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ACADEMIC RESEARCH COMMERCIALIZATION IN PAKISTAN: ISSUES AND CHALLENGES

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ABSTRACT

Commercialization of academic research is considered as main tool of trade and industry growth in developed and developing countries. The growth of third mission activities in higher education institutions mainly aims at commercialization of academic research and entrepreneurial platform creation, in order to bridge the gaps between industry and academia. Innovation is the first commercial application of academic research commercialization. The purpose of this paper is to identify the current challenges and barriers that Pakistan's Higher Education Institutions are facing in commercialization activities. In this present study Delphi method is used to find out the main challenges and solutions for academic research commercialization in Pakistan. Analysis has been constructed according to the current situation of the issue. Finally, the paper concludes with the discussion of research findings.

Keywords: Academia, Commercialization of academic research, Challenges of Commercialization in Research, Pakistan

INTRODUCTION

Developed and civilized economies concentrate and stresses on research and development by all means. Academia plays a vital role in this R&D journey. The important sources of researches are universities, research centers, governmental departments, non-governmental organizations (NGOs), and industrial research and development departments. Academia acts as a main body for knowledge creation, while industry helps in the production of goods and services for the betterment of society [1,2,3,4]. Therefore, industries without the support of academia may not be able to excel. Academia produced the knowledge and industries helps to manipulate this knowledge good or services those results in overall development of trade, economy growth and progress of country. Academia and Industry played a vital role in industrial revolt in west. All the major industrial progression is due to the back support of academia [4,5,7]. Developing countries can be in row of developed world by acting on this old saying, "united we win, divided we fall" we required unity in this regard like industries and universities unity and interaction. Pakistan is far behind in academia industry linkage and R&D expenditure like other Asian countries [17]. World technological pyramid diagram demonstrates that Pakistan has inadequate R&D base as well as fragile innovative potential as compared to other countries [9]. By looking on developed countries of 21st century, it is clarified that industrial

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succession is driven by academia, unfortunately technological developments in Pakistan is in scarce [17]. In order to move towards the zenith of technological pyramid intense "innovative potential" is required which leads towards technological advancements, trade and industry growth and overall economic progress of country. In the last five years there are only 1064 "patents grants" in Pakistan. The patents grant has shown a sheer decline due to numerous reasons like accumulation of black mail box application relating to chemical products planned to be used in agriculture and medicines. Another major reason is the unstable political condition of the state [19]. Improvement and growth of R&D and innovation potential would help out Pakistan to become a manufacturer of certain revolutionary technologies in specific areas. Furthermore, it is very important to keep in

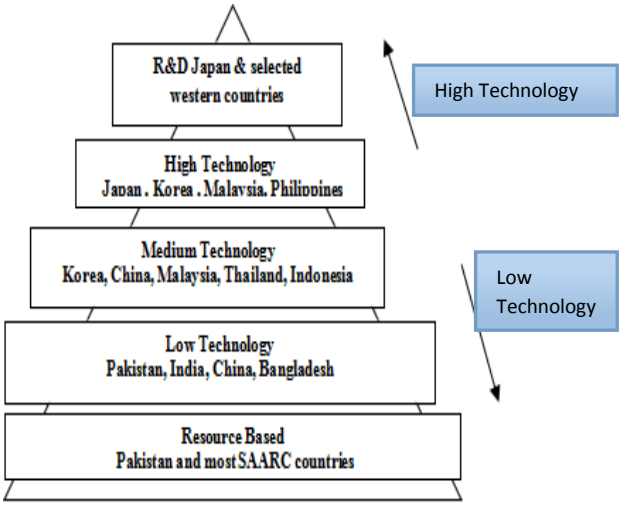

Figure 1: World Technological Status Pyramid

mind that such growth and expansion of research and development would also directly contribute towards progress of national innovation system.

Pakistan is lagging behind in terms of research and development as compared to other developing countries like Malaysia, Singapore and India. The main reason behind this is that R&D in Pakistan is still at earlier stages. Higher Education Institutions are those organizations that are drivers of education engine by imparting knowledge [7,6]. Recently, many higher education institutions have taken a step towards third mission activities assigned by the policy-makers. Universities are now pressurized to develop and maintain a sustainable academia industry linkage apart from teaching and research. Gulbrandsen *et al.*, [7] stated that role of universities as a recent information based economy has been changed that leads towards expansion of its original task "teaching.

Higher Education Institutions have now greater focus on activities related to academia industry linkages and whereby universities are now expected to play a vital role in trade and industry development. The stress is on the third mission of the universities that is academia industry linkage. Academic Commercialization movement has been determined by the peripheral conditions specifically the political condition and status of university level education, as the policy makers discourages grants and funds for higher education and they view university education as a personal and private investment rather than a public good [18, 23]. If we look at academia-industry linkages since 1990s remarkable changes of commercialization of academic research has been occurred. University's Vice Chancellors, as well as policy makers and government is emphasizing on knowledge transfer (KT), this is the most debatable and strategic issue in developing countries now a days to gain the competitive advantage in terms of income generation for universities and overall economic development of the country.

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Higher education institutions are the main partners of industries and business organizations in the journey of innovation and knowledge transfer. Industry academia linkage journey started in 1990s when expert knowledge transferred from universities to industry and it acts as a tool to gain competitive advantage [4, 12]. Higher education institutions have two main traditional tasks, teaching and research; however, commercialization of academic research has dragged the universities in the process of revenue generation and has been given the name of "Third Mission" of the higher education institutions. According to Science Policy Research Unit Report [11] “third mission” activities are defined as “creation and development of expert knowledge and transferring it to industries and business for the betterment of society and economy development”.

Developing countries are pressurized from government for academic research commercialization for industry linkages progress and growth of trade and industry which leads to overall societal progress. Universities in developing countries found themselves in challenging positions as compared to other universities of developed nations. The Higher Education Institutions (HEIs) of developing countries tend to be less funded and they do not have facilities of latest research equipment. Moreover, faculty and staff are also less qualified or on average level. In comparison with industrialized countries, HEIs of developing countries are low in academic standards. Moreover, the government and university relationship can build a transparent and strong decision making criteria [21]. Higher Education Institutions need to convert themselves from ivory tower to entrepreneurial enterprises. Since decades, main problem is academia-industry linkage that is the implicit nature of knowledge. It is the responsibility of academic scientist to ensure that their invention is relevant to the private sector [8,7].

For a developing country like Pakistan, importance of knowledge conversion to business and industries is required to boost up the trade and industry growth and the progress of country. Academic staff of higher education institutions responsibility is the creation of expert knowledge and transfer of this knowledge to industries for industrial development and academia linkages. Pakistan as compared to other developing countries has realized the importance of research and development. Higher Education Commission, (HEC) Pakistan's mission is conversion of all higher education institutions to research led university. HEC Pakistan, next five year plan is based on academic research commercialization in universities in order to change the economic structure of the country.

Higher education commission of Pakistan has pressurized all universities for the development of Office of Research, Innovation and Commercialization and these offices have taken the charge for driving the commercialization activities in public and private sector universities of Pakistan. This article describes the issues and challenges that universities are facing in path of academic research commercialization in Pakistan, and what are the difficulties that professionals are facing who are involved in knowledge production/creation activities. The present study focused on the main barriers and challenges of academic research commercialization and innovation in Pakistan. This study attempted to answer the two main questions? What are the main hurdles and problems of academic research

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commercialization in Pakistan and how these problems and hurdles of academic research commercialization in Pakistan can be solved? To answer these question secondary data is reviewed and then Delphi method is used to gather the expert views in this regard.

METHODOLOGY

The present study has a qualitative approach and Delphi method is adopted for this study. Dalkey Cyas developed the Delphi method, it is a process through which the experts' opinion and findings are collected and refined via series of questionnaires. Researcher concentration is on problem area, prospect, elucidation, feed-backs that usually endorse a list of judgments on the result of research. In this method each questionnaire is modified on the base of earlier questionnaire. In this process the research questions are answered as much as possible [12]. Delphi method is used in various studies of different fields [1,20]. This method is adopted for the making sequence of various judgments to find out the solution of problem. Rowe [2] stated that various benefits linked with the Delphi methodology as obscurity of Delphi participants; revision of their ideas (Iteration); ability to inform the participants about earlier participants views and judgments, and statistical aggregation of group responses. Tapio *et al.,* [24] stated that in the quantitative approach of Delphi method other stand on with this belief that it could be used with qualitative techniques. The structure of study is as follows:

1. Explanation of research problem specifically its nature and what are its logistical deliberation which arose from the topic.

2. Preparation of ground questionnaire that is based on literature review and the participants will be asked about the questions for next questionnaire.

3. Attaining qualitative feedback via introductory questionnaires answered by the participants. A grid of problems and solutions is achieved in this step, and also the comments of the participants on problem area.

4. Preparation of final questionnaire on the base of ground questionnaire by keeping in view the secrecy of participants' views and comments.

5. By keeping all the data in a sequence for analysis and conclusion of the research findings.

Mc Keena [20] defines the "panel of informed individuals" like participants should be aware of the topic on which the research is going to be conducted. Fifteen experts have participated in this study and shared their knowledge and views via Delphi study. Purposive sampling technique has been used to choose the cases. Experts were informed prior about the topic with the agreement to participate in this study. Data collection and analysis based on three steps that are as follows: breakthrough of the views and thinking, determination of the most vital issue and analysis of data. Furthermore, the literature highlighted two to four rounds of discussion are preferable [3, 10]. In this study we have adopted five rounds of discussion. In order to do the analysis of qualitative data, content analysis technique was used. Moreover, the data gathered on the preminilary stages were analyzed by assemblage the same issues. Respondents were assigned codes so that they can be easily traced out. Finally, the results finalized with the outcomes.

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DISCUSSION

Commercialization of academic research and technology transfer is the key of economic development and progress of country[5]. Although, the commercialization process seems to be conventional and straight, yet it has its own problems and hurdles, obviously it is a complex process of turning an idea in to creation and then gives it to a shape of commercial product/ service. The present study follows the series of interviews with expert / specialist having the knowledge of this area and has dealt with commercialization in their professional career. The obstacles and hurdles that are identified are in the context of Pakistan.

- Research and technological products are not fulfilling the need of consumer.
- How to protect IP right, rules and regulations are not properly defined.
- Need of appropriate evaluation criteria for knowledge and technology in national entity as Office of Research, Innovation and Commercialization (ORIC) are operating in Universities but qualified staff in the area of commercialization is lacking.
- Lack of interaction and linkage with the local and worldwide market.
- Insufficient venture capital for new technological investments.
- Poor coordination among big industries and higher education institutions.
- Researchers needed to be educated in terms of business courses in order to give them understanding of commercialization, as publishing is much more important in front of academic researchers as compared to commercialization.

Keeping in view the literature, most important issue is about the caliber and potential of the academic scientist for knowledge creation and academia industry linkage and commercialization of academic research. Moreover, researchers and scientist must be aware of market needs and requirements; uniformity with the market trends is of great importance. The interviewed experts / specialists believe that current researchers and innovations are not according to the need and requirements of customer need that results in wastage of knowledge potential. Intellectual Property Rights (IPR) is of great importance in academic research commercialization. Commercialization of academic research is directly linked IPR whereby without considering IP, commercialization is weird. According to the interviewee's views, existing policies, rules and regulations are not up to mark to face the challenges of commercialization. Lack of proper policies and rules is a big challenge for academic researchers to commercialize their innovation.

Awareness of Academic Commercialization aspect among researchers	**Training of researchers in terms of business courses**	**Insufficient venture capital for new technological advancements**	**Poor coordination among big Industries and HELs**
Commercialization Challenges in HEIs of Pakistan			
R&D/ technological products not fulfilling customers need	**IPR rules and regulations are not properly defined**	**ORIC offices required qualified staff in field of commercialization**	**Lack of interaction and linkages with local and worldwide market**

Figure -2 Commercialization Challenges in Pakistan

In Pakistan, Office of Research, Innovation and Commercialization (ORIC) is established in public and private sector higher education institutions but still lacking in qualified staff and experts in field of commercialization. In addition, these offices of Research, Innovation & Commercialisation are not following any national standard rules and regulations; innovation registration process is also not properly integrated and systematic. This leads to problems for investors of commercialization activities. Moreover, proper policies and rules are mandatory and they act as a first step in successful commercialization, venture capital and entrepreneurial funds are the most important topic of discussion and considered as a change agent. Coordination among big industries and universities should be align in order to enhance academia industry linkage. There is great need to educate researchers in terms of business courses as they rely on publications more as compared to actively participate in commercialization activities and academia industry linkages. This practice is necessary in order to get the maximum earning in terms of funds generation, and in the end to boost up the trade and industry growth of country and overall development and progress of society.

RECOMMENDATION

Following recommendations have been formulated to cope up with the hurdles and obstacles of academic research commercialization in Pakistan, which were classified in coding process. The main solutions are stated as follows:

- Higher education institutions must keep a balance between basic and applied research which this is very important for successful commercialization.
- Higher education Institutions must establish international research collaborations in order to promote the culture of research.
- Documentation and evaluation systems and procedures must be arranged and updated in order to protect IP rights in more sequential and better way. IP is the most important part of commercialization process and it plays a remarkable role. Higher education institutions must file patents in IPO as this is very important to protect the intellectual rights of researchers.
- Rules and regulations regarding commercialization activities needs to be revised and updated according to international standards.
- In Higher Education Institution, Office of Research, Innovation and Commercialization, should hire the staff expert in commercialization area, so that they may be able to handle the commercialization activities in better way and can charge the commercial value of their research contribution.
- Research financing must be from the governmental and non-governmental budget and handsome funding is required for commercialization activities. Lack of funding leads to failure of commercialization, so public and private sector both sectors funding must be utilize in commercialization.
- Higher education institutions must focus on human resource development in order to improve the research standard, and to

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establish entrepreneurial culture and motivate the academic researchers to be a part of commercialization and entrepreneurial activities and come up with their innovative ideas and creations to in order to get maximum benefit in form of funds generation as a result of academic research commercialization.

- Development of sale and marketing sectors in commercialization entity also plays a remarkable role in the successful journey of commercialization, as by empowering these departments will automatically eliminate most of the hurdles related to commercialization of academic research.
- Benefits associated with the commercialization activity must be shared equally among researchers and innovators as the academic researchers play an important part in the commercialization.

CONCLUSION

Commercialization of academic research and industry academia linkage is considered as most important issue practically and heretically. Moreover, there are various problems and hurdles in successful commercialization and strong academia industry linkages. Identification of these problematic areas is important in order to find out the possible way to handle the situation. This paper has pointed out the obstacles and solution of problematic areas which Pakistani higher education institutions are facing in journey of commercialization of academic research. Delphi method technique is used to get the expert views about this raising issue of commercialization and obstacles related to this area. The major recognized difficulties and hurdles in these areas are as follows: Research and technological products are not fulfilling the need of the consumer, lack of interaction and linkage with the local and worldwide market. In order to overcome these issues and challenges, road map for academic research commercialization is required in which the prior areas of research are highlighted. There is a need of suitable environment for research and development on regional and global level, proper documentation and evaluation system is required to protect the IP rights in more systematic and sequential way. Proposing suitable rules and regulations systems and updating the earlier system with modifications. Research and innovation financing must be from both sides governmental and private sector. Motivation of investor triggers the commercialization of academic research. This can be done by offering them tax exemptions, benefits must be equally distributed among the inventors, researchers and investors

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