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RECIPROCAL COLLABORATION AMONG ACADEMIA-PUBLIC EXTENSION-INDUSTRY IN PAKISTAN: AN INTERVENTION PROSPECT

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Abstract

Effective linkage objectives can be achieved through faster mobility, tactical planning and dynamic liaison among productive sectors. The present study sought to promote the two-way arena among productive sectors, so as to accelerate the linkage dimension as a resourceful tool and maintainable management of information about technology transfer process. The target population for the present study was contained of academia, public extension and industry respondents of purposefully selected districts of Balochistan due to the apparently ineffective linkages between productive sectors in the respective areas. One hundred (100) respondents were selected by using simple random sampling. Statistical data were coded by using the Statistical Package for the Social Sciences. Significant differences were observed 4 out of 12 linkage items by using Wilcoxon-Mann-Whitney Test at 5 percent significance level. Significant discrepancies were found 6 out of 9 linkages categories by using Kruskal-Wallis test. Based on achieving results following recommendations were suggested. Synergy and relationship among productive components is observed as worthwhile, important regarding the technology transfer practices. Productive sectors like academia, public extension and industry should establish a platform for the research trajectory in order to trigger the uni-directional mode of transfer technology with the term of working-out for entrepreneurship skills and enlarge the body of information.

Keywords: Academia, Balochistan, Industry, Pakistan, Public Extension Services

1. INTRODUCTION

The notion of linkage indicates the working relationship established between two or more organizations pursuing and achieving commonly shared objectives in order to have consistent interaction and upgrade the output (Agbamu, 2000; Oladimeji et al., 2006). The academia, public extension and industry triangular relationships were considered as a significant innovation tool and utmost important in the process of diffusing of knowledge and new skills towards intended beneficiaries. Collaborations and synergies links between productive sectors can play a significant role in safeguarding and leveraging supplementary resources so as to promoting the

innovation paradigm and effective technology transfer mode (Ssebuwufu et al., 2012). However, novelty as one of the uppermost linkages right of way.

Public sector universities have long been recognized as an absolute knowledge developer, source of information creation and technology advancement regarding the technology transfer process (Etzkowitz et al., 2000; Nelson, 2006). Robust linkages among key system actors for the effective transfer of technology to the stakeholders was not succeeding unless both are brought together (multi-disciplinary interactions) and engaged in adaptive research which accelerates perhaps the adoption rate of the technology.

The current research study was focusing the essence of dynamic and vivid contacts between productive components in order to determine gauge and provide the significant edge with the respect of structural modification, policy implication, interventions and finance avenues. Now the question has risen that who can linkages mechanism made strength or more comprehensive endeavour for building partnerships with productive sectors. Besides, it is also important to identify the various factors which are responsible for the poor performances of these organizations and suggest ways and means to improve these services. Therefore present research was designed to fill-up the communication and knowledge gap so that reinforce the linkage mechanism and elicit areas whereby advocacy and support could help the productive sectors in order to accelerate their progress with the term of access to state-of-the-art equipment; improved curriculum, new ideas& horizon-scanning, training in technology-oriented programs and managing synergistic partnerships with the productive sectors.

1.2. SIGNIFICANCE OF THE STUDY

The present study was providing the useful and worthwhile information regarding linkages, their collaborative efforts and effectiveness. The outcomes were beneficial and fruitful to all the concerned for the linkage mechanism, institutional developments and provides a road-map towards steer the future linkages strategies, approaches, new visions, long term planning's, packages for sustainable development and facilitate to refocusing the entrepreneurial role of university as knowledge developer so as to better meet the needs of the individual. However, the limitations that are experienced by the respondents and plan for development of institutional growth was massive facilitate for government organizations, practitioners, educators, extensionists, planners, policy-makers and training institutes to draw plan for future achievement in an efficient manner.

1.3. JUSTIFICATION OF THE STUDY

Balochistan province was dignified as the underprivileged province of the Pakistan with the term of deplorable quality of education, low human indexes, low capacity service providers and so forth. Academia-public-industry relationships are quiet incipient and pathetic issues either in the feature of quality service provider or quantitative leaps in the Balochistan context. Universities, public extension and industry were encompassed widespread expertise and information. But regrettably the linkages connection visions as these sectors were non-existed and numerous volume gaps at the province level, which could not achieve the present day's prerequisite and criterion. On the other hands, there was absence of small as well large industries apart from Quetta and Lasbela districts whereby some small and large industries implicated the economic activities. Beside that the industries unaccompanied produces slight invention and small economic value. A general modernism comes from by dynamic linkage among the productive

sectors that are appropriate for the generation, diffusion and use of technical information. Lack of synergistic linkages between the public extension and industry was another gap about transfer of technology. The linkages between productive sectors faced the restrictions at considerable extent with the term of configuration of economies, political settings and institutional capacity at provincial level. There was dare need to improve the energetic and vibrant linkages contour between higher education institutions, public extension and industry so as to stimulate the foci theme of connections and faster to institutional ties. The lucidity of the present research was thorough to strengthen the interlinks mechanism between productive components for the opening the innovation doorway, in which system actors may hold certain priority issues and productive activities such as capacity building programs, Research and Development (R&D) activities, exchange of dynamic human resource sections so as to continue absorptive volume for innovative progressions. Hence, the present study was constructive attempt to empower the linkages mechanism towards an entrepreneurial direction. Developed to strengthen the institutional capacity so as to support the systematic linkages of common concern with the context of cross-disciplinary research platform. Thus, the purpose of this study is to see the reciprocity of collaboration among academia-public extension-industry in Balochistan province of Pakistan: expedition from intervention conception towards profit-orientation.

1.4. OBJECTIVES

The specific objectives were; (i) to examine the relations and interactions among academia, public extension and industry regarding knowledge exchange path; and (ii) to design the applicable linkages models and ways to improve the relations among productive sectors for educators and policy makers.

2. MATERIALS AND METHODS

Descriptive survey design (non-experimental) was used in the present research because of descriptive research design is suitable for gaining people's current insights on social issues relating to the existing position of phenomena (Cohen and Manion; 1980; Trochim, 2000). The statistical population for the present study was contained of academia, public extension and industry respondents of the two purposefully selected districts of Balochistan province viz. Quetta and Lasbela districts because of industries site, locations of universities and public extension services setup existed and seemingly ineffective linkages among productive sectors in the respective areas. Therefore, thirty (30) respondents were selected from public universities, (15) from University of Balochistan and (15) from Lasbela University of Agriculture, Water & Marine Sciences, Uthal (LUAWMS), forty (40) public extension field staff and twenty (30) industry skilled worker or participants were also selected as sample by using simple random sampling. Comprehensive questionnaire based on information was planned as the central tool for the study. Five-point Likert scales were used to operationalized the attitude paradigm (Balram & Dragicevic, 2005) and elicit primary data from processors. Accordingly, the range captures the strength of their emotional state for a specified item (Burns et al., 2008.). The replies of the respondents were verified as not at all influential links, slightly influential links, somewhat influential links, very influential links, extremely influential links, which were 1, 2, 3, 4 and 5 (Likert, 1932). Both populations were determined by using the Fitzggibbon table (Fitzggibbon & Lynn, 1987) at 0.05 error rate. Content and face validity were proven by a panel of professionals containing of Agricultural Extension Wing: Agriculture Department, Quetta, Balochistan, in order to determining the reliability of the questionnaire for the study. Cronbach's Alpha coefficient, a measure of internal consistency of the questionnaire was 0.871was excellent

(George & Mallery, 2003). Statistical data were coded and analyzed by using the Statistical Package for the Social Sciences (SPSS 22) (SPSS Inc, Chicago, Illinois, USA). Descriptive statistics were used to analyze raw data. The Kruskal-Wallis Test and The Wilcoxon-Mann-Test were employed to analyze the relationships between and among variables (Lehmann, 1975). The test consents to compare replies of dual samples (Clarkson & Dormody, 1994).A statistical value of $p<0.05$ were regarded and taken as significant. All p-values were 2-tailed.

3. RESULTS AND DISCUSSION

The imperative aspects of the present research were to explore the perceptions of respondents regarding linkages mechanism. Respondents were enquired if they “not at all influential links,” “slightly influential links,” “somewhat influential links,” “very influential links,” or “extremely influential links” engage in these activities. These queries were then changed into numerical scores from one to five, so that to tested the current perceptions of the respondents.

Table-1: Mann-Whitney U Test regarding linkages between productive sectors (n=100)

Linkages foci themes	Universities		Public extension		Mann-Whitney U test	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
	Mean Rank	Sum of Rank	Mean Rank	Sum of Rank				
Technology transfer process	33.30	999.00	37.15	1486.00	534.000	999.00	-.830	.407[NA]
Capacity building packages	23.72	711.50	44.34	1773.50	246.500	711.500	-4.364	.000**
Research & deployment paradigm	34.68	1040.50	36.11	1444.50	575.500	1040.500	-.298	.766 [NA]
HRD section	32.70	981.00	37.60	1504.00	516.000	981.000	-1.476	.140 [NA]
Research for new technology	31.58	947.50	38.44	1537.50	482.500	947.500	-1.497	.134 [NA]
Sharing information in planning process	30.65	919.50	39.14	1565.50	454.500	919.500	-1.887	.059*
MOU sign with technical institutes	31.85	955.50	38.24	1529.50	490.500	955.500	-1.404	.160 [NA]
Webinar or web conferences	42.97	1289.00	29.90	1196.00	376.000	1196.000	-2.868	.004*
Campus connect portal	38.82	1164.50	33.01	1320.50	500.500	1320.500	-1.237	.216 [NA]
Arrange seminar or workshop	31.48	944.50	38.51	1540.50	479.500	944.500	-1.561	.119 [NA]
Need base program	30.58	917.50	39.19	1567.50	452.500	917.500	-2.135	.033*
Joint survey	37.15	1114.50	34.26	1370.50	550.500	1370.500	-.728	.466 [NA]

Scale **1=Not at all influential links, 2=Slightly influential links, 3=Somewhat influential links, 4= Very influential links, 5=Extremely influential links*

Significant at 0.05 Level *NA=Non-significant*

** *Significant at 0.0 Level (2 tailed).*

In order to denote the perceptions, the respondents were asked to rank each linkages category. In this regard, the respondents enquired to give their responses which summarized in (Table 1). To check for any significant variation between public extension and academia respondents the Mann-Whitney U test statistics was applied at the 0.05 alpha level. The relationship of the various categories with the Mann-Whitney *U* Test depicts that exceedingly or highly significant variations observed on one linkages objects were: capacity building packages (Mann-Whitney *U*=246.500, p<.005). However, three linkage items observed statistical significant were: sharing information in planning process (Mann-Whitney *U* =454.500, p<.005); webinar or web conferences (Mann-Whitney *U*= 376.000, p<.005) and need base program (Mann-Whitney *U* =452.500, p<.005). Similar eight survey items not found significant were: technology transfer process (Mann-Whitney *U* =534.000, p<.005), research & deployment paradigm (Mann-Whitney *U* =575.500, p<.005); HRD section (Mann-Whitney *U* =516.000, p<.005);research for new technology (Mann-Whitney *U* =482.500, p<.005); MOU sign with technical institutes (Mann-Whitney *U* =490.500, p<.005); campus connect portal (Mann-Whitney *U* =500.500, p<.005); arrange seminar or workshop (Mann-Whitney *U* =479.500, p<.005) and joint research (Mann-Whitney *U* =550.500, p<.005). Significant differences were observed 4 out of 12 items by using the Wilcoxon–Mann–Whitney Test at 5% significance level. There are diverse productive factors and trends, which accelerate the relationships. In the linkages framework or trends the MOU will sign other technical colleges and university representatives, sharing information in the process, information section should liaised and conduct joint venture survey. While in digital infrastructure trends, the campus connects portal, webinars and web conferences significant and imperative areas regarding linkages. Whereas in the program and event trend the seminar, conference and workshop beneficial aspect regarding linkages mechanism.

Table-2: Kruskal-Wallis Test regarding linkages between productive sectors (n=100).

Linkages foci themes *:*	**Mean Rank**			**Kruskal Wallis**	**Sig****
	Academia	**Public extension services**	**Industry**		
Technology-oriented trainings	48.05	61.44	38.37	12.232	.002*
Research consortia	49.23	49.78	52.73	.302	.860 NA
Improved curriculum	49.25	58.91	40.53	8.395	.015*
Setting forms regarding innovations	45.45	47.61	59.40	4.653	.098 NA
Setting on advisory board	58.13	62.48	26.90	31.461	.000**
Creativity education	49.35	49.74	52.67	.329	.848 NA
Joint research	46.47	58.63	43.70	6.375	.041*
Consultancy services	49.63	43.21	61.08	7.597	.022*
Joint publications	35.50	71.33	37.73	39.559	.000**

Scale **1=Not at all influential links, 2=Slightly influential links, 3=Somewhat influential links, 4= Very influential links, 5=Extremely influential links*

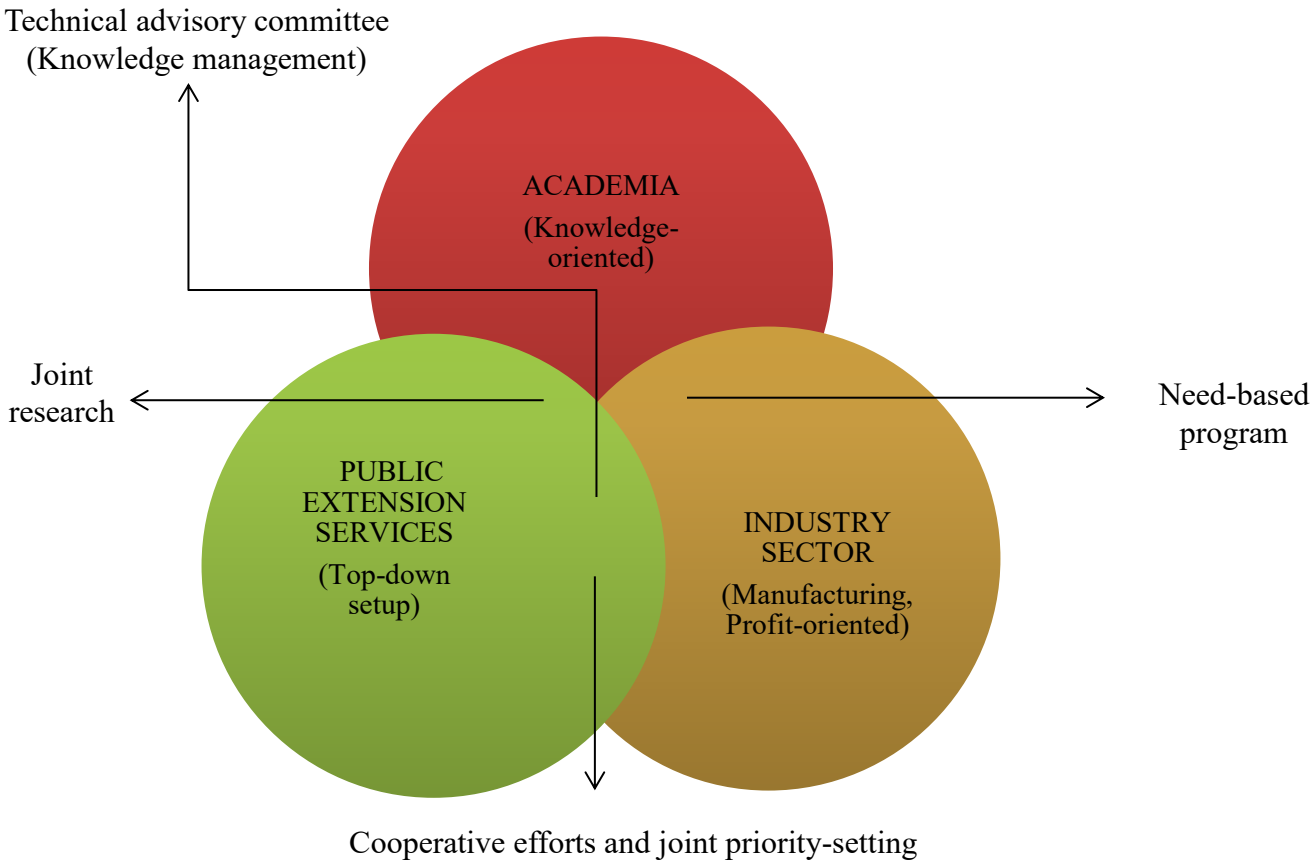
Significant at 0.05 Level *NA=Non-significant*

** *Significant at 0.0 Level (2 tailed).*

In order to recognize if the variations in the rankings, depending on the respondents' perceptions particular academia, public extension and industry sectors were statistically significant, the Kruskal-Wallis test was conducted. The responses of the respondents are summarized in (Table 2).The outcome of the Kruskal-Wallis Test was used in order to find the relationship among three groups. The judgment of Kruskal Wallis Test depicted that highly significant dissimilarities was foud on the two (2) linkages item were: setting on the advisory board (Kruskal Wallis =31.461, p<.005) and joint publications (Kruskal Wallis =39.559, p<.005). While significant differences observed in linkages item were: technology-oriented program Kruskal Wallis =12.232, p<.005); improved curriculum (Kruskal Wallis =8.395, p<.005); joint research(Kruskal Wallis =6.357, p<.005) consultancy services (Kruskal Wallis =7.597, p<.005).Whereas non-significant found

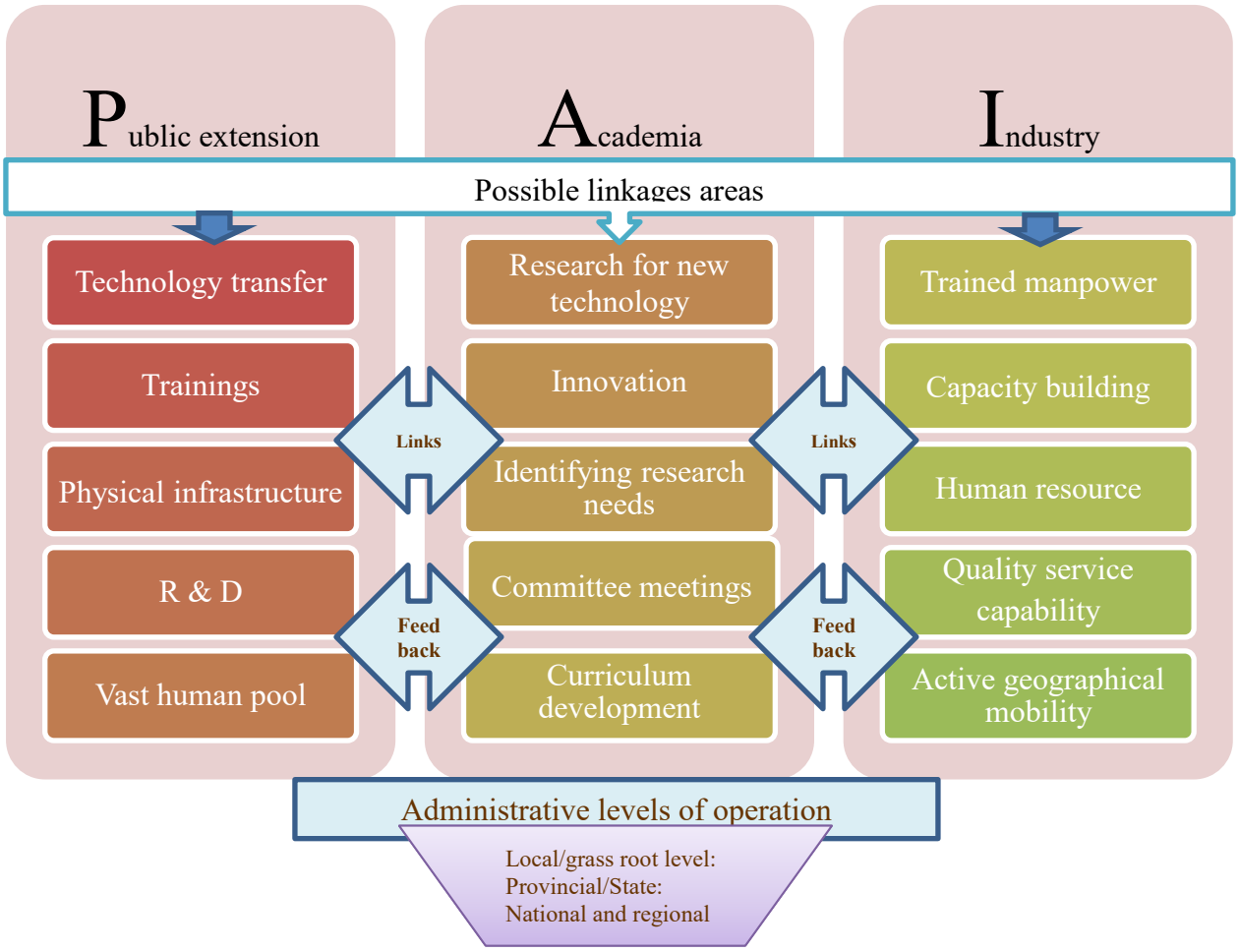
only in three linkages item were: research consortia (Kruskal Wallis =.302, p<.005); setting forms regarding innovations (Kruskal Wallis =4.653, p<.005) and creativity education (Kruskal Wallis =.329, p<.005). Significant discrepancies at p<.005 was found six out of nine linkages categories. It was concluded that the variation among the perceptions of the respondents were observed with a linked two tail significance level of 0.000. Ever since the significance value of 0.000 has been less than 0.05 levels, it implied that academia respondents' perceptions regarding linkages were differed from the EFS and industry workers. It was concluded that variation were existed among the perceptions of the three groups. In this regard, the differences in the perceptions among the three groups could be attributed to linkages disparities.

Figure-1: Trilateral networks and connections between the main productive sectors regarding linkages mechanism.



Effective communications outline can assist and bridge the gap between effect and outcome. It is important to have two-way knowledge between the university, public extension and industry as shown in (Figure 1). Academia should keep a need-based program, cooperative efforts and joint priority-setting with industry and public extension services in order to accelerate their foci themes regarding earning-base motives. Whereas the technical advisory committee about (knowledge management) should collaborate and constitute the trilateral networks or connections vision and keep the clusters up-to-date regarding progress of research, innovation, interventions, often new practices and ideas.

Figure-2: Knowledge exchange among productive sectors regarding possible linkages areas

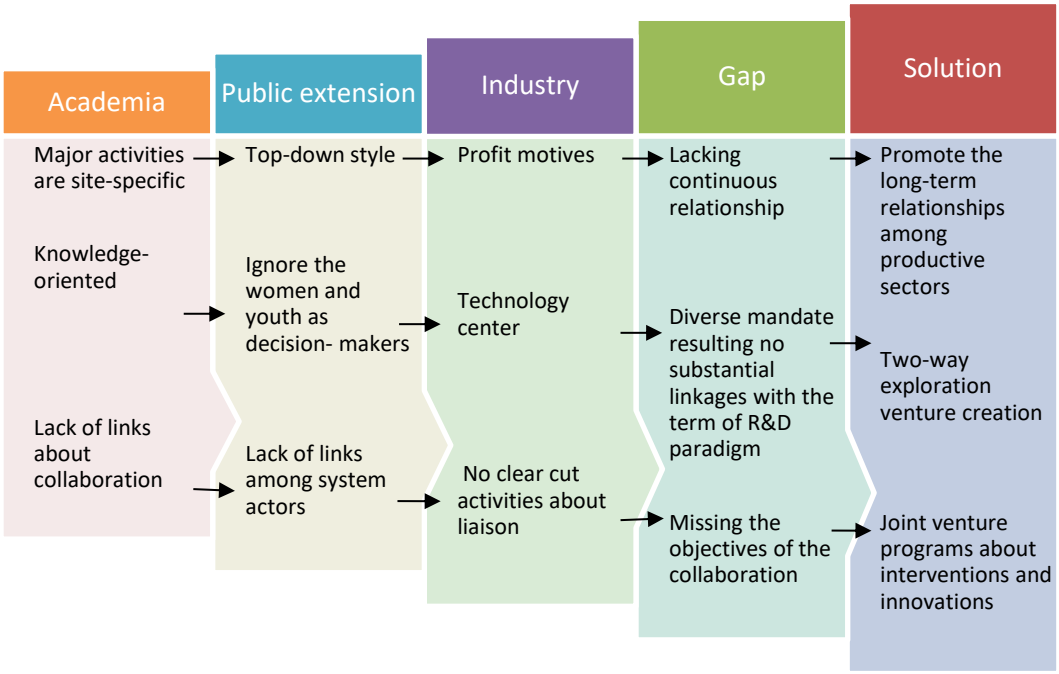


Worldwide, contributing factors universities are (the raw materials of innovation) being placed as strategic resources and assets with the term of economic competitiveness, development of human capital, problem-solving components and modernization (Ssebuwufu et al., 2012). Universities are materialization of technological entrepreneurship that clustering and bunching factor of inventions (Carlsson & Jacobson, 1997; Audretsch et al., 2005).The knowledge exchange path not only codified transfer of technology but also problem-solving motives. The present knowledge exchange path was designed in order to promote the effective liaison between key system components regarding possible linkages areas as shown in (Figure 2). Public sectors have effective technology transfer mode, training capacity, better physical infrastructure, research & development paradigm, extensive and vast pool of human resource sections. However, in this regard industry sector were measured as trained or skilled manpower, dynamic human resource portion, quality service capability and active geographical mobility. On the other hand, the university is known to have, research for new technology, curriculum development and better up-scaling technologies and considered as institutions of higher learning that can generate knowledge through basic research.

While academia in this regard enhances the public extension and industry sectors linkages so as to achieve the objective of building human capacity for food security and sustainable rural development through capacity building programs at local, provincial and national level. The core

theme of the possible linkages areas was strengthening the academia, public extension and industry sector collaboration and multi-way feedback between key systems. Linkages among university, public extension and industry sectors are the window of opportunity, road map and tangible option of academia so as to enhance the theme of technology development regarding earning-based motives. The networks of productive sectors communication can generally be defined into four (4) classes such as research support, technology transfer, knowledge transfer and cooperative research (Santoro, 2000).

Figure-3: Interconnected block regarding gap and solution among academia-public extension and industry collaboration.



Academia, public extension and industry relationships were indispensable, part and parcel with the context of Balochistan. In order to stimulate the effective linkages and reduce the gap between productive sectors the interconnected block process as mechanism recognized as shown in (Figure 3). Gaps are flaws which may provide restrictions about the flow of the technology transfer process. The focal point of the model was consolidating the academia, public extension and industry association with the term of connections. The academia, public extension and industry should links on mandatory basis so as to fill the information gap and provide a significant edge for the entire provincial education, agriculture and livestock sectors. Academia, public extension and industry require to link with each other's in following components such as joint venture programs, innovative approaches, knowledge-oriented and long term relationships so as to strengthen the linkages vision. Joint cooperation between system actors regarding research intervention could be achieved through the impetuous collaboration based on resource infrastructure.

4. CONCLUSION AND RECOMMENDATIONS

Notwithstanding the discrepancies in the assignments, philosophies, organizational cultures and motivations of the productive sectors there should be need to promise in joint explorations, enquiries, partnership, linkages and joint venture projects so as to provide a means to form a new

relation and foster new logistic and managerial capability among productive sectors. The results reveal that significant differences were observed 4 out of 12 linkages item by using Wilcoxon–Mann–Whitney Test at 5 percent significance level. On the other hand, significant discrepancies at $p<.005$ was found six out of nine linkages categories by using Kruskal-Wallis test. Based on achieved results following recommendations were suggested. Compact and firm relationship among productive sectors are part and parcel about technology transfer process, in this regard productive sectors should appoints the Technology Transfer Officer (TTO) (significant legal or contractual component) in order to bridging the gap concerning the specific tasks which can catalyze the entire knowledge exchange path such as combined venture programs, state-of-the-art equipment, improved curriculum, knowledge-oriented events, creative synergies links and long term relationships among productive sectors. Synergy and relationship among productive components is observed as worthwhile, important regarding the technology transfer practices. The contact among productive sectors was trivial. In this connection, productive sectors such as acdemia, public extension and industryshould establish a platform for the research trajectory in order to triggers the uni-directional mode of transfer technology with the term of working-out for entrepreneurship skills and enlarge the body of information and knowledge among productive sectors.

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