

Case Study on: "Universities / Public / Private Funded Research Organizations Interactions:
A New Era for S&T Entrepreneurship

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*"Universities / Public / Private
Funded Research Organizations
Interactions: A New Era for S&T
Entrepreneurship*

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Indian National Science Academy-(INSA)
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***Study Handled by
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Study handled by: Natural Resources India Foundation (NRIF)

New Delhi-110087

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Chapter 4 Conclusions and Recommendations

The Case Study examined in detail the varied types of interactions between university and industry / research institutions in selected twelve institutions in India. The selection of 12 case study universities / institutions ¹covered across different regions of the country having common criteria of excellence as defined by the Government (*criteria for definition and ranking that places the selected institutions as institutions of excellence are explicitly covered in **Chapter-1** of this report*). The selection was guided by the rationale that interactions visible in these benchmark institutions would demonstrate the development of the university-industry partnership in the country. However, the policy issues / recommendations that are derived should be interpreted with this caveat *i.e.* these are based on the case study of select set of institutions.

The study has investigated the interactions of university with industry / research institute at three levels of delineation. At the first level, the linkages at the level of university as a single entity, aggregated across science disciplines were examined. Another delineation was done based on aggregation at discipline level across universities. The third was Industry having linkages with the selected university / Institutes The three levels of delineation helped to compare the linkages across institutions, across broad science disciplines, as well as the response from the Industry towards the support that they are receiving from the selected Universities / Institutes.

The secondary data collected from published reports / documents supplemented / complemented the primary data obtained from 117 faculties of science departments of all the 12 selected case study institutes. It helped to derive more meaning to the data from the primary source (questionnaire / feedbacks that were collected from interview) as well as validate the data set. The survey based data for example showed whether the department exhibited a particular type of linkage or not. The investigation through secondary sources was done to obtain the intensity and further insights of the linkages

¹ Brief Role-played by the 12 Selected Case Study Institutions & the Faculty of Sciences and, their possible interface have been highlighted in **Appendix-I**. It also gives the details of: a) Specialized database / Lab. equipment used by industries; b) Specificity of the linkages undertaken by these Institutes; and, c) University-wise major linkages (Funded Project / MoU Signed)

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that were affirmed in the questionnaire. The other set of questions were based on perception of the faculty head of the possible barriers, steps that may facilitate the collaboration further, etc.

We distinguished the interactions under the following different categories: general research interaction, institutional support, service type interaction, academic involvement, PhD level linkage, and cooperative interactions. The level of sophistication and intensity of linkages increases as one moves from general research interaction to service type interactions to finally cooperative interactions. The cooperative interactions mutually helps both the entities to make significant impact towards new product / process development, shared intellectual property, equity partnerships, new spin-off firms, etc. Joint collaborative projects, successful products / processes development, joint patents are attributes of cooperative interactions. Spin-off firms would be a resultant of a very highly developed collaboration.

Our investigation was with an analytical perspective to obtain insights for addressing the question: to what extent Government has played a role in synergizing the public-private partnership. Accordingly, The study has shown that government is an important catalyst in the synergising the interaction process through specific programs and mechanisms. These are fiscal and non-fiscal in nature. The "Policy Initiatives, Overview of R&D In Industries and, Support Through Govt. Mechanisms" have been dealt at length in **Chapter-2** of this Report. Thus feedback, interaction with Government scientific departments through detailed investigation from secondary sources helped us to uncover the role of the Government in promoting / catalyzing the public-private partnership in this Chapter.

Primary data was analyzed under three major categories: a) university-wise, b) discipline-wise and, c) the Industry having linkages with the selected university / Institutes. University wise categorization involved university as a unit of aggregation. Response from all the departments in a particular question was aggregated. Like wise the response form the Industry (ies) for a particular question was aggregated. The responses in this study were collected, organized and analyzed within the six broad categories viz.: general research interaction; academic level interaction; service type interaction; institutional support, PhD research linkage, and cooperative linkage. These distinctions helped to bring out the varied nature and depth of the collaborations that are evolving in the science faculty of the selected institutions and, the role being played by the Industry. (*For details refer Chapter-3*).

One of the important aspect in which the study made examination was on the linkages in the PhD research program. In the research activity of university, doctoral research program is the main driver. The faculty can have individual areas / problems that it wants to explore in depth and generally this is explored by delegating this work to researchers who have undertaken doctoral program in his / her guidance. It can also be stated that research problems that the department wants to address, are through the doctoral research program. Doctorates are finally the high quality manpower that is required by the firms for their R&D. Thus it is important to uncover the extent the doctorates are getting exposed to firms, working on the research problems of industrial nature, and related issues. Our primary examination based on questionnaire and interviews that

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were further supplemented by secondary level analysis provided important clues in this direction.

Few success examples covering: I) S&T Entrepreneurship; II) Research Linkages and, III) Technological Capabilities: of university / industry interactions have been highlighted in **Appendix-II**. These provide further evidences of cooperative level of interactions.

Salient Findings

The study revealed that interactions of universities with industry / research institutes are developing in all the broad domains: general research interaction, institutional support, service type interaction, academic involvement, PhD level linkage, and cooperative interactions. The same trend is also reflected in the broad science disciplines across the universities. Amongst all the disciplines, mathematics & statistics exhibited much less interaction.

Personal contacts emerged as most important and pervasive factor in initiating and strengthening the linkages among the various actors, at both levels of aggregation.

Generating S&T capabilities was perceived as most important activity for universities in forging linkages with industry/research institutes. Maintaining quality standard in R&D was considered as the next most important reason for establishing linkages. However, interdisciplinary departments consider exposure of PhD scholars to problem identification in industry/research institutions as the most important resultant of their linkage.

The perceptions of barriers were uniform across different universities / disciplines. Lack of mutual trust and appreciation of the research was perceived as the most important barrier. Lack of infrastructure facilities & different norms of evaluation / reward were also perceived as important barriers.

The study revealed that PhD scholars have different modes to interact with the industry / research institute. Some of the modes like summer training, participation in industry / research institute sponsored workshops etc. are more of a learning process for the researchers. Industry / research institute has no major stake in this process. However, there are sponsored projects from industry / research institutes involving the active participation of researchers. The researchers are also involved in the service support that universities are providing to the industry / research institute (these are explicitly given in *Chapter-3*). In the later interactions, industry / research institutes stake is higher.

It is interesting to observe that universities are allowing external guides from industry as well as from research institutes. This is important as this can bring wider scope/issues that can be addressed in the research. It may lead to developing long term association with the external guides and their respective institutions.

A healthy and an encouraging sign was observed regarding the creation of institutional structures to facilitate interactions between university and industry / research institute in majority of the universities. It was observed that the institutional structures are more of recent phenomena. However, within the short time of their establishment, they have

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stimulated the interactions and provided an important entry point for industry/research institute to interact with university (*the details of these specialized facilitating cells are elaborately discussed in Chapter-3*).

The study also found the involvement of industry / research institute in curriculum design of various science departments in the universities. This is a very important process as problems / areas that are matter of concern for industry / research institute can be a part of the curriculum.

Policy Recommendations

Institutional structures for facilitating interactions with industries / research institutions etc play a key role in the linkage process. Literature review based examination of the successful public-private partnership in different countries indicated facilitating cells has played a major role. Our study also supports this assertion.

Thus the study recommends that these types of cells should be a part of the university structure. These cells apart from enhancing the S&T capabilities of the universities, should help showcase the strengths of different departments in technology development; protect the technology developed in different departments through IPR protection, evolve guidelines for technology transfer/exchange, etc.

Government has an important role to act as a catalyst in enhancing the public-private partnerships. The government should ensure that the benefits of the various mechanisms / support measures should reach all the universities. The study showed that even within the select premier institutions, some universities could not derived benefits from these programs. The programs that government has evolved (as presented in *Chapter-2*) should be continued with time- targeted approach.

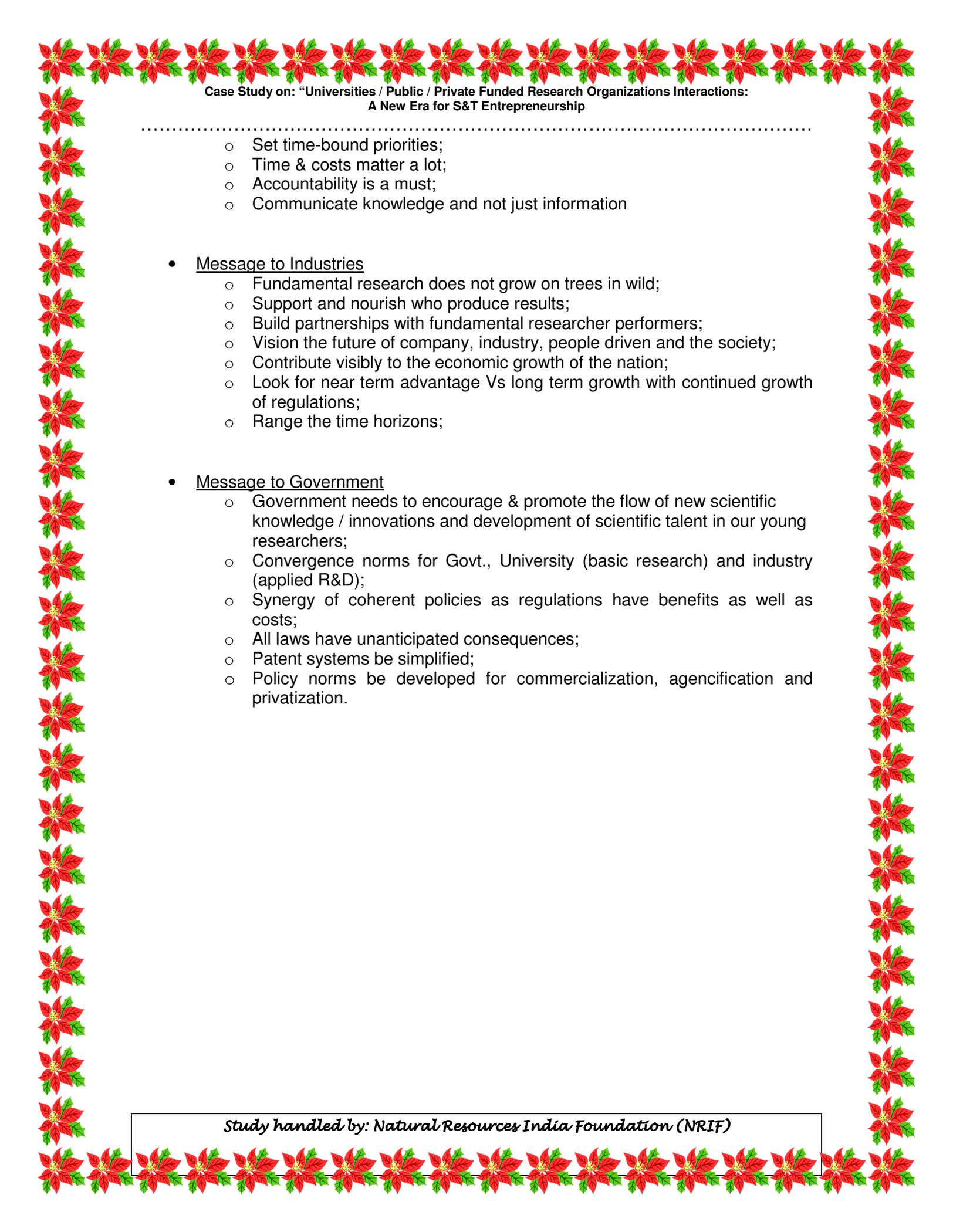
The study has shown that lack of mutual trust and appreciation of the research acted as an important barrier during the linkage. Concerned government departments, industrial associations, research institutions and universities should provide appropriate platform where the different actors can interact and develop mutual trust and appreciation of each others work and constraints.

The study has not only exhibited the role of university as central player in the innovation chain but even outside studies / models have demonstrated that science based industries are evolved around universities. Efforts need to be made to learn lessons from successful models for its suitable incorporation. This can develop and intensify the cooperative level linkages to harness the complementary strengths of the various actors.

With this backdrop given are the Message to Academicians / Scientists; Industries and, Government:

- Message to Academicians / Scientists
 - Explore the possibility of partnerships / interface with the local industries;
 - Address problem driven / curiosity driven research;
 - Address tough rather than handy problems;
 - Future vision / blue print is necessary;

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- Set time-bound priorities;
 - Time & costs matter a lot;
 - Accountability is a must;
 - Communicate knowledge and not just information
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- Message to Industries
 - Fundamental research does not grow on trees in wild;
 - Support and nourish who produce results;
 - Build partnerships with fundamental researcher performers;
 - Vision the future of company, industry, people driven and the society;
 - Contribute visibly to the economic growth of the nation;
 - Look for near term advantage Vs long term growth with continued growth of regulations;
 - Range the time horizons;
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- Message to Government
 - Government needs to encourage & promote the flow of new scientific knowledge / innovations and development of scientific talent in our young researchers;
 - Convergence norms for Govt., University (basic research) and industry (applied R&D);
 - Synergy of coherent policies as regulations have benefits as well as costs;
 - All laws have unanticipated consequences;
 - Patent systems be simplified;
 - Policy norms be developed for commercialization, agencification and privatization.

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