



## **A CONCEPTUAL FRAMEWORK FOR DEVELOPING STRATEGIC PARTNERSHIP BETWEEN UNIVERSITY AND INDUSTRY IN PAKISTAN WITH PARTICULAR REFERENCE TO NWFP**

*Syed Hafeez Ahmad,*

Kohat University of Science & Technology, NWFP – Pakistan



*Syed Hafeez Ahmad* is currently working as Deputy Registrar (Academics), Kohat University of Science & Technology, NWFP, Pakistan. He also served as Assistant Director (Planning, Monitoring & Evaluation) in the Directorate General, Population Welfare Department, Govt of NWFP with additional charge of Deputy Director (Planning, Monitoring & Evaluation). He won award and certificate of commendation for outstanding performance and meritorious services in the NWFP Population Welfare Department, Govt of NWFP, during the year 2004-05. He published widely and regularly, as a free-lance columnist, on regional and international burning issues with prime focus on current economic situation and socio-political problems of the country.



## **A CONCEPTUAL FRAMEWORK FOR DEVELOPING STRATEGIC PARTNERSHIP BETWEEN UNIVERSITY AND INDUSTRY IN PAKISTAN WITH PARTICULAR REFERENCE TO NWFP**

*Syed Hafeez Ahmad,*

Kohat University of Science & Technology, NWFP – Pakistan

*Fatima A. Junaid,*

Institute of Management Sciences, Peshawar, NWFP – Pakistan

### **ABSTRACT**

University industry linkage is regarded as a major collaborative effort on part of the two distinct entities, academia and industry that share their resources in an effective and efficient way for attaining mutually compatible goals of technological innovation, enhancing global competitiveness and performing as engine for economic growth. Various mechanisms of such relationship are effective in the developed countries for fairly sometime. However, its practice is relatively novel in developing economies of the world. Similarly, no strategic alliance has been established, between university and industry in Pakistan. In fact, our universities have not attained the desired level of excellence in the field of academics and research, while the industrial sector in the country has its own set of problems in achieving the required competitive level. Consequently, very little attention has been paid to understand, initiate, manage and patronize this relatively new and complex kind of relationship in our country. The purpose of the paper is to take the lead in order to fill this gap. This exploratory study examines various dimensions of the strategic partnership between university and industry in Pakistan, with particular reference to NWFP. The paper analyzes key problem areas, which, indeed, have hindered the establishment of an effective and strategic alliance between university and industry in NWFP. The paper concludes with recommendations; how to transform, the prevailing dismal condition of collaboration between university and industry to a win-win situation by developing a conceptual model under which university and industry are allowed to interact with one another in a more meaningful and proactive manner.

**Keywords:** University industry partnership; collaboration; strategic; knowledge based economy; Triple Helix.

### **INTRODUCTION**

Collaboration between industry and academia has increased dramatically in the developed countries for the last couple of decades. This evolving partnership has been stimulated, primarily by social, political, economic and technological forces. Government assistance, for research related ventures, has declined whereas the pressures from global competitiveness and realization of the significance of science-based knowledge to the innovation process has multiplied manifold (Feller, 1997).

University-Industry (UI) collaboration is of vital significance for the promotion of educational institutions, growth of vibrant industries and development of national economies. In

fact, some informal kind of liaison between the two major entities has been in practice; however, its wider institutionalized application is relatively new in Pakistan. In fact the country [Pakistan] does not have a solid industrial foundation. Her current capabilities for innovation and investment in research are not impressive in contrast to those in the developed economies. In addition, Pakistani firms generally develop very few new products. At the same time, universities in Pakistan have not developed the culture of genuine research. Consequently, no such effective partnership between the two entities has been materialized in the country, since its inception. As a matter of fact both the institutions failed to understand the significance and potential of cooperation. In the fastly moving, rapidly changing world there is a considerable realization of the inevitability of inter-organizational cooperation. This study examines various dimensions of the strategic partnership between university and industry in Pakistan, with particular reference to North West Frontier Province.

NWFP is a province of Pakistan, located on the banks of the river Indus, bordering Baluchistan and Punjab provinces in the south and Afghanistan on the west. Its borders touch or are in close proximity to those of China, Tajikistan and the disputed territory of the state of Jammu and Kashmir in the north. It covers an area of 74,521 sq. km. with total population of about 14 million (52% are males and 48% females). Peshawar is the capital city. Once the cradle of Gandhara civilization, the area nowadays is in the spotlight for all wrong reasons. The Pukhtoons famous for hospitality, who live in NWFP are regarded as invincible in the history books (GoNWFP, 2008).

According to the data available from the Higher Education Commission of Pakistan website, there are 22 universities and degree-awarding institute in NWFP. Out of these one is university of engineering & technology with three campuses in remote districts of the province. Two are universities of science and technology. Out of the total there are 13 public sector universities. These universities encompass an array of strengths and weaknesses in connection with university industry partnership.

NWFP has a modest industrial base mainly located at Peshawar, Hattar, Gadoon Amazai and Nowshera. However, the last 10 to 15 years have witnessed steady growth in its number as new industries are being established, although at a slow pace. To begin with only 11 industrial units in 1947, the NWFP today has nearly 1,500 industrial units employing more than 60,000 people. Most of them are small industries producing consumer goods, but a few large-scale and heavy industries such as sugar, cement, paper, fertilizer, and textile mills also exist. Other major sectors are chemical, petroleum, rubber, plastic, mineral products, metal products and wood products. Government incentives during the last decades have attracted some industries, but most of industrial estates are not yet fully developed. The remote location of the NWFP from the Karachi port is the main constraint in attracting entrepreneurial investment in the province (IUCNP, [n.d]).

Apart from having fragile industrial foundation, there is scarcity of skilled labour in Pakistan. According to a World Bank study (2002), cited by Kalim and Lodhi [n.d], Pakistan is having half of the number of R&D scientists and engineers than India and nearly 3% of the number of R&D scientists and engineers in Korea. Similarly, the research papers published in scientific journals in Pakistan (1997) are about 3% of Indian publications and 5% of the Korean. The high technology exports also follow the same trend, as Pakistan's exports are not even comparable to the exports of China, India Korea, and Thailand. These issues have gravely restrained the growth of effective UI partnership in the country.

In this scenario the current study examines the potential barriers, which, in fact, have stalled the fostering of an effective and efficient strategic partnership between academia and industry in NWFP. The study generates some new insights by illustrating various dimensions of UIP for hypothesis testing in future research. Effort has been made to identify the potential strengths and weaknesses of the two major players in order to develop a mechanism for effective UIP. The paper concludes with recommendations for policy makers and key stakeholders, offering viable suggestions for bringing substantial improvement in the prevailing sorry state of affairs.

## **LITERATURE REVIEW**

### ***What is strategic University Industry Partnership (UIP)?***

The term strategic partnership refers to ‘collaborative efforts between two or more firms that pool their resources in an effort to achieve mutually compatible goals that they could not achieve easily alone’ (Hunt *et al.*, 2002). Elmuti *et al.* (2005) observed that strategic partnership generally represent inter-firm cooperative agreements aimed at achieving competitive advantage for the partners.

Researchers working on the subject described UIP more or less in a similar fashion. According to Gray and Wlater (1998) UIP is predominantly an organizational structure e.g. office or arrangement intended to initiate, streamline and maintain interaction between industry and university. This fairly specific organizational set up has been regarded by Aldrich (1977) as a boundary-spanning structure (a separate organization with its own structure, mission, goals, and objectives).

University industry linkage (UIL) mechanism is relatively complex boundary spanning structure aimed at bringing together distinct entities, streamlining their effective interaction and maintaining conducive environment for its smooth functioning by avoiding the chances of potential conflict (Gray and Walter, 1998). These structures (may be consisting of liaison offices, centers, labs, and institutes), have allowed universities and industry to meet each other halfway, at their organizational boundaries (Gray and Wlater, 1998).

In our study partnership is an umbrella term used for linkage, interaction, collaboration, cooperation and alliance which means a specific form of relationship between the two organizations characterized by the creation of a separate entity having distinct mission, strategy and policy. The partnership to be strategic implies that both the entities must be responsive to a dynamic, ever changing environment having future orientation. Strategic partnership, therefore, underlines the importance of making decisions that will ensure the organizations’ ability to successfully respond to the changing circumstances in the long run (Bryson, 2004; Wheelen and Hunger, 2000). Our present research deals with a specific form of partnership which is future-oriented, trusting and interactive, enabling the diffusion of creativity, ideas, skills and people with the aim of creating mutual value for both the partners over a long period of time (Plewa and Quester, 2008). This connotes that both the entities must stay abreast of rapid changes in the surroundings in a holistic manner with long term perspective as to make the best decisions in particular circumstances.

### ***Significance of UIP***

UIP is regarded as one of the widely used interactive best practices, a powerful tool for creating congenial environment for technological innovations and enhancing global competitiveness ultimately promoting the interests of the firms and academia across the world. According to Ali (1994), cited by Santoro and Chakrabarti (1999), intense global competition, shorter product life cycle, rising demand for technological innovation unpredictable economic conditions, and escalating cost of research provide firm grounds for the organization to foster collaboration with institutions of advanced learning.

UI collaboration is instrumental in strengthening the ability of universities to conduct high quality and relevant research and enhancing the capability of industry to compete globally. Collaboration is generally regarded as a vehicle for the realization of some of these aims and promoting a higher level of competitiveness (Liyanage and Mitcheil, 1994). Davis has underlined the significance of UIP in his work (1996) as:

The strength of universities lies in their science base; the strength of industry is technological development. Today the challenges facing both organizations have never been greater and both must adapt to rapidly changing circumstances. Failure to do so will have significant and far-reaching consequences for all concerned.

These collaborative undertakings transform the entire edifice of business firms by turning them into true learning organizations. Thus companies learn new ways of doing things, and this may ultimately alter the nature and direction of the entire business world. Dodgson (1993) observed that collaboration encourages a higher-level of learning, learning about leading edge technologies, learning about methods of creating future technologies and learning of the ways new technologies might affect the existing business. University-Industry linkage mechanism could help in identifying various individual scientists or research groups involved in research ventures pertinent to the Industry, facilitate their coordination, arrange their meetings, organize training workshop to design preliminary studies and to discuss problems faced by the companies in launching their innovative products.

A stream of research generated in the recent past reflects on the potential of linkages between universities and industry for the survival of both parties in the competitive marketplace and as an engine for economic growth (Siegel *et al.*, 2004). Essentially, as noted by Davis (1996) ‘university and industry now exist in a harsh and competitive economic climate. Indeed, their very survival depends increasingly on their ability and willingness to adapt to an unprecedented pace of change. There are a number of compelling reasons for university and industry to undertake collaborative research.’ The industry will be mainly benefited in terms of having ready access to professionals with the right knowledge, right skills and right attitude. On the other hand, the university graduates will have exposure and experience of the practical work life, which will act as a launching pad for their future professional career.

### ***Impetus for industry to collaborate with university***

There are many compelling reasons for industrial firms and universities to cooperate with each other. Industrial firms narrate access to potential trained students, qualified researchers and professors, access to innovative technologies, enhancement of the company’s prestige, ready access to efficient and economical resources and access to university labs and facilities as some

of the motivating factors for fostering collaborative links with institutions of higher learning (Bower, 1993; NSF, 1982a).

According to Cyret and Goodman (1997), firms tie the knot with institutions of advance learning for the simple reason that they want access to new scientific knowledge, new tools, new methodologies, new products, and so on. Business firms are largely concerned with effective use of the outcomes of research to facilitate resolution of their pressing business problems or to thwart challenges of immediate nature so as to maximize their earnings and stakeholder capital (Lee, 1998). In view of that, inter-organizational collaboration is frequently employed to stimulate the development and commercialization of cutting edge technologies (Parkhe, 1993).

The business concerns are generally keen to collaborate with universities, as described by Atlan (1990) and Peters and Fufeld (1982), cited by Wu (1999), to ensure: (1) access to human resource, including well-trained graduates and knowledgeable faculty, (2) access to basic and applied research results from which innovative products and processes will evolve, (3) access to professional expertise not usually found in an individual firm, (4) access to university facilities, not available in the company, (5) assistance in continuing education and training and (6) being good local citizens or fostering good community relations.

For a company the main motivational factors are early access to scientific or technological knowledge, risk reduction, access to unique research skills (Bonaccorsi and Piccaluga, 1994; Meyer-Krahmer and Schmoch, 1998). In addition to all these, Azaroff (1982) observed that such collaboration might also reduce the recruiting and selection costs and increase efficiency of the business concerns in many ways.

### ***Impetus for university to collaborate with industry***

In fact, there are many potential benefits to be realized when industrial firms and universities work together. Institutions of advanced learning interact with industrial firms primarily to obtain basic research funding, industrial expertise, exposure to practical real world problems, and employment opportunities for university graduates (NSF, 1982a; Ervin *et al.*, 2002).

According to Peters and Fufeld (1982), cited by Wu (1999), the driving forces that push university to collaborate with industry are (1) Industry provides a new source of financial support for university, (2) Industrial funds involve less bureaucratic formalities than the government financial support, (3) Industrially sponsored research provides student with exposure to real world research problems and (4) Industrially sponsored research provides university researchers a chance to work on intellectually challenging research projects.

As observed by Davis (1996) such collaborations are essential if momentum is to be maintained in what is becoming a more unfriendly and competitive environment. Many universities are keen to become involved in the transfer of research to industry and it is now standard practice for universities all over the world to have their own industrial liaison cells to deal with such issues pertaining to effective implementation of UIP projects.

In his study Hurmelinna (2004) found that the most frequently quoted motivation factors for academia to collaboration was ‘the enhancement of teaching followed by funding/ financial resources and reputation enhancement.’ Meyer-Krahmer and Schmoch (1998) are of the view that the ‘knowledge gain’ from industry researchers and the access to ‘empirical data’ from industry are leading motivational force. Apart from this, cooperation between universities and industrial firms is crucial to ensure that universities develop and deliver appropriate curricula for training students in state-of-the-art techniques (Santoro, 2000).

### ***Types of UIP***

While delineating the nomenclature of the university industry linkage, Wu (1999) is of the opinion that there has not been a universally accepted watertight classification of university-industry interactions. However, Santoro (2000) simply categorized these into four broad areas: (1) research support, (2) cooperative research, (3) knowledge transfer and (4) technology transfer. These are briefly discussed as under.

#### ***Research support:***

Under research support mechanism members of the corporate community make contributions in the form of both money and equipment to universities. Such contribution are extremely valuable for academia, since the university has much more leverage in using these funds for up-gradation of laboratories, or provision of fellowships to graduate students, or granting seed money for initiating new projects (Reams, 1986).

#### ***Cooperative research:***

Under this mechanism close interaction is established between the two organizations through institutional agreements and formal group arrangements, (NSF, 1982a). This arrangement (NSB, 1993) involves one university faculty member working with a single firm on a specific research project to deal with an immediate industrial firm problem. Group arrangements include special purpose link programs and research consortia, which put emphasis on contact between the member organizations and the university’s faculty, staff, and students. The use of institutional facilities, and informal communications are also part of this arrangement (NSF, 1982a).

#### ***Knowledge transfer:***

This mechanism involves various practices mainly focusing on personal interactions, interactive education, and personnel exchanges. Knowledge transfer activities provide a platform for invigorating larger scale cooperative university–industry research collaborations (Reams, 1986). This also includes hunting for fresh university graduates by the firms (NSF, 1982a). Knowledge transfer can also occur through institutional programs and interactive education systems, which are designed to promote information, exchanges between academia and industries (Santoro, 2000).

#### ***Technology transfer:***

Technology transfer programs capitalize on joint industry–university research and aim at integrating university-driven research into applied initiatives for the development and

commercialization of new technologies (NSF, 1982b). More specifically, technology transfer usually includes several key activities such as addressing specific research problems, providing technical expertise to companies seeking to develop new products and providing technology patent or licensing services (Santoro, 2000).

The above discussion amply demonstrate that each type of UI linkage mechanism is a slightly different organizational form, some types will be better suited than others for performing certain kinds of research venture and attaining definite objectives (Gray and Walter, 1998).

### ***UIP process***

The interaction between a university and industry often starts with some kind of solicitation from each part (Elmuti, *et al.*, 2005). It has been observed by Mead *et al.* (2000) that firms generally seek a new contact with industry, university or government to establish the collaboration, while some partners expand an existing relationship to move on with. They developed a framework for the UIP processes given by **Figure 1**. It starts with each party identifying what can possibly be attained from the association and the likely requirements of the other partner. A formal joint working group is constituted that basically develops the mission and organization of the strategic alliance. The working group is supposed to develop mechanism for interaction, formalize agreement, implement the same and last but not the least; it evaluates the entire collaborative process. The critical step then will be the implementation of the collaboration project and evaluation of the major activities and its tangible outcome. The complexity of the linkage mechanism is obvious. It is aimed at bringing entirely different and distinct entities to reach a compromise between corporate and academic norms.

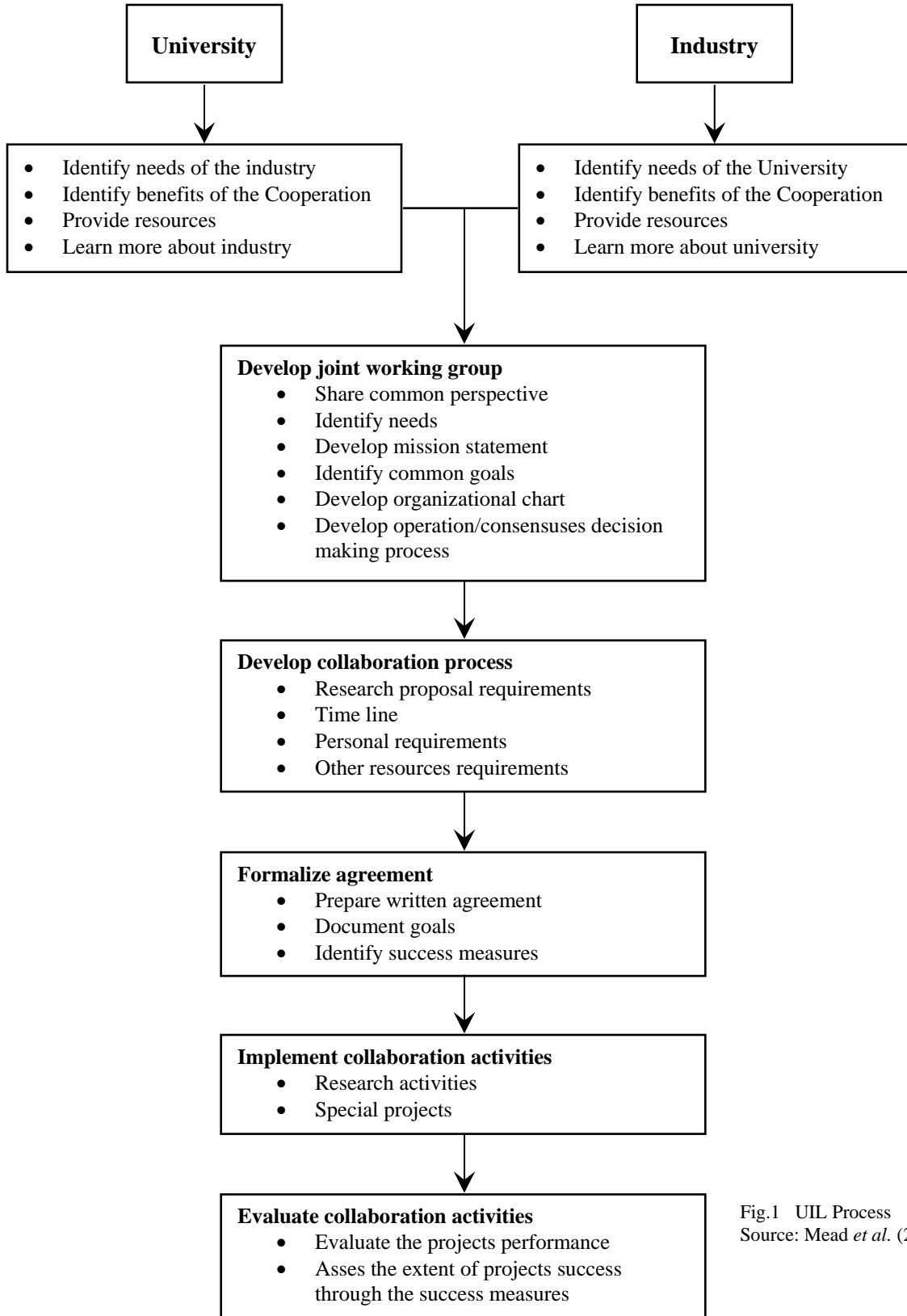


Fig.1 UIL Process  
Source: Mead *et al.* (2000)

### ***Success factors for developing UIP***

The university industry partnership is regarded as valuable if the endeavour helps the firm accomplish the objectives of enhancement of competitive position and maximization of shareholders' capital. One way these alliances contribute to the realization of such objectives is through advancing new technologies. Thus, many corporations evaluate the success of such alliances largely on the level of technological outcomes generated as a direct outcome of the partnership (Santoro, 2000). Researchers unanimously claim that certain factors play a critical role for the success of UIP. Realizing its significance, unwavering trust, firm commitment, effective communication and effective role of leadership on part of both the partners are some of the important elements for an effective UIP. Elmuti *et al.* (2005) regards:

Partner selection, senior management commitment, clearly understood roles and communication between partners as 'essential' components of alliance success. The commitment of senior management of all parties involved in the strategic alliance is often a critical success factor. Senior management's commitment to an alliance is important not only to ensure that the alliance receive the necessary resources, but also to convince others throughout the organization of the importance of the alliance.

They maintained that by committing human and financial resources, time, and a great deal of attention to overcome the differences within the partnership, the management of UIP tries to balance their values in order to avoid conflicts (Elmuti *et al.*, 2005). For UIP to be successful, Cyert and Goodman (1997), have identified a number of contributing factors, including support from top executives, perceived importance of the relationship, level and frequency of communication, well defined conflict resolution procedures, external competition as a motivator, portable technology, generalizable technology, and experience in working with other organizations. These relationships are largely influenced by the people involved in these relationships and by the organizational cultures of both partners (Plewa and Quester, 2006).

Strategic alliance partners should be selected based on past experience of such interactive ventures, their expertise in the similar operation and their culture fit between the two entities. According to Cyert and Goodman (1997), success in university and industry alliances is often measured in terms of 'the number of new products, publications, patents, students trained, students hired and new enterprises started, as well as some intermediate out comes.' Cost benefit analyses to a great extent determine the success or failure of such partnerships. Firms generally consider their strategic alliances to be success story if the benefits reaped were greater than the costs incurred. Timely and effective communications among the partners plays a vital role in the effectiveness of strategic alliances. Without effective communication, alliances will inevitably dissolve as a result of the doubt and mistrust which surface during the execution process (Hsieh, 1997).

Hunt *et al.* (2002) regard trust, commitment and communication as success factors, for effective and successful alliances between university and industry. At the same time, how a linkage mechanism is managed will also affect performance. In conformity with this view, one industrial observer estimates that only four percent of university-based centers actually exceeded corporate expectations (Hesselberth, 1991). To put it differently, decisions about which specific UIP mechanism one chooses (e.g., affiliate, institute, center) and how well one manages that form will ultimately influence the kind of outcomes one will attain (Gray and Walter, 1998).

Budding UI relationships necessitate that universities must get involved in research that industry deems valuable. Similarly, industry must be willing to employ the types of research that universities are conducting. Key individuals, (champions) can serve an important role here, who ensure that there is frequent, on-going, and personal involvement between university researchers and industry managers (Evans *et al.*, 1993; NSF, 1982a). However, instead of its positive and fruitful outcomes a number of forces work against such collaborative ventures. The inherent diversity in the organizational philosophies, values and functions of the two constituting partners hinder development of an effective UIP.

### ***Barriers in effective UIP***

Researchers have identified scores of complications, which have literally hindered the effective collaboration between academia and industry. Irrespective of the size of enterprise, Corsten (1987) has underlined the following factors as potential barriers to cooperation with academics: (1) unfriendly attitude of some university professors and their reluctance to cooperate with industry, (2) university researchers/ faculty and businessmen tied up with divergent systems of values, (3) irrational inclination towards perfectionism, (4) lack of regard for commitments, (5) lack of effective communication, and last but not the least (6) the confidentiality problems.

Apart from this, one of the most serious prevailing concerns in the universities as noted by Davis (1996) is the likely misuse of intellectual property prior to the same can be patented. Secondly, delay in the publication of the research findings due to commercial obligations and sensitivity has always been a source of deep nuisance for the researchers as researchers build their reputations on published results. Contrary to that there is a common misconception prevailing in industry about the role of research in the seats of advanced learning. Contemplating, 'such differences in outlook emanating from entirely different environments, one could hardly be blamed for thinking that the two rarely find common ground on which to cooperate (Davis, 1996).' These barricades are more pronounced in terms of functional, operational and cultural disparities between the two institutions.

### ***Gaps between university and industry***

In the recent past, there has been recorded a phenomenal increase in cooperation between industry and university for its obvious productive outcomes. However, in lieu of its encouraging results, numerous factors hinder its full outgrowth. The inherent difference in the structure, culture, mission, policies, objectives, norms and values of the two partners work against effective UIP. Obviously, the university and industry are diametrically opposed in terms of diverse functions. There has nothing been found like each other. Both the distinct entities continue to follow very divergent pathways in terms of structure (problem-driven vs. disciplinary), time horizons (short vs. long), and goals/values (profit vs. knowledge dissemination) (Fairweather, 1988). Cyret and Goodman (1997) in their study have discussed in detail the widespread differences between academia and industry, which are summarized here:

#### ***Structure:***

University, across the world has having well-defined autonomous self-contained kind of set up, characterized by freedom of research and development activities, while the industry has formal hierarchal style of management with little freedom for such ventures. Universities by and large are public organizations and are therefore organized

very differently from the companies that are profit driven and have well-established management structures.

***Culture:***

According to Samson and Gurdon (1993), cited by Oyebisi, Ilori and Nassar (1996), ‘academic scientists live in a culture which is peer group oriented; peer recognition and tenure provide motivation and security within academic structures in which they function fairly independently. In contrast, in business culture financial performance principally influences rewards, a clear hierarchy exists and job security is limited at the best of times. Reaching results quickly and swiftly is commonly regarded as desirable in commercial world. In academic circles the assumptions are often conflicting. Fast results are associated with research being carried out in haste and not sufficiently authenticated (Rappert *et al.*, 1999).

***Product:***

As part of its mission university creates and disseminates knowledge and ideas, while companies manufacture products (goods and services) in a highly competitive environment. The end products of these two institutions are entirely different. The university faculty members work for a much different product: contributions to knowledge in the form of new concepts, models, empirical findings, measurement techniques, and so on. On the other hand industrial firms desire concrete applications: typically products (goods or services), but also innovative procedures or approaches to problem solving.

***Motivation:***

The driving force for faculty members is either publication of their research endeavours as part of academic requirement, or reputation and sometimes monetary reward for outstanding contribution. While the university gives these researchers remuneration and permanent employment, their standing in the field are the dominant motivating force. In contrast, such inspiration does not carry any value for most managers. For them, mere approval or appreciation of their immediate boss or hierarchical superior is vital and essential.

***Working environment:***

The two partners have essentially different working environment, languages and values that pose communication problems (Kock *et al.*, 2000). The institutions of higher learning are regarded, in many respects, as self centered, more introverted and self-contained. On the other hand the industries realize their survival depends more on fostering collaborative links with other organizations. Apart from this, both the partners usually lack basic understanding of the working relationship in each other organizations. Firms neither discern how work gets assigned in universities or how university budgets are prepared and financed, nor are they familiar with the nitty-gritty of investments practices in the university. Similarly, university partners typically do not understand market dynamics, competitive forces, consumer tastes and preferences and the incentives offered by the firm.

### ***Changing conditions:***

Nothing is as constant, in the corporate world, as change. Mergers, acquisitions, restructuring, expansion, downsizing and rightsizing frequently take place in the industrial firms. External forces such as socio-economic, politico-legal factors gravely affect the policies and directions of industrial firms. On the other hand the university environment has in general been more steady, stable and calm. However, posting-transfer on some key position can alter the direction and intensity of UIP altogether.

### ***Objectives:***

The two institutions pursue entirely different ends. The university researchers bank on basic research for conceiving new concepts, models, and measurement techniques (Ervin *et al.*, 2002). Elmuti, *et al.* (2005) are of the view that business firms, generally, focus on applied research aimed at developing marketable products or service besides discovering new innovative processes or approaches towards problem solving. For institutions of higher education, any advance in knowledge is an outcome and would be considered as an achievement, whereas in the business world, a profit-making product is the least that is expected and only a product that is successful in the marketplace will be regarded as an overall successful execution of the R&D efforts.

This disparity in philosophy, focus, and time frames has served to hinder UI collaborative efforts; particularly with respect to advancing new technologies (Reams, 1986) and this is why the efforts towards attaining the desired goal meet disastrous end.

### ***Why UIP fails?***

Keeping in view the inherent differences between the two entirely different entities the road to successful UIP has always been bumpy. Notwithstanding the fact, there are intrinsic synergies in corporate-university alliances; there are also areas of likely conflict. Elmuti *et al.* (2005) have identified a verity of reasons for the under-performance and failure of strategic alliances. The most common reasons among them are, sinking trust, frequent changes in leadership and strategy, unproductive communication, and poor integration of systems and cultures. They maintained that these rationales for malfunction are generally true for most of the strategic alliances, including university-industry alliance, which is limited in scope and requires careful execution due to its sensitive nature and complexity.

Cyert and Goodman (1997) observed that even under successful alliances, there are many obstacles for moving from prototype to commercial product. ‘The road to commercialization is made even more intricate in UI alliances because (1) university researchers typically lack the motivation and skills to move beyond the prototype, and (2) company representatives will have difficulty understanding the explicit and tacit knowledge inherent in the prototype.’ Even after the realization of desired tangible outcomes or successful innovation, there is lack of coordination in taking these findings to the marketplace (Elmuti *et al.*, 2005).

Santoro and Chakrabarti (1999) found that industrial managers traditionally look towards other inter-organizational partners when pursuing technological initiatives. To Reams (1986) this could be the result of the commercial industrial firm’s perception that academics are not on the same wavelength with the needs of industrial firms and seeing that many academics have

inclination to conduct their research on issues centered around their own areas of interests rather than on issues significant for the industry. Hagen (2002) found that instead of its fruitful outcome a third or two third of such collaborative projects fail to realize its ultimate objectives as ‘alliance/partnership process is an extremely high risk strategy at the level of implementations’.

### ***Criticism of UIP***

Gray and Wlater (1998) observed that notwithstanding the fact UI linkage mechanism has increased the amount of interaction between the two sectors, they haven’t always changed the way participants interact. In truth, much of the work performed through these mechanisms looks a lot like traditional academic or industrial research. Such arrangements have fueled a variety of criticisms ranging from, they offer nothing new to one side or the other is being exploited (Brooks, 1993).

It is said that university-industry links threaten traditional research and scientific values, and adversely affect academic life and work. Turpin and Hill (1995) explain the entire situation: ‘many university academics appear to welcome the new directions in research and science policy at both government and institutional levels. On the other hand, some academics resent the new directions and in particular the intrusion of commercial values and what they see to be a steady loss of independence and autonomy over academic work. This situation often creates an uneasy cultural divide.’ The major criticism made by the experts, from time to time, is that the entire effort of UIP is aimed at promoting the cause of private sector at the expense of national exchequer. Stephen (2001) is of the view that academia industry alliance may have negative effects on education, including content and quality of teaching and teachers–students relationship as the teachers associated with such partnerships would spend less time on teaching and students supervision. Issues of secrecy, the cornerstone of these interactions may cause conflict and diminishing trust between supervisors and students.

Such interactions, as observed by Nelson (2001), may cause degradations of the culture of ‘open science’ (free exchange of and disseminations of innovative ideas among faculty members and students). Despite the fact, ‘industry has much to gain through cooperative relationships with universities, collaborations with investigators in universities can sometimes compromise strict confidentiality. Moreover, academic researchers need to publish their findings on a regular basis is in conflict with industry’s tradition of withholding proprietary discoveries until patents are filed or, possibly, even until they are defended. Another drawback will be the loss of complete control over the directions of research funded by industry (Mak, 1995).’

### ***Role and function of university***

University is a place of advanced learning where students carry on their education after school or college. It is an educational institution of the highest level offering various program of graduate and post graduate studies, with one or more affiliated colleges, and authorized to confer various degrees i.e. bachelor’s, master’s, and doctorate’s. Originally, the word ‘Academia’ has been derived from the Greek word ‘Akudemein’, which was the name given to the garden near Athens dedicated to the local hero Adademos. For some time it was used by Plato and his disciples for teaching and learning purposes. The obligation of academia is traditionally, therefore, to the people of the entire world, and its aims are to acquire and disseminate knowledge and to promote progress and development of the nation states (Mak, 1995).

Universities are primarily concerned with providing education and maintaining an environment which fosters freedom of research and investigation for extending the frontiers of fundamental knowledge (Brown and Brien, 1981). Traditionally research in the seats of higher learning has been concentrated on discovering and disseminating basic forms of knowledge and integrating this knowledge into an overall learning agenda. Likewise, academics focused on revealing new scientific knowledge, useful for providing long-term insight on basic and applied research issues, which become the foundation for training and grooming of future scientists, engineers and researchers (Reams 1986; Santoro 2000; Elmuti *et al.*, 2005).

The main functions of the present-day university include the triad of teaching, research, and service (Santoro, 2000; Phillips, 1991). According to Readings (1996) the entrepreneurial university assumes a ‘third-mission’ of economic growth and development in addition to research and teaching, though the precise shape this might assume fluctuate such that different scenarios of academic development can be projected. Entrepreneurial university refers to that which acts as agent of innovation and play due role in national economic development. In a knowledge-based economy, (economy which considers knowledge as the most important source of economic development), the university becomes a key element of the innovation system both as human capital provider and seedbed of new firms (Etzkowitz *et al.*, 2000).

### ***Role and function of industry***

The word ‘industry’ has been derived from the Latin word ‘industria’, which originally meant ‘business’ and ‘diligence.’ Very lately, the meaning drawn from it has been organized creation and production. In other words it is the set of people or companies engaged in a particular kind of commercial enterprise. The progress of an industry is dependent on skilled workers, capital, and goods that are competitive. It is driven by economics and, thus, one of its tenets is the generation of profits. This, of course, means that ‘new products must be developed, new technologies created, more efficient methods of manufacturing devised, and a system of establishing patents must be devised to protect inventions.’ To achieve this agenda, industry needs to recruit qualified workers, engage in advance research and to develop linkages which are regarded as essential for increasing market share and achieve competitive advantage (Mak, 1995).

Industries are primarily concerned with utilization of existing knowledge in the commercialization of new and improved products and in improving industrial processes (Brown and Brien, 1981). According to Porter (1985) the ultimate mission of any industrial firm is to enhance its competitive position and maximize shareholder capital. It needs no mention that the industries cannot achieve competitiveness and major breakthrough without research and development (R&D) operation. In general industrial firms are mostly interested in utilizing the results of the research to solve applied problems of immediate concern so that they can maximize their earnings and add to the shareholders investment (Berman, 1990).

### ***UIP and role of the government***

In the changing scenario the boundaries between public and private sector, university and industry are increasingly disappearing, giving rise to a system of overlapping interaction which did not previously exist. Subsequently, new organizational environment and cultures emerged in which industry; government and academia tend to integrate their own interests and goals while carrying out and regulating research and economic activities. University-industry-government

relations can therefore be regarded as a Triple Helix of emerging channel of communication (Etzkowitz and Leydesdorff, 2000).

As traditional linking mechanism between universities and industry may not be adequate or flexible enough to meet the challenges of the contemporary complex world (Brown and Brien, 1981), it is therefore suggested that, in order to create an environment more conducive for developing close nexus between universities and industry, the government should come forward to bridge the divide. Triple Helix model provides for effective role of the government to fills the gap between university and industry.

The Triple Helix (TH) is an innovation model where university, industry, and government work together and interact closely as equal and independent partners where each partner assumes some of the capabilities of the other in such a way as each institution maintains its primary role and distinct identity. This model suggests that the interaction among university+industry+government is the key for improving the environment for innovation in knowledge-based society. Under this model industry operates as locus of production, university as a source of knowledge and technology and the government as the source of contractual relations and funding that guarantee smooth interactions between all the three partners (Etzkowitz, 2003).

### ***Role of the champion in UIP***

Individuals who play a lead role in UIP are regarded in our study as champions of effective UI relationship. According to Santoro and Chakrabarti (1999) champion is the key player in the entire linkage game. For smooth functioning of UIP individuals who understand the nature of the divide between university and industry and discern how to work proficiently within these fundamentally diverse environments, appear particularly critical (Plewa and Quester, 2008). Underlining the salience of their decisive role in UIP, Schon (1963) stated that ‘the new idea either finds a champion or dies.’

The literature on the role of champion has described champion and championship behaviour in various different ways (Plewa and Quester, 2008). The champions exhibit the ability to promote the cause of mutual relationship (Santoro and Chakrabarti, 2002) and secondly demonstrate the enthusiasm and intrinsic motivation to succeed at any cost (Irwin et al., 1998). They are highly motivated, with ‘never say die’ passion for work in diverse environments, in addition to sustaining the effort with focus on long-term relationship (Plewa and Quester, 2008). As observed by Howell and Shea (2001), the essential trait of the champion is conviction, involvement and persistence under adversity.

From the champion we mean the team leader, reasonably qualified, exceedingly experienced in both the environment, having the desired thrust, keen interest and will power to make things happen in the face of all challenges. The champion has the ability to promote the cause of the relationship (Santoro and Chakrabarti 2002). In other words, champions are individuals within an organization that make good use of structural characteristics (individual’s physical position in the formal hierarchy and informal networks) and personal characteristics (individual’s personal skills and physical traits) to influence organizational dynamics in order to advance new ideas and initiatives (Chakrabarti, 1974; Pfeffer, 1981).

## **METHODOLOGY**

To the best of our knowledge very little research has been conducted in the field of UIP in Pakistan. Various dimensions of this concept are yet to be thoroughly investigated with special reference to NWFP. In view of this, qualitative research method has been adopted which is valuable for the exploration of new dimensions and their interrelationships, and to gain an in-depth understanding of the ground realities. In light of a thorough literature review, data has been collected via telephonic interviews and face-to-face in-depth interviews. Telephonic interviews were conducted with key informants both from universities and industries. These informal telephonic interviews were used as a base for the in-depth face-to-face interviews. A series of in-depth face-to-face interviews were subsequently conducted with the key informants who remain involved in UIP in NWFP. These include five interviewees from industry (I-1 to I-5) and five from university (U-1 to U-5). As very few people understand the nitty-gritty of this concept, therefore, snowball sampling technique was used to identify these key informants. Snowball sampling utilizes referrals of identified members of the target population to identify additional participating members. To keep bias to the minimum, however, interviewees were chosen to represent a broad range of individuals from various different institutions and industries. Six out of ten of the interviewees (three from the universities and three from the industry) had work experience in UIP whereas four out of ten of the interviewees (three from the universities and one from the industry) had previous experience of working in both the environment. It is assumed that the experience of working in multiple environments and in the UIP ensures a deeper understanding of the issues of both the environments. Characteristics of the respondents from university/industry are given at **Annexure-I**. After a thorough literature review and telephonic interviews two sets of questionnaires were developed one for industry and the other for university given at **Annexure-II**. This allowed a systematic approach to a series of interviews without limiting the opportunity to uncover and explore new dimensions of the issue. Sometimes, interview sessions were repeated in order to have a better understanding of the difference of opinion. Notes were taken during the interviews. After each step, data was recorded and analyzed both during and after data collection. Based on the literature review, telephonic interviews and in-depth face to face interview analysis of the data was made. This was aimed at having a systemic comprehension of the different dimensions of practical application of UIP in NWFP.

## **FINDINGS**

The findings of the study have been organized in a methodical way as follows. Firstly, the rationale for, ‘why no strategic linkage has been established between university and industry in NWFP’, has been assessed. Secondly, the strengths and weakness of both the university and industry are thoroughly examined and discussed. The problems being faced by both the industry and university in NWFP vis-à-vis, university industry linkages are discussed in greater detail. This is done in order to have an idea of the ground realities so that a viable mechanism can be devised for planning, developing and sustaining an effective UIP in NWFP. It was found that each partner has a pie in it. Lack of awareness, paltry interest and realization of its potential, in both the circles (the academia and industry), did not allow UIP to flourish. Lack of government patronage, weak industrial base and poor public support are the cause of serious concern. Apart from this, the university has not assumed the role of entrepreneurial university, whereas the industry has short-term focus with moneymaking orientation coupled with blurred vision. It was found that the government has a major role to play in the entire episode. By providing legal cover, ensuring level playing field and bringing the key stakeholders together meaningful

interaction can be substantiated. The prospects of such joint collaborations have always been overwhelmingly rewarding, provided that these are carried out meticulously.

***Why have no strategic partnership been established between university and industry in NWFP?***

For the last 60 years no effective partnership has been established between universities and industry in Pakistan. Our data revealed that all the interviewees agreed on the same point but they identified more or less different antecedents for the missing link. For example (U-3) and (U-5) were of the opinion that:

In fact there was some informal kind of collaboration already in practice between the two institutions since long. For instance students internship programs, joint capacity building and training activities, and apart from this some of the faculty members here and there worked for industries in individual capacity. However, the same concept has never been institutionalized for obvious reasons. The prime important is the lack of government patronage, lack of policy support and mostly due to lack of understanding of this concept on part of both the campus and industry. It is very recently that the Higher Education Commission (HEC) realized its significance and took initiative and finally started working on it.

To establish such intimate relationship has not always been a plain sailing. It is a two-way traffic. Very hard to manage (U-1). While delineating reasons for the failure of the concept to take firm roots in our set up (U-5) further elaborated, ‘the same phenomenon has not been institutionalized partly due to lethargic attitude of provincial government which never took such bold initiatives and partly due to the lack of interest on the part of industry, as the industry has not realized the potential of such interactive undertakings.’ Industry in this part of the world lacks the right kind of exposure to collaborative undertakings and is critically deficient in realizing the prospects of such enterprises and has never been fascinated by the idea for the share lack of confidence to grow and flourish (U-3).

The culture of such interactive ventures has not been developed in this country until now. A great majority of our academicians and a great deal of our industry are not even aware of the basic philosophy of UIP (U-2). (U-1) considers lack of awareness as a crucial element for the failing to tap the potential of UIP.

Awareness, to me, lack of awareness is the critical part. Common man generally inquires ‘what is the role of industry in university and what is the role of university in industry?’ University is university, industry is industry. Both are poles apart. There is no point in their friendship.

Mak (1995) has almost similar views, ‘one main question remains: why would two sectors of society with such different fundamental philosophies increasingly choose to enter into collaborations?’

Such complex undertakings do not take place in vacuum. In the entire world whenever and wherever such collaboration has been initiated the respective governments played an anchor role (U-2). The interviewees developed some degree of consensus on this point – failure of the policy makers to promote the cause of UIP in the country. To put in (U-3) words, ‘the

government are supposed to frame policies, devise mechanism with close association with key stakeholders, provide funding and, above all, made available here for the idea to flourish.’ There is serious communication gap between the two and very little effort has been spearheaded to bridge the gap. There is lack of understanding of each others problems, each others potential and working relationship (I-3).

(U-2) is of the view that: ‘sluggish attitude on the part of academia, I would say is the major factor responsible in this regard. Universities never approached Industries with substantial problem resolving recipes, marketable ideas and quick solutions of their technical problems. If there is any contact, it is very personal sort of affair.’ (U-3) came up with something different. ‘There is lack of trust, confidence and commitment on part of both.’ He further elaborated that education imparted by our universities is in no way tailored with practical work life. Look I am running my own business, my university degree has no contribution in the affairs of my firm. Linkages between the two are almost non-existent. The efforts of HEC in this regard are superficial rather than practical, one has to blame the faculty members for their negative attitude to work with the industry (I-1).

### ***What are the strengths and weakness of universities in NWFP in relation to UIP?***

The universities in NWFP have become more or less traditional teaching institutes, mainly concerned with producing poorly skilled and inadequately trained graduates, which are of little or no use of industry. Our data revealed that almost all the interviewees expressed the same concern, however, some of the respondents came up with startling revelations. For instance (U-5) stated that for a variety of reasons the capabilities of the university research ventures have become seriously affected. Industries need skilled professionals. Universities failed to meet the same need. This is a matter of serious concern. (U-3) is of the view that: ‘in some universities and in some of the areas we have excellent researchers with modern laboratories and latest equipment, capable students and congenial environment for research and enquiry but the researchers face serious problems regarding funding and secondly how to market their innovations’. In the same vein (U-1) added that the core job assumed by our universities is just teaching without playing any effective role in the overall economic development and social welfare of the entire society. (U-2) explained the entire situation:

As a matter of fact, the culture of research has not taken firm roots in our campuses for obvious reasons. There is an acute shortage of state of the art labs and sophisticated equipment. If some of those are available with a few well-established institutes like University of Peshawar and University of Engineering and Technology in that case there is lack of qualified faculty and skilled researchers to utilize those sensitive and sophisticated equipment. When you talk about training there are very few opportunities available for the capacity building of the researchers.

Brown and Brien (1981) in their study observed a number of factors responsible for poor show of the institute of advanced learning. Those factors commonly include, the deteriorating financial positions of universities, lack of the culture of genuine research, reduced opportunities for career growth of young researchers and the growing ‘unfaculty’ situation and obsolescence of research equipment. (U-3) was of the view that our universities miserably failed to win the confidence of the industry. Key strengths and weakness of university are given in **Table-1**:

*Table-1 - Strengths and Weakness of the University*

<b>Strengths</b>	<b>Interviewees</b>	<b>Weaknesses</b>	<b>Interviewees</b>
Exquisite researchers	U-1, U-5	Lack of culture of research	U-1, U-2, U-3, U-4, U-5, I-1
Capable students	U-3, U-4	Involvement of faculty in politics & hostile attitude of researchers	U-4, U-3, U-5 U-2
Some sophisticated Equipment	U-1,U-2	Procedural delays in research funding	U-2,U-3,U-5,U-4
Some excellent Laboratories	U-4, U-5	University education is not tailored with practical work life	U-1, U-2, U-3,
Congenial environment for research	U-1,U-4	lack of dynamic administrators	U-1, U-5, U-4, U-3
		Lack of realization of potential of Linkage with University	U-4,U-3,U-5 U-2
		Shortage of qualified researchers	U-1, U-3, U-5 U-2
		Lack of proper supervision and guidance in research work	U-2, U-3, U-5 U-2
		No vision	U-2, U-3, U-5
		Lack of opportunities for training, growth and promotion of young researchers	U-1, U-2, U-3 U-4
		Lack of credibility	U-2, U-3 U-4

The university is more bookish, with shortage of dynamic administrators. The research undertaken in campuses is resource based and the faculty more concerned with promotion, grades and politics, you name it. Universities think their role ends as soon as the students get degrees. No thinking is spared regarding what these graduates will suppose to do once they complete education. Are they prepared to meet the challenges of the real world? I do not think so (U-2).

The major failing of the university is that the institutions of higher education have not been able to develop effective coordination with industrial firms, as we do not have proper guidance and an effective indigenous mechanism for this purpose (U-3). Institutes of higher learning have their own set of problems. The private sector universities are more keen in making money. There is nothing like research there (I-5). I strongly feel that the faculty members are unwilling to visit industries very frequently. To be very honest no university or faculty has ever contacted us in this regard (I-1). Universities in NWFP have been subjected to extreme financial crisis due to ‘unprecedented and un-bearable’ budgetary cuts on the recurring grants. The major portion of the recurring expenses goes towards payment of salaries (about 70%). Additionally, the adverse effects of inflation, salary/pension increase by 20%, and utilities have struck the universities a grievous blow, which may cause some to collapse altogether. While old universities have been badly mauled by this financial crisis, the very survival of the new universities is at stake. In such conditions, the universities can’t think of such ambitious schemes (U-5).

***What are the strengths and weakness of industries in NWFP in relation to UIP?***

Industries are primarily concerned with the utilization of existing knowledge in the commercialization of new and improved products and in improving industrial processes (Brown and Brien, 1981). In Pakistan industrial firms in most cases do not possess the required confidence (U-3), will power and essential financial muscle for investment in R& D allied activities (U-5). Industry here has traditionally been engaged in ‘me-too-production’ (producing

the same products which other produce), which amply demonstrates that the industry is trend follower not the trendsetters. Moreover, the industrialists here are mostly risk averse. There is no innovation taking place around here in our industries (U-3). (U-1) underscored the problems of industry in NWFP:

Industrial sector in the province is having its own concerns mainly related to sky rocketing prices of energy sources, soaring taxes, insecurity, and government apathy. The general atmosphere is not congenial in any way for investment and investors are shy off from investing in new enterprises owing to bureaucratic red tap and increasing militancy in the neighboring tribal belt. Apart from these, the industry does not have the necessary foresight.

(U-2) added that, ‘inconsistent investment and industrial policies, with occasional support for technological innovation within the firm, are the hallmark of our industrial base. No meaningful and sound inter-organizational linkages are being established.’ Industries in NWFP, in fact, are not competitive and are operating at a very low end of technology. Most of the firms lack in-house R&D design and engineering capabilities. A very small amount of investment is being made in the capacity building of human capital (U-2).

Pakistani universities have a poor track record as far as linkages with industries are concerned. (U-1) explained his point as, ‘indeed, owing to serious deficiencies in developing indigenous capabilities and enhancing competitiveness, the performance of Pakistani firms are not commendable compared to those of foreign countries. Generally, top class researchers, engineers and skilled professionals are not sufficiently available in the industries in Pakistan.’ Of course there are opportunities, we have abundant cheap labour, big untapped market and strategic location but there are few who are committed to the cause and are willing to take risk (I-5). Close proximity of industrial zone with university is one of the major strength of the industry. Even one of the campus of a well-reputed national university is located in the heart of industrial zone. Our culture and tradition of meeting all and sundry may also be a big plus for allowing the linkages to flourish (I-1). Major strengths and weakness of industry are listed at **Table-2**:

*Table-2 - Strengths and Weakness of the industry*

<b>Strengths</b>	<b>Interviewees</b>	<b>Weaknesses</b>	<b>Interviewees</b>
Close proximity with University campuses	I-1, I-4	Lack of confidence, trust and interest	I-4, I-2, I-3, I-5
Socio-Culture factor	I-1, I-3, I-4	lack of R&D facilities	I-2, I-3, I-5 I-1, I-4
Conducive environment for learning & training	I-1, I-4	lack of concern for collective cause	I-4, I-3, I-5 I-2
Practical work life	I-2, I-5	Risk averse	I-3, I-5
		lack of dynamic managers	I-4, I-3, I-5 I-2
		Lack of realization of potential of linkage with University	I-1, I-3, I-5 I-4
		Lack of training opportunities	I-4, I-3, I-5 I-2
		Lack of skilled human resources	I-4, I-3, I-5 I-2
		No innovation	I-1, I-3, I-5 I-2 I-4
		No vision	I-4, I-3, I-5 I-1

### *How to develop strategic alliance between universities and industries?*

In the developed countries both the university and industry in individual capacity have developed core competencies by producing quality products and delivering quality of services in terms of knowledge dissemination, conducting quality research and developing innovative ideas. Core competencies are the things with an organization can do exceedingly well (Wheelen and Hunger, 2000). UIP added value to it by means of binding both the partners through an effective alliance.

Our data suggest that industry and university in NWFP are growing with the snail pace. If the envisaged UIP has been effectively established at this point in time, it would ultimately result in astonishing tangible outcomes. (I-5) suggested that in order to realize the full potential of such endeavours the university will have to put its own house in order by meeting the needs of industries through applied research. Such kind of partnership can be maneuvered through continuous efforts, trust and effective communications. (U-5) elaborated his point saying that: ‘one thing which is of vital importance is that drastic changes are required in the university set up to transform the contemporary trend of producing poorly trained graduates to a culture of research and investigation. Pattern of education, particularly in the professional disciplines i.e. engineering, IT, management sciences and pharmacy needs transformation on the lines of medical education. For this sweeping reforms are needed in the existing set ups of universities.

Many universities have undergone considerable reorganization. Traditional ‘departmental’ boundaries have been removed; research is thriving by bringing together scientists from different disciplines and establishing teams of sufficient critical mass within an environment that provides essential and state of the art equipment. Resources are used effectively and efficiently and, within such an environment, ideas can flourish and speculative lines of investigation can be pursued alongside those of a more obvious and immediate value.

But simply pushing the two partners into an arranged marriage is unlikely to succeed; there needs to be a structure and carefully worked out process to make a success story out of the partnership (Bower, 1992).

(U-2) called for positive government support. ‘There is a need for a visible and viable government commitment for enhancing innovation and productivity.’ To restructure relations between industry and public sector research organizations through government interventions will be of immense assistance. (U-1) stressed the need for each campus to make formal bonds with business concern. Slatyer (1994) is having the same opinion, ‘it should be made mandatory that one university build partnership with at least one industrial partner.’ Davis (1996) found that a few years ago the government of UK decided that one of the steps it could take to improve the economic prospects of the country is effective UI liaison. The government encouraged collaboration between universities and industry and stimulated universities to pursue this aim. Several universities established science parks; separate buildings on campus where university faculties or departments could carry out research with industrial partners.

The Government’s role in forging appropriate university-industry linkages by adopting a coordinated approach will be an integral element in the success of our innovation and productivity endeavors and in meeting the challenges of the future (Brown and Brien, 1981).

Champions can play a vital role here. The job is to identify those individuals who have kept their enthusiasm by developing and maintaining meaningful relation with industry despite all odds. The pool of these individuals can act as a role model for UIP. In fact, some very committed individuals from across the universities of Pakistan can bring about the requisite changes in the behaviour of at least the management and faculty of the universities (U-2). According to Davis (1996):

Clearly, individuals are needed who understand these differences and act to reduce them. Within the universities it is necessary to have people who appreciate the pressing needs of industry to develop and market products ahead of competitors. Within commerce individuals are needed who appreciate the functions and ethos of universities, who understand the possibilities when creative minds are encouraged to follow their own instincts. They must also have patience as this process follows through to a truly innovative discovery and then provides the driving force to see its application in the commercial world.

(U-4) was of the view that indeed here is a dire need for setting up a working mechanism like a forum of university teachers and entrepreneurs to take care of research and development requirement at particular industry or sectoral level to stimulate the country's manufacturing activities.' I think the university should take the initiative by involving the industry (U-3) and penetrating into their domain (U-2).

The chamber of commerce and industries, industrial associations, academia and HEC should have joint forum to discuss these issues regularly and frequently. A meeting in a year or a seminar once in a while wouldn't work. There should be a standing committee comprising of all major stakeholders to meet quarterly, to discuss their concerns and devise mechanism for meaningful collaboration. Imported schemes wouldn't work. Carrot and stick approach must be adopted for effective implementation. Provincial department of commerce and industry should provide for regulatory framework and take legal action against those industries that have failed to established liaison with academia. Faculty members to compulsory spend 20-25 days in summer vacation in industry and come up with publications on practical problems for which extra remuneration may be allowed to them (I-1).

### ***Are the universities in NWFP prepared for the kind of partnership?***

The data revealed that the universities in the province have the potential to play a lead role but there is a dire need to put them on the right track. University will have to come up to play due role to meet the challenges of knowledge-based economy. 'Well, yes. If not, they can be made prepared (U-4).' However, a little amount of spadework would be required. Actually one has to tell them, that this is the priority area and this is the thing that needs to be undertaken at any cost (U-2). (U-1) is having almost similar views:

In some cases we have excellent facilities and some sophisticated equipment like electron microscopes, whereas, scientists in developed countries are still doing it on dummies. Apart from it there are some excellent researchers available with us who can be of great help to develop the much-needed culture of inquiry to facilitate UIP.

All this depends upon the leadership of the university. If the top brass of the university are dynamic, they, of course, can steer the ship in the right direction. Those who took the initiative would definitely take the lead, those who didn't, would miss the train (U-4). It is a competitive age and the parents look to the end product of the university. If the graduates of an institution are good at finding right places in job market the reputation of the university goes up otherwise they would fail, this is why the universities have to give it a serious thinking (U-2). I would straightaway go for it, although it is costly and the outcome is not tangible, but we have to take chances, to further the cause (U-5).

***Are the industries prepared for this kind of partnership?***

‘Well, I seriously doubt as we do not have that broad based industrial base. We have very few industries, with poor R&D activities (U-1). No, no way, but we have to convince them that the university is committed about making positive contribution (U-2). It is a long, extensive and steady process. It would take sufficient time to thrive and of course it would grow only with the passage of time (U-3). Untiring efforts would be required to bring industries to the level where productive liaison can be established between the two entities. One has to take both the partners into confidence to bring them on board (I-5). Partly, yes, but you have to involve them, give them ownership in the program. In the past such endeavours miserably failed as the industry did not own those schemes (I-1).

***Have you any conceptual model for bringing university industry close to each other in NWFP?***

Industrial firms and universities can collaborate through a diverse mechanism of relationships ‘having varying degrees of formality, monetary exchange, resource dependency, and commitment’ (Santoro, 2000). It depends upon the understanding of the key stakeholders to devise a flexible mechanism for bridging the divide. Above all this complex kind of joint venture between the two cannot be imposed on a gunpoint. It calls for confidence building measures, commitment and a positive attitude on the part of the people responsible for bringing in the desired change (U-1). The idea of a separate organization (cell or unit) for UIP is perceived as a very effective mechanism. Since, it facilitates the collaboration of campus and firms by creating a common identity with a mutual vision and mission (Rohrbeck and Arnold, 2006). Based on their experience of one and a half years, they identified some best practices for creating effective UIP such as: (1) creation of a mutually shared mission and goals, (2) creation of an environment of trust and transparency, (3) clear policy on publication and Intellectual Property Rights, (4) co-location, shared and open office space and team-building activities and last but not the least (5) clear division of labour and management with different key performance indicators. (U-3) is of the view:

Well, one thing I would suggest rather strongly recommend, i.e., that each university should have a separate, full fledged, university industry liaison cell, manned by handsomely paid capable and committed employees with rich experience in both the environment, hunted after thorough probing and assessment, responsible for the entire schemes of the things and perform as ‘champions’. The cell will identify core departments /institutes and industries which may possibly be considered as ideal for such kind of collaboration. The cell will also identify committed people of these departments/institutes and provide a

platform to facilitate frequent visits, meetings, seminars, workshops and research collaboration between university and industrial partners.

The HEC can play a major part in the entire scheme. The composition, ToRs and agenda of the said standing committee should be the prerogative of the HEC taking all the major stakeholders in confidence for effective execution (I-1).

### ***What is the future of university industry linkage in NWFP?***

Looks very promising. I do not have an iota of doubt in my mind that we can't do it. If other people can do it why not we. But things can't take place in the air. Of course a holistic approach is required to be adopted, taking all the key stakeholders on board (U-2). It all depends upon government commitment, political stability and policy continuation, which will allow such interaction to thrive and prosper (U-3). Keeping in view the prevailing sorry state of affairs both in the university and industry and strategic nature of their potential needs we realize there would be even greater role for UIP in future (U-1). If we didn't realize its significance there would be even severe crises in the future in terms of unemployment, inflation shortage of skilled people etc. 'In the face of all odds, to me the future looks bright, to hope against hope, let's hope for the best (U-2).' Historically speaking, all such endeavours in the past miserably failed without attaining the desired results or producing the slightest of impact. This time the HEC has taken up the cause and undertaken major initiatives, which are destined for failure if well-deliberated and timely action were not taken to take all the stakeholders in confidence (I-1). (U-5) was optimistic about the outcome of such interactions: 'There will be every likelihood of success, if both the federal and provincial governments play their cards watchfully and undertake the spade work by strengthening the required infrastructure for effective collaboration before putting the system of linkage into operation.'

## **CONCLUSION**

UIP has produced overwhelming results for the technologically advanced nations. Developing countries like Pakistan, if they want to overcome the problems of unemployment, economic degradation, and social unrest should move forward on the road towards rapid industrialization and restructuring the institutions of higher education. Once these objectives have been achieved it would become extremely easy for the government to patronize UIP to take firm roots in the society. The campus, in the first instance, must ensure that the graduates are skilled, competent and capable to meet the needs of business world. The graduates must be graded by high level of efficiency and ability to participate proficiently in R & D of an applied nature and of direct relevance to the industries.

The students should keep themselves abreast of the latest trends in the field of entrepreneurship. The students must be imparted highly pragmatic professional training at the universities. As recommended by the experts, the university graduates particularly hailing from professional disciplines like IT, Engineering, Pharmacy and Business administration must be trained on the analogy of medical students. Since the medical students during their academic life spend half of their time in hospital and half inside the campus, in the same vein, the students from other professional disciplines must be extensively trained in practical real life environment for fairly a major part of their academic life. The industries have a major role to play in these collaborative endeavours. We must learn from the best practices of advance nations. In some countries, the university qualification is regarded as only one half of the academic life of a

student, whereas for the rest half the corporations and business entities train the graduates for quite sometime which enable the students to complete their professional education.

Very effective role of industry is required in the entire process by being more receptive to the students for internship. Frequent visits from both sides needs to be encouraged. Professionals from industry must be encouraged to deliver lectures in the universities. Representatives from industrial associations and chamber of commerce and industries must also be given membership of the various august academic bodies of the university. Ironically since its inception, the successive higher education policies in Pakistan did not provide anything for the promotion of the cause of UIP. Even our existing higher education policy is not supportive, in any way, of the UI relationship. In the recent past, much emphasis is served for recruiting teachers having PhD qualification with no stress on practical experience in any industrial setting. Pure academic orientation of the teachers coupled with high qualifications does not provide any favorable grounds for interaction between the two partners.

It is highly recommended that the professional disciplines should have a great deal of teachers having hands on experience in industrial environment. The campus must make certain that its teaching faculty is copiously aware of the demands and problems of the industries. Faculty should spend at least 20-25 days in the summer vocation in industry. Ranking of the universities should be made on the basis of effective linkages with industry. Those faculty members who play instrumental role in such interactions, 'the true champions', must be given incentives and extra remuneration. While determining pay packages, promotion, extension of tenure and award of fringe benefits, the efforts of the individual faculty members in the course of developing liaison with industry must also be taken into consideration. Length of service and the number of publications should not be the sole criterion to gauge academic excellence. It would not be unrealistic and highly ambitious to identify these true champions and confer 'Champions Teachers Award' on them.

From the above discussion it has been inferred that unless and until the space between academia and industry is bridged attaining of high standards in the working of both the university and industry and realization of the goals of national economic development would be next to impossible. If we sincerely realize that in the age of knowledge-based economy, the creation, diffusion and exploitation of new knowledge will smoothen the way for our economic, political and social development. Finally, it is our share liability to promote the culture of research in our institutes of advanced learning.

## REFERENCES

- 1) Aldrich, H., 1977. Boundary spanning roles and organizational structure. *Academy of Management Review*, 217-230.
- 2) Atlan, T., 1987. Bring together industry and university engineering schools, in getting more out of R&D and technology. *The Conference Board*, Research Report #904
- 3) Azaroff, L.V., 1982. Industry-university collaboration: how to make it work. *Research Management*, 25(3), 31.
- 4) Berman, E., 1990. The economic impact of industry-funded university R&D. *Research Policy*, 19, 349–355.
- 5) Bonaccorsi, A. and Piccaluga, A., 1994. A theoretical framework for the evaluation of university-industry relationships. *R & D Management*, 24(3), 229.
- 6) Bower, D.J., (1992). *Company and campus partnership*. London: Routledge.
- 7) Brooks, H., 1993. Research universities and the social contract for science. In: Branscomb, L.M., (Ed.) *Empowering technology*. MIT Press, Cambridge.
- 8) Brown, G.E.& Brien, T.C. 1981. University-industry links: government as blacksmith. *Technovation*, 1, 85-95.
- 9) Bryson, J.M., 2004. *Strategic planning for public and nonprofit organizations: a guide to strengthening and sustaining organizational achievement*, 3rd Edition Available from:
- 10) [www.Josseybass.com/WileyCDA/](http://www.Josseybass.com/WileyCDA/) [Accessed 20 August 2008].
- 11) Chakrabarti, A., 1974. The role of champion in product innovation. *California Management Review*, 17, 58–62.
- 12) Corsten, H., 1987. Technology transfer from universities to small and medium-sized enterprises- an empirical survey from the standpoint of such enterprises. *Technovation*, 57-68.
- 13) Cyert, R.M. and Goodman, P.S., 1997. Creating effective university- industry alliances: an organizational learning perspective. *Organizational Dynamics*, 45-57.
- 14) Davis, R. M., 1996. Industry-university collaborations: a necessity for the future. *Journal of Dentistry*, 24, 3-5.
- 15) Deutch, J., 1991. Getting university-industry relations right. *Technology Review*, 65.
- 16) Dodgson, M., 1993. *Technological Collaboration in Industry: Strategy, Policy and Internationalization in Innovation*. London, Routledge.
- 17) Drucker, P., 1996. *Non-profit prophet, The Alliance Analyst*, available from: <http://www.allianceanalyst.com>
- 18) Drucker, P.F., 1979. Science and industry, challenge of antagonistic interdependence. *Science*, 204, 806
- 19) Elmuti, D., Michael, A. and Nicolasi., M., 2005. An overview of strategic alliances between universities and corporations. *The Journal of Workplace Learning*, 17, 115-129.
- 20) Elmuti, D. and Kathawala, Y., 2001. An overview of strategic alliances. *Management Decision*, 39, 205-17.
- 21) Ervin, D., Lomax, T., Buccola, S., Kim, K., Minor, E., Yang, H., Glenna, L., Jaeger, E., Biscotti, D., Armbruster, W., Clancy, K., Lacy, W., Welsh, R. and Xia, Y., 2002. University-industry relationships: framing the issues for academic research in agricultural biotechnology. Available from: [www.pewagbiotech.org/research](http://www.pewagbiotech.org/research) [Accessed 20 June 2008].
- 22) Etzkowitz, H., Webster, A., Gebhardt, C. and Cantisano Terra, B.R., 2000. The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, 29, 313–330.

- 23) Etzkowitz, H., 2003. Innovation in innovation: the triple helix of university-industry-government relations. *Social Science Information*, Vol. 42 No. 3, pp. 293-338.
- 24) Etzkowitz, H. and Leydesdorff, L., 2000. The dynamics of innovation: from national systems and 'mode 2' to a triple helix of university-industry-government relations. *Research Policy*, 29, 109-23.
- 25) Evans, D., Starbuck, E., Kiresuk, T., Gee, R., 1993. Center for interfacial engineering: an experiment in building industry–university partnerships. *International Journal of Technology Management*, 8, 622–651.
- 26) Fairweather, J. S., 1988. *Entrepreneurship and higher education: lessons for colleges, universities, and industry*. Higher Education Report, Association for the Study of Higher Education.
- 27) Feller, I., 1997. *Higher education: handbook of theory and research*, 12<sup>th</sup> ed. New York: Agathon Press.
- 28) Friedman, R. S., and Friedman, R. C., 1986. *Sponsorship, organization and program change at 100 universities*. Pennsylvania State University. University Park, PA.
- 29) Government of NWFP., 2008. About government of NWFP. Available at: <http://www.nwfp.gov.pk>. [Accessed 10 August 2008].
- 30) Gray, D.O. and Walter, S.G., 1998. *Managing the industry/university cooperative research center: a guide for directors and other stakeholders*. Ohio: Battelle Press.
- 31) Hagen, R., 2002. Globalization, university transformation and economic regeneration: A UK case study of public/private sector partnership. *The international journal of Public Sector Management*, 15(3), 204-218
- 32) Higher Education Commission, Pakistan (HEC). 2008. Our institutes. Available from: [www.hec.gov.pk](http://www.hec.gov.pk) [Accessed 10 July 2008].
- 33) Howell, J.M. and Shea, C.M., 2001. Individual differences, environmental scanning, innovation framing, and championship behaviour: key predictors of project performance. *The Journal of Product Innovation Management*, 18,15-27.
- 34) Hsieh, T.Y., 1997. Prospering through relationships, *Corporate Finance*, 8, 21-2.
- 35) Hurmelinna, P., 2004. Motivations and barriers related to university-industry
- 36) collaboration-appropriability and the principle for publicity. *In: Seminar on Innovation, UC Berkeley*.
- 37) Hunt, S.D., Lambe, C.J. and Wittmann, C.M., 2002. A theory of business alliance success. *Journal of Relationship Marketing*, 1(1), 17–36.
- 38) International Union for Conservation of Nature (IUCN)., 2008. Sustainable industrial development. Available from:
- 39) <http://www.spcs.iucnp.org/sustainable%20industries.pdf> [Accesses 16 July 2008].
- 40) Irwin, H., More, E. and McGrath, M., 1998. Relationship management for innovation: the central role of communication in Australia's participation in two hi-tech industries. *Technology Analysis and Strategic Management*, 10(4), 467-81.
- 41) Kalim, R. and Lodhi, S.A., [n.d] The knowledge-based economy: trends and implications for Pakistan. Available from: [www.pide.org.pk/pdf](http://www.pide.org.pk/pdf) [Accessed 5 August 2008].
- 42) Kock, N., Auspitz, C. and King, B., 2000. Using the web to enable industry-university collaboration: an action research study of a course partnership, *Information Science*, Vol. 3 (3), 157-66.
- 43) Lee, Y., 1998. University-industry collaboration on technology transfer: views from the ivory tower. *Policy study journal*, 26, 69-84.
- 44) Liyanage, S., and Mitcheil, H., 1994. Strategic management of interactions at the academic-industry interface. *Technovation*, 14(10), 641-655.

- 45) Mak, T.W., 1995. Funding, education, and training in the context of Industry-academia relations. *The American Journal of Medicine*, 99, 84-86.
- 46) Mead, N., Unpingco, P., Beckman, K., Walker, H., Parish, C.L. and O'Mary, G., 2000. Industry-university collaborations. *Journal of defense software engineering*, available from: <http://www.stsc.hill.af.mil/crosstalk/2000/03/mead.html> [Accessed 8 August 2008]
- 47) Meyer-Krahmer, F. and Schmoch, F., 1998. Science-based technologies: University industry interactions in four fields. *Research Policy*, 27, 835-851.
- 48) National Science Board (NSB), 1993. *Science and engineering indicators*. Washington, DC: US Government Printing Office.
- 49) National Science Foundation (NSF), 1982a. *University-industry research relationships: myths, realities, and potentials, Fourteenth Annual Report*. Washington, DC: US Government Printing Office.
- 50) National Science Foundation (NSF), 1982b. *University-industry research relationships: selected studies*. Washington, DC: US Government Printing Office.
- 51) Nelson, R.R., 2001. Observations on the post Bay-Dole rise of patenting at American Universities. *Journal of Technology Transfer*, 26 (1-2), 13-19.
- 52) Oyelesi, T.O., Ilori, M.O. and Nassar M.L., 1996. Industry-academic relations: An assessment of the linkages between a university and some enterprises in Nigeria. *Technovation*, 16(4), 203-209.
- 53) Parkhe, A., 1993. Strategic alliance structuring: A game theoretic and transaction cost examination of inter-firm cooperation. *Academy of Management Journal*, 36(4), 794–829.
- 54) Pfeffer, J., 1981. *Power in Organizations*. Pitman, New York.
- 55) Plewa, C., Quester, P. and Baaken, T., 2005. Relationship marketing and university–industry linkages: a conceptual framework.. *Sage Publications*, 5(4), 433-456.
- 56) Plewa, C., and Quester, P., 2006. Satisfaction with university-industry relationships: the impact of commitment, trust and championship. *International journal of Technology Transfer and Commercialization*, 5, 79
- 57) Plewa, C., and Quester, P., 2008. A dyadic study of “champions” in university- industry relationships. *Asia Pacific Journal of Marketing and Logistics*, 20 (2) 211-226
- 58) Phillips, D., 1991. New alliances for policy and the conduct of research and education. *International Journal of Technology Management*, 6, 478–487.
- 59) Porter, M., 1985. *Competitive advantage: creating and sustaining superior performance*, New York, Free Press, 70-8.
- 60) Rappert, B., Webster, A. and Charles, D., 1999. Making sense of diversity and reluctance: Academic-industrial relations and intellectual property. *Research Policy*, 28(8), 873-890.
- 61) Readings, W., 1996. *The university in ruins*. Cambridge: Harvard University Press.
- 62) Reams, B., (1986). *University-industry research partnerships*. Westport, CT: Quorum Books.
- 63) Rohrbeck, R. and Arnold, H. M., 2006. Making university-industry collaboration work - a case study on the Deutsche Telekom Laboratories contrasted with findings in literature. *In: ISPIM Annual Conference: Networks for Innovation*, Athens, Greece, 11
- 64) Santoro, M., and Chakrabarti, A., (1999). Building industry-university research centers: Some strategic considerations. *International Journal of Management Reviews*, 1(3), 225–244.
- 65) Santoro, M., 2000. Success breeds success: the linkage between relationship intensity and tangible outcomes in industry–university collaborative ventures *The Journal of High Technology Management Research*, 11, 255–273.

- 66) Schon, D.A., 1963. Champions for radical innovations. *Harvard Business Review*, 41(2),77-86.
- 67) Siegel, D.S., Waldmann, D., Atwater, L.E. and Link, A., 2004. Toward a model of the effective transfer of scientific knowledge from academicians to practitioners: qualitative evidence from the commercialization of university technologies. *Journal of Engineering and Technology Management*, 21(1/2), 115–42.
- 68) Slatyer, R.O. (1994), Cooperative research centres: the concept and its implementation, *Higher Education*, 28, 147–158.
- 69) Stephen, P.E., 2001. Education implications of university –industry technology transfer, *Journal of Technology Transfer*. 26(3), 199-205.
- 70) Turpin, T. and Hill, S., 1995. Researchers, cultural boundaries and organizational change, In: Simpson, R. and Simpson, I. (eds.), *Research in the Sociology of Work, 5: The Meaning of Work*. JAI Press.
- 71) van Dierdonck, K., Debackere, K., Engelen, B., 1990. University–industry relationships: how does the Belgian academic community feel about it? *Research Policy*, 19, 551–566.
- 72) Wheelen, T.L. and Hungar, D.J. 2000. *Strategic Management and Business Policy*, 7th ed., Addison-Wesley, Reading, MA, 125-34, 314.
- 73) Wu, F.S., 1999. An Empirical Study of University Industry Research cooperation-The Case of Taiwan. In: *A New Technological Landscape in Asia Pacific Workshop, Taipei, Taiwan*.

## **Annexure-I**

*Table 3. Characteristics of the respondents from university*

<b>Respondent from University</b>	<b>Experience in UIP</b>	<b>Experience in other environment</b>	<b>Designation</b>
U-1	Extensive	Extensive	Director University- Industry Liaison Cell
U-2	Extensive	Some	President of a private sector university
U-3	Extensive	Extensive	Head of the Department
U-4	some	some	Head of the Department
U-5	Some	No	Assistant Director Planning

*Table 4. Characteristics of the respondents from industry*

<b>Respondent from Industry</b>	<b>Experience in UIP</b>	<b>Experience in other environment</b>	<b>Designation</b>
I-1	Extensive	No	President, industrial association & member chamber of commerce & industries
I-2	Some	Extensive	CEO
I-3	No	No	Joint Director, small industries development board
I-4	No	No	Deputy Director, small industries development board
I-5	Some	No	Management

## **Annexure-II**

### **Questionnaire for University**

#### **Personal:**

Name: \_\_\_\_\_

Profession/Designation: \_\_\_\_\_

Experience in UIL: \_\_\_\_\_

Experience in other environment \_\_\_\_\_

Email & Contact No: \_\_\_\_\_

#### **Antecedents:**

1. Why have no strategic UIP been established NWFP?
2. What are the strengths and weakness of universities in NWFP?

#### **Prospects of UIP in NWFP:**

1. How can this partnership be established, flourished and improved in NWFP?
2. Are the industries prepared for this kind of partnership?
3. Have you any conceptual model for bringing university industry close to each other in NWFP?
4. What is the future of university industry linkage in NWFP?

### **Questionnaire for Industry**

#### **Personal:**

Name: \_\_\_\_\_

Profession/Designation: \_\_\_\_\_

Experience in UIL: \_\_\_\_\_

Experience in other environment \_\_\_\_\_

Email & Contact No: \_\_\_\_\_

#### **Antecedents**

1. Why have no strategic UIP been established NWFP?
2. What are the strengths and weakness of industries in NWFP?

#### **Prospects of UIP in NWFP**

1. How can this partnership be established, flourished and improved in NWFP?
2. Are the industries prepared for this kind of partnership?
3. Have you any conceptual model for bringing university industry close to each other in NWFP?
4. What is the future of university industry linkage in NWFP?