ANALYSIS OF FUNCTIONAL LINKAGES BETWEEN RESEARCH AND EXTENSION IN DAIRYING UNDER DIFFERENT LINKAGE SYSTEMS IN HARYANA

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The need of functional interaction between knowledge production system and knowledge dissemination system has been identified globally as well as nationally (Anonymous, 1992; Cernea et al. 1985; Prasad, 1988; Venkatesan, 1985). In the similar vein, Lionberger and Chang (1970) also pointed out that more is the meaningful interaction within and between the above systems, faster will be the process of modernization of agriculture. In the field of dairying research and extension(R&E), meaningful interaction between these two is further magnified looking into the cost of research and development facilities for producing superior germplasm and evolving better health services especially disease diagnostic facilities (Acharya, 1994; Singh, 1994). With respect to the effective functional linkage between research and extension, several researchers have argued about effectiveness of functional linkage vis.-a. -vis., their organizational arrangements. There had been debate and deliberation on putting R&E in the same organization or keeping them separately. Bourgeosis (1989), Kessaba (1989), Pineiro (1989) and Antholt (1990) have argued for merging R&E in one institution for better linkage. Contrary to them, Trent (1989) and Eponou (1993) found that R&E integration does not give guarantee of effective link between them. Such international experiences offer ample stimulus to make an empirical probe on differential status of functional linkage between research and extension in dairying where both are working in different organizational settings. An investigation was, therefore, carried out with the specific objective to analyze the functional interaction between research and extension in dairying, operating under two organizational systems in the state of Haryana.

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The null hypothesis formulated for the present study was 'irrespective of organizational systems, the strength of functional linkage between research and extension was same.'

Materials and Methods

The present study was conducted in the purposively selected state of Haryana as the state has registered an appreciable performance in dairy development (Anonymous, 1997). The research and extension systems were selected on two criteria-firstly, when both were working from same organization (system-1) and secondly, when both were placed in separate organizations (system-2). Accordingly, National Dairy Research Institute (NDRI), Karnal, Choudhary Charan Singh Haryana Agricultural University (HAU), Hisar and State Department of Animal Husbandry (SDAH), Karnal were the research and extension organizations/ departments selected for the present study as they met the above criteria. Based on the availability, a total of 32 research personnel from NDRI and HAU research systems and 47 extension personnel fromNDRI, HAU, and SDAH extension systems were sampled randomly. Care was taken that these personnel could represent higher level to field level. An index was devised to measure the functional linkages between research and extension. Parameters of functional linkages included in the study were communication, collaborative professional activities, joint planning and decision-making regarding research and extension activities, their joint implementation and evaluation, training and supply and services. Under each parameter, a number of items were formulated which meant the linkage-related activities. Response was ascertained against each item falling under all the above parameters on a four point interval scale of 'always, sometimes, rare and never' and accordingly the score of 3,2,1and zero, respectively were accorded. Based on the response, extent of functional linkage was worked out by using following formula.

$$\text{Extent of functional linkage} = \frac{\text{Maximum possible linkage score}}{\text{Actual linkage score}} \times 100$$

Finally, the overall average extent of functional linkage (AEOFL) was computed for further categorization and other statistical treatments like, means, standard deviation (SD), coefficient of variation (CV) and unpaired t-test to draw meaningful conclusions.

Results and Discussion

Under the following sub-heads results of the present study have been presented and discussed.

A) Frequency distribution of research and extension personnel according to the perceived linkage strength

Researchers and extension personnel working under different system were distributed according to their average extent of functional linkage (AEOFL) with each other. The findings as contained in table 1 indicate that most of them (63.49%) were falling under weak linkage category, followed by 26 percent in moderate linkage category. One-fourth of the sampled respondents did not have any involvement in linkage related activities. This was the scenario when both research and extension operated from the same organization. However, in another organizational setup i.e., when both were separately placed, equal percentage (40.62) of the respondents belonged to no linkage and weak linkage category. Under the same arrangement, however about 11 and 8 percent of the sampled personnel had moderate and strong linkage respectively. It could be therefore inferred that irrespective of organizational set-up, the overall functional interaction between R&E was discouraging as majorities of the personnel were either in no linkage or weak linkage category. At the existing strength of linkage between them it could be, also, concluded that researchers and extension personnel interacted better when both were working from same organization as compared to the situation when both were in two different organizations. Hence, the null hypothesis is rejected, and subjectively, system-1 could be considered over performing the system-2. The organizational proximity, as in system-1, might have promoted

a shared goal and facilitated the communication and collaboration between research and extension and therefore, resulted in relatively better functional linkage between them. The findings get support from the works of Bourgeosis (1989), Kessaba (1989), Pineiro (1989) and Antholt (1990). From the same table, it is further evident that there is greater frequency of interaction between the R&E personnel both within HAU and between HAU and SDAH as compared to the case of NDRI where it was relatively lesser both within the organization as well as with SDAH.

Table-1: Frequency distribution of research and extension personnel selected from different linkage systems on the basis of their extent of overall linkage

Selected organisational systems	Selected organisation/ department and personnel	Extent of linkage			
		No linkage (0)	Weak linkage (<4.42)	Moderate linkage (4.42-22.12)	Strong linkage (>22.12)
Research and extension in same organization (System 1)	i) Research personnel				
	a) NDRI (n=17)	5 (29.41)	8 (47.06)	4 (23.53)	-
	b) HAU (n=15)	2 (13.33)	8 (53.34)	5 (33.33)	-
	Pooled (n=32)	**7 (21.88)**	**16 (50.00)**	**9 (28.12)**	**-**
	ii) Extension personnel				
	a) NDRI (n=16)	6 (37.50)	6 (37.50)	4 (25.00)	-
	b) HAU (n=15)	3 (20.00)	8 (53.33)	4 (26.67)	-
	Pooled (n=31)	**9 (29.03)**	**14 (45.16)**	**8 (25.81)**	**-**
	Overall (n=63)	**16 (25.40)**	**40 (63.40)**	**17 (26.01)**	**-**
Research and extension in separate organizations (System 2)	i) Research personnel				
	a) NDRI with SDAH (n=17)	12 (70.59)	5 (29.41)	-	-
	b) HAU with SDAH (n= 15)	4 (26.67)	6 (40.00)	3 (20.00)	2 (13.33)
	Pooled (n= 32)	**16 (50.00)**	**11 (34.38)**	**3 (9.37)**	**2 (6.25)**
	ii) Extension personnel				
	a) SDAH with NDRI (n=16)	6 (37.50)	10 (62.50)	-	-
	b) SDAH with HAU (n= 16)	4 (25.00)	5 (31.25)	4 (25.00)	3 (18.75)
	Pooled (n= 32)	**10 (31.25)**	**15 (46.87)**	**4 (12.50)**	**3 (9.38)**
	Overall (n= 64)	**26 (40.62)**	**26 (40.62)**	**7 (10.94)**	**5 (7.82)**

Figures in parentheses indicate percentages

B) Average extent of functional linkage between research and extension under different organization system

The findings as presented in the above sub-head revealed only the frequency distribution of research and extension personnel according to their linkage strength category. Therefore, the computed values of AEOFL (in percent) were used for further analysis. A perusal of table-2 reveals that overall AEOFL was only 13.27 percent in system-1. A high percent of CV (85.15%) indicated that there is greater variation in the participation of research and extension personnel in linkage related activities. Further, under this system only, HAU did better than NDRI as the AEOFL of former was 16.10, and 12.19 percent in latter. Relatively lower CV further explained that the personnel from HAU (CV=54.28 %) varied comparatively lesser than those from NDRI (CV=74.40%) with respect to their participation in mutual linkages. The scenario under system-2 was highly disheartening. The overall AEOFL was found only 5.89 percent with CV as high as 172.50 percent. Between NDRI and SDAH, AEOFL was lower to the extent of 1.16 percent (CV = 73.27%). However, between HAU and SDAH, it was 10.19 percent (CV = 41.90%). Therefore, irrespective of the system and organization/

Table-2: Means of overall extent of functional linkage (in percent) between research and extension personnel under selected linkage systems and organisations

Sl. No.	Selected Linkage Systems	Selected Organisation/ Department and Personnel	Mean of Overall Extent (%) of Functional Linkage	S.D.	C.V. (%)
1.	Research and extension in same organisation (System 1)	i) Within NDRI (n=33)	12.19	9.07	74.40
		ii) Within HAU (n=30)	16.10	18.74	54.28
		Overall (n= 63)	**13.27**	**11.30**	**85.15**
2.	Research and extension in separate organisation (System 2)	i) Between NDRI and SDAH (n=33)	1.16	0.85	73.27
		ii) Between HAU and SDAH (n=31)	10.19	4.27	41.90
		Overall (n= 64)	**5.89**	**10.16**	**172.50**

department, the value of linkage strength varied between as low as 1.16 percent to a poor value of 16.10 percent with considerably high coefficient of variation (41.90% to 172.50%). The above finding emanated two fold derivations. Firstly, the presence of good number of structural linkage mechanism in HAU might have resulted in better functional interaction of research and extension personnel as compared to those from NDRI. Secondly, the cadre and professional experiences of research and extension personnel may be hypothesized to have contributory influence on the functional linkage between them. In other words senior personnel and higher-ups might have been given preferences in operating the linkage-related activities. If that is the case, effectiveness of dairying R&D would suffer as the middle and lower level personnel are edged out of their linking roles. Further, better interaction between HAU and SDAH as compared to NDRI and SDAH could be explained on the ground that dairying being the state subject, state level research and development organizations is therefore mandated to interact with one another more frequently. NDRI, on the other hand, owing to its national status has much wider mandate, organization goal and functional base and hence, very little interaction with the state functionaries is self-explanatory.

C) Comparison of the means of functional linkage parameters between research and extension personnel

Average extent of function linkage was also computed for the selected six indicators of functional linkage between research and extension. The computed mean values were subjected for unpaired t- statistics in order to see the significance of difference between them. Findings as shown in table-3 showed that in both the systems AEOFL was highest in communication followed by collaborative professional activities and training. The AEOFL value was lowest for supply and services. Other important parameters like joint planning and decision making regarding research and extension activities and their joint monitoring and evaluation had poor AEOFL values. The perusal of table further revealed that on all the parameters of functional linkage, system-1, was significantly (P value less than or equal to 0.01) ahead

Table-3: Comparison of the means of functional linkages between research and extension in the selected organisation systems

Sl. No.	Parameters of Functional Linkage	Research and Extension in Same Organisation (n_1=63)		Research and Extension in Separate Organisation (n_1=63)		$X_1 - X_2$	t-Value at 125 d.f.
		Mean (X_1)	S.D.	Mean (X_2)	S.D.		
1.	Communication	30.29	19.07	12.86	15.01	17.43	12.78*
2.	Collaborative professional activities	17.25	25.10	6.82	13.42	10.43	13.37*
3.	Planning and decision making	9.24	11.71	2.33	6.62	6.91	11.73*
4.	Implementation and evaluation	8.07	10.57	2.34	8.32	5.73	10.52*
5.	Training	11.27	12.52	4.33	10.40	6.94	11.55*
6.	Supply and services	5.49	7.17	4.56	10.49	0.93	1.76^{NS}
7.	Overall	13.27	11.30	5.89	10.16	7.38	12.69*

* = *Significant at 1 percent level of significance.*

NS = Not significant.

of system-2. The only exception found was linkage in supply and services, on which neither of the system was found giving emphasis. The above findings further negated the null hypothesis. Irrespective of system, AEOFL varied from as low as 2.33 percent in joint planning and decision making to a moderate value of 30.29 percent in communication.

From the findings discussed as above, it could be noted that almost all parameters of functional linkage between research and extension personnel were non-functional to a larger extent. Among the identified parameters, only communication and collaborative activities and their joint planning to some extent were observed to be marginally better performed. Remaining parameters did exceptionally poor. This led to inference that the existing level of structural mechanism, especially in system-2, was not adequate with respect to their purpose and modes of participation of research and extension personnel. Further, lesser periodicity of activities of the existing structural arrangements and their conformity to age-old organizational mandate could be the another explanatory reason for such a poor strength of functional linkage. Singh (1994) and Gupta (1998) also reported the similar scenario in dairying R&D and they attributed this to the non-existence of proper mechanism at the department level as well as the poor performance of the existing mechanisms.

Conclusions and Recommendations

Based on the findings of the present investigation, it could be concluded that functional linkages between R&E personnel was not the priority area of the concerned organizations involved in dairy development in Haryana. They were found operating in little interaction with one another. Hence, a type of isolation between these two actors in dairy development was noted. This is certainly an unhealthy signal. Such separation would harm both research and extension, as the former will suffer from the want of researchable ideas in order to generate the transferable appropriate dairy production technologies. In other words, the dairying research would tend to be more academic in nature rather than applied or adaptive. In addition, the direction of technology-oriented research may also suffer and researchers may not address the right problem, which are farmers' need based and production situation specific. On the other hand, for extension, there would be considerable time lag between availability of new research findings to them and their application at the producers' level. In nutshell, the effectiveness of R&E endeavors would be impaired. In this context therefore, following organizational interventions are apt to be recommended.

1. The existing goals and mandate of R&E organizations should be refined and redefined, keeping in mind the changes taking place in national and global dairy development scenario.
2. There is need for institutionalizing the more number of structural linkage mechanism particularly the technology treatment group at the institution/ department level for better functional linkage.
3. Frequency of activities of existing mechanism need to be increased with greater participation of research and extension personnel of different cadre and professional experiences.
4. The entire gamut of technology development and technology dissemination process necessarily is considered as the linkage related activities.

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