manager of alliances should pay attention to the human side of cooperative process. The real change occurring cooperation projects must be positive and included in the process as well as in the final outcome. Through on-going communication, the leader must facilitate in identification of common and individual goals, promote positive chemistry between partners, and help participants to focus on bringing about positive change. Therefore, the leader should identify the roles of partners at the beginning of constructing alliances. The ultimate goal of alliance as well as partners relies on strength of all participants.

**Partnership in Alliances**

Since 1980s, more businesses have been motivated to enter into business/education partnerships to improve the academic and technical skills of future work force [5]. Nowadays, multiple partnership prevails. Within the strategic alliance, there are faculties from different universities or colleges. Those faculties have to interact with related corporations, research institutes as well as training sectors in accomplishing the revitalization programs. The agreements become more complex then the ones of one to one institutional partnership. According to the regulations set by M.O.E., there are at least three universities or colleges within an alliance. How to recruit the partners and propose joint-programs determines the performance of alliances. Since the programs are financially supported by M.O.E., the host manager of alliance must have a clear picture about the motivation of intended partners. Once the individual goals of
participants did not meet the integral ones, the multiple partnership will not be last longer. The role playing of partners is to contribute the joint-projects instead of being subsidized passively from governmental funding. Once the joint-projects were well recognized by review panels, the government funding was released to the host manager instead of to the partners directly. The host managers evaluated the contributions of partners upon accomplishing the joint-programs and the partners will be paid the optimum pay. It is obvious that governmental funding is not the major driver for the partnership of strategic alliance. It is the identification of role playing in accomplishing the joint-programs. The role playing of partners is well planned beforehand and the accomplishments of joint-programs will honor those participants. In the view of academy/industry partnership, the integrated channels have been constructed as well. Traditionally, the profiles of partnership, such as cooperative apprenticeships, facilities donated, training for faculties, remedial programs for employees, onsite administrative support provided by the college, college-assisted recruitment of new trainees, were not well organized. Through the functioning of alliances, the strategic partnership prevails. Those academy/industry cooperation activities or projects are well planned and fit each other [6]. The energy is regenerated within the alliance instead of being consumed as accomplishing the revitalization programs.

The best way to address the challenges presented by changing demographics, rapid advances in technology and international competition is by creating innovative strategic partnerships among higher education, business, government, labor, and economic/community development organizations [7] Such cooperative ventures are a refreshing change form an earlier periods which was characterized by fragmented attempts, less creative less efficient, and less productive. Such independent action in an increasing interdependent world is a luxury than we can no longer afford. The strategic alliances serve as the platform to construct the value chains and forge partnership with the resources used and being repaid with interest. The interactive alliances are shaped through strategic partnership.

What is interactive alliance?
Utilize new means of learning (cooperative education, internships and practice). Wall, classroom, libraries and residence halls do not confine the interactive alliances. Businesses are supplied with trained graduates. New employee will be able to fully integrate into their workplace.
Students and faculty work together with a curriculum shaped by society’s need.

Entrepreneurship

The chance will favor the prepared alliances. The strategic alliances contribute toward the reformation and revitalization of academy/industry cooperation relationship. In promoting aerospace technology education, the cooperation relationship among high education, industry, government, research institute and training sectors plays a crucial role. M.O.E. launched strategies to establish alliances among universities or colleges and develop integral partnership with corporations and research institutes. The investment within the alliance projects shall be returned with interests only if the strategies adopt entrepreneurial attitudes as start to transform themselves. From the very beginning of alliance establishment, no ones know for sure how they will reach their ambitious goals. M.O.E. only declare the thematic scheme of establishing alliance and identify the role playing of the program office and alliance centers. As for how to coordinate partners, to propose the revitalization programs, there are no details for guidance. That allows alliances feel free to interact with
industry and proposed promising joint-projects. The means to the end are discovered along the way. Strategy is nothing without passion and vision from the people creating and implementing it [8]. The leading roles within the alliances have to learn to state their goals in emotional terms, not just have goals, but irrational dreams. The revitalization programs shall contribute a lot only with inspired alliances.

**Grouping**

How to decide the grouping of alliances? In view of aerospace technology education, there are four thematic alliances respectively, namely as aviation maintenance, aircraft components manufacturing, avionics and aerospace quality assurance. However, those thematic alliances share many overlapping disciplines with each other. Why did M.O.E. decide to establish four alliances instead of an integral alliance? The major concern is to enlarge the populations of enthusiastic faculties for the revitalization programs. Once the department is identified as the managing center of the alliance, the faculties will be honor to devote more participation to accomplish the programs. The task for interaction among alliances will be left to the program office. Generally, the geo-proximity to the university facilitates the relationship of industry-university collaboration [9]. The re-grouping of alliances might be feasible due to the geo-proximity. The expenditure to set up the comprehensive aerospace technology education resources within one campus is over what we can afford. The resource sharing and interchange shows the ways.

**REFERENCE**


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The Action Research in Establishing Strategic Alliance of Aerospace Technology Education

FIGURE 1

G: government, A: academy, I: industry, R: research, T: training

Alliance A: quality assurance, B: maintenance, C: manufacture, D: Avionics

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