

Creating a University-Industry Advisory Board for a Joint Engineering School

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Introduction

For a company to survive it must continually adapt to its business environment, its customer demands, and the needs of the wider society whether through legislation or changing market. This phenomenon is well known and the subject of many business management texts [1]. Similarly for University undergraduate engineering courses to be effective and acceptable to both students and industry they must be continually revised to incorporate the latest thinking, both in technology and pedagogy. Traditionally, the method used to ensure courses remained relevant was to approach companies in the immediate locale of the education institution or local alumni [2] and elicit membership to form an Industrial Advisory Board (IAB). This approach was effective when companies addressed markets which were predominantly national or international, but in a world where the majority of companies operate globally with activities dispersed across several continents this approach is no longer applicable. This paper examines the historic requirement for Industrial Advisory Boards, highlights their shortcomings, and through the use of strategic analysis tools, proposes a new paradigm for IABs suitable and capable of adaption for the future. The paper uses as an exemplar, the process of creating an IAB for an International Joint Engineering School undergraduate program between a United Kingdom and Chinese University.

Unfitness for purpose

To understand why the existing structure is no longer fit for purposes for either the Educational Institution or Industry it is useful to review why IABs came into existence. Engineering Schools have had IABs for many years but the purpose of these has not always shared common goals. In some instances the primary purpose of an advisory board may be fund raising, gaining political influence, developing a student internship program, or developing industrial placements for graduates of the program [2]. Although these may be worthy causes, they are not the primary role of an IAB; an IAB should be advising on course content and teaching methods. In 1994, this mismatch between IAB activities caused the ABET commission to place the existing accreditation methodology under scrutiny and moved the focus from what was being taught towards a more strategic role focused on outcomes and objectives. The ABET EC2000 methodology was adopted in 2001 as the standard against which all engineering education programs would be accredited [3]. EC2000 required greater involvement by Industry in the accreditation process which gave rise to a significant rise in the establishment of IABs. According to survey data collated by Rooney & Puerzer [4], virtually all educational institutions now offering engineering degree programs have IABs however many of these have limited power over activities within the institution. In the majority of cases, the IAB's role was to assist the School in attaining program accreditation from an appropriate and relevant body.

As companies transitioned first into international and then global organizations the geographically centric advisory board became a limitation; the original strengths and benefits of engaging with local companies were outweighed by both the commercial and educational need to embrace cultural and ethical differences. Furthermore, as system and product integration extended beyond single engineering disciplines the membership of the advisory board had to be similarly extended. A topical and relevant example of this is the blurring of

boundaries between Computer Science and Electronic Engineering in the emergent market for the Internet of Things [5]; the new products consisting of a fusion of technologies from both disciplines. With the advent of trans-national joint degree programs between Universities in separate continents, the problem is further exacerbated by the need to assimilate and accommodate cultural differences. As the market dynamics of global business change, the membership and methodology of establishing IABs must similarly be revisited.

Who is the customer?

Prior to identifying potential IAB members for a Joint School, some considerable thought should be given to the purpose of an IAB and subsequently the strategy adopted in establishing the new Board. There are many approaches to developing strategy for business and Industry [1] and after balancing complexity with superficiality, it was decided to adopt Porter's Five Forces model [6] as most appropriate. Furthermore, the inclusion of the 6th force (complementors) after Nalebuff and Brandenburger [6] would enhance the applicability of the model for higher education applications (Figure 1). Other authors on the subject of IABs such as Jackson [7] and King [8] have elected to use the traditional Five Force model however the addition of the 6th force aligns better with the Higher Education environment.



Figure 1: Porter' Six Forces model

In order to establish the requirements of the IAB, each of the 6 forces must be analyzed against the most likely competitive scenario. After all forces have been analyzed, the defined

business landscape will identify the most appropriate stratagem to be adopted by the organization.

1. Threat of New Entry

Although it is possible for an organization to establish a new Joint School in China, this is a significant undertaking and requires governmental approval. It is reasonable to assume that any of the World's top 100 [10] Universities would be capable of establishing such an operation however they would need to partner with a high quality Chinese institution, most of which already have partnerships. The possibility of a direct Threat of New Entry is considered unlikely as the specialist knowledge required to operate a Joint-School coupled with the economies of scale already in operation would prove a reasonable obstacle to any new entrants.

2. Supplier Power

In an educational context, the concept of supplier becomes complex as the "raw material" required to produce graduates and associated fees are the students themselves. However in the context of education, the students (and their fee-paying parents) are more appropriately considered as buyers, although if the applicant quality were to drop this variation in supply side input would impact output quality and teaching costs. A more relevant supply side issue is the availability of suitably qualified teaching and administration staff for overseas joint programs. A key USP of a Joint-School degree is the use of English for all classes and the adoption of UK teaching methods for engineering. The recruitment of capable and willing staff to teach the program can be an issue if not carefully managed.

3. Threat of Substitution

The greatest threat of substitution is the impact of MOOC courses being offered in engineering. However, the defensive position taken against such a threat is the classroom learning experience combined with hands-on laboratory and group project activities. The experience of working in a close-knit team with direct access to your supervisor is difficult to emulate via distance learning. When combined with the UK education pedagogy and teaching experience the whole joint-school experience is difficult to substitute. Consequently the threat of substitution is considered low.

4. Buyer Power

Buyer power is probably the largest threat to the program and gives rise to the question "Who is the customer?" Identifying the first customer is straightforward; it is the new potential student and their families who will invest in education products. The student has 3 options for education: the first is the domestic Chinese University sector that provides excellent education in Chinese at an affordable cost; the second option is enrolling in a Joint School program which is more expensive but taught in English using Western style pedagogy. The third option is attending an overseas University for a totally immersive experience. In many cases, the financial barrier of the third option places it beyond the reach of many students and families. The USP of the Joint-School is the opportunity to experience the benefits of both the Chinese and UK systems in a single undergraduate degree program while remaining in a Chinese cultural environment.

The second group of buyers are the employers. These have an indirect influence on the success of the program as they are consumers of the end product (graduates) and therefore have significant interest in the quality of graduates. This of course, assumes that dissatisfaction by employers of the quality of graduates is fed back to the Joint School (short feedback loop) or to the new applicants to the course via student satisfaction surveys, graduate employment statistics, or national /international surveys. These surveys may suggest the course does not reflect the needs of modern employers.

However, there is a third “Buyer Power” force which is little mentioned. The education system itself is a consumer of graduates; either as postgraduates to participate in Masters or PhD level courses, or as new recruits as future researchers and teachers. Furthermore, the unique access available to the education sector gives them greater insight to the graduates’ capabilities and potential. There is an argument that this access gives the education sector unfair advantage over the other buyers as their absorptive capacity is only 5-10% that of industry.

In most IABs, the ability to influence the curriculum is the most tangible activity considered by the Board. Furthermore, by adopting the Pareto Principle [11], greater attention should be focused on how to meet the needs of the first two buyer groups (students and employers) and reducing the influence of the third.

5. Complementors

The new force suggested by Nalebuff and Brandenburger adds an interesting dimension to the analysis. Although there may be others, two significant complementors to the Joint School activities are any changes in China’s High School curriculum and changes to the accreditation process. However, changes to the High School curriculum would equally advantage or disadvantage all Engineering Institutions (indigenous and joint programs) so would not cause a change in forces in the competitive rivalry situation (to a first approximation).

In contrast, changes to the accreditation requirements and indeed demand for course accreditation from industry could have impact on the success or attractiveness of the Joint School degree program. Furthermore, the selection of the accreditation body, presently under negotiation in China could have a bearing; the options being the IET (Institution of Engineering and Technology) based in the UK, ABET (the Accreditation Board for Engineering and Technology), and CEEAA (China Engineering Education Accreditation Association). Each of these bodies has similar remits but the variations in requirements may align better with the curriculum and with industry expectation. There is opportunity for strategic benefit to be gained via this complementarity force.

6. Competitive Rivalry

The final force influencing the Joint School is the on-going competition between rival institution for the best students, best facilities, teaching staff etc. Although it is possible to channel this to be a strategic advantage, given the number of competitive variables available to each institution, it is likely where one organization benefits, it loses in another area; i.e. over the medium term it is a zero-sum game. The important activity for the Joint-School and thus the IAB is ensuring a good understanding of the most important variables at any given

time to their main customers (new students and industry). In this regard, the IAB can prove invaluable.

The Strategic Analysis Outcomes

Performing a strategic analysis even with the help of tools such as Porter's Five Forces demands skill, effort, experience, and time. This is not a "quick fix" approach to defining the key strategic imperatives for the Joint-School. Also it should be appreciated, that although the identification of the components of the different forces can be reasonably objective, the impact of a given component is usually highly subjective. As an analogy, the quantification of the force components can be compared with grading written work or essays and the use of a Likert scale is most appropriate.

However, using strategic analysis methodology above, the key attributes (USPs) and strategic objectives of the Joint-School become clearly exposed. Although the detail remains confidential, using the approach in this paper produced a profile of the typical student applying to the School and the profile of the companies interested in hiring the graduates. In general terms, the students were generally recruited from relatively prosperous, ambitious family backgrounds who could appreciate (or had directly experienced) the value of overseas education. The companies were divided into two categories; the first being Global Corporations who had operations in China and sought English speaking electronic engineers who had some understanding and exposure to practices and methodologies commonly used in large corporations. The second group is indigenous Chinese organizations with a view to exporting or establishing overseas operations. The ubiquity of the English language in standardization activities within the Electronics Industry enables these companies to contribute and participate in the global engineering community.

The IAB membership proposition

While the strategic analysis produced a company profile that may be interested in participating in an IAB, there must be a clear articulation of the value proposition to the potential members. Greenlaw [2] in his excellent paper expands on the structure, mechanics, and challenges of running an IAB, however less is said about the recruiting of membership. Although some individuals take the view that membership of an Institution's IAB is a honor, the reality of the situation is much more transactional; there must be a "quid pro quo" proposition between the Institution and the IAB membership. Regrettably, many institutions fail to recognize that engineers in industry are trained from the day of recruitment to perform cost analysis of different options; indeed as engineering managers and directors, their success and remuneration depend on these skills. Hughes [11] does an excellent job of describing the mismatch in Industry-University relationships from the viewpoint of Industry; illustrating how the success drivers for Universities can be orthogonal to the needs and demands of Industry.

However, it is possible to positively engage with potential members of the IAB by adopting a more commercial mind set. Fundamentally any candidate for membership of an IAB is amenable to a fair and reasonable proposition, trading their time and devotion to the IAB in return for non-monetary recompense. The most tangible collateral available to the institution is access to their high quality graduates of a caliber suitable as future employees. In return for (and ideally part of) performing the duties required by the IAB, members have the opportunity to engage and interact with the student body as part of the curriculum. This can

take the form of guest lectures, project sponsors, even acting as a “Dragon’s Den” of investors judging business ideas and proposition. These interactions enable industry members to form a view on the future employability of students. Indeed, through carefully crafting the IAB membership proposition, it is possible to enhance the learning experience for students and generate greater involvement of IAB members.

Conclusions

This paper began by exploring the challenges and approaches taken to address some of these issues when establishing an Industrial Advisory Board and the methodology employed in one particular School. The ideal board for a Joint-School must be international, multi-cultural, and multi-discipline to support a joint undergraduate degree program in Electronic and Electrical Engineering in China. Although using tools such as strategic analysis may appear overly complex and time consuming, the result is a clear set of IAB membership attributes that align with the ambitions and vision of the institution. In negotiating a clear proposition with the potential members of the IAB, both the University and IAB membership understand the expectations and commitment to each other. Using this approach, the School can deliver best-in-class, up-to-date knowledge and experience from an industrial perspective, combined with solid grounding of the fundamental principles. By involving the Industrial Advisory Board, both students and industrialists get a richer, more relevant experience and interaction.

The status of the IAB formation in the Joint School in China has just begun. The strategic analysis has been completed and a membership proposition has been prepared and articulated to the first 5 members of the IAB. The first meeting of the IAB has been held and roles and responsibilities of the Board have been discussed and defined. Based on the positive reactions by the founding members the approach appears to be working effectively. Clearly the passage of time will prove the long term viability and commitment of the membership but initial indications suggest the effort in undertaking a strategic analysis was appropriate.

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