



Potential of Intellectual Property Rights Enforcement in Technology Management: Perception among Animal Science Scientists

C. Chithra Chandrasekharan¹, R. S. Jiji^{1*} and C. Sunanda²

¹Department of Veterinary and Animal Husbandry Extension, College of Veterinary and Animal Sciences (CVAS), Mannuthy, KVASU- Thrissur, Kerala, INDIA

²Department of Statistics, CVAS, Pookode, Wayanad, KVASU, Kerala, INDIA

*Corresponding Author: jjiramavarman@gmail.com

How to cite this paper:

Chandrasekharan, C., Jiji, R. S, & Sunanda, C. (2020). Potential of Intellectual Property Rights Enforcement in Technology Management: Perception among Animal Science Scientists. *International Journal of Livestock Research*, 10 (11), 149-157. doi:

<https://dx.doi.org/10.5455/ijlr.20200412072651>

Received : Apr 12, 2020

Accepted : Sep 21, 2020

Published : Nov 30, 2020

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Abstract

The study was conducted among scientists of south zone animal science research institutes of Indian Council of Agricultural Research (ICAR) to analyze scientists' perception of the potential of Intellectual Property Rights (IPR) enforcement in technology management. A scale comprising of forty-seven items, distributed under three sub-domains of technology management was developed to measure scientist's perception. The subdomains included technology generation, protection, and transfer/commercialization. The content validated and reliability tested scale was administered among respondents who were requested to indicate their degree of agreement or disagreement towards the statements. Out of eighty-three scientists working in the institutes, seventy-two recorded their ratings. Findings revealed that more than three-fourth of scientists had high perception about potential of IPR enforcement in overall technology management. Among scientists, 80.56, 79.17 and 69.44 per cent belonged to high perception group under technology generation, transfer/commercialization, and protection domains, respectively, while technology generation domain displayed highest mean score (3.27).

Keywords: Animal Science Research Institutes, Indian Council of Agricultural Research, Intellectual Property Rights, Perception of Scientists, Scale, Technology Management

Introduction

Intellectual Property Rights policy of India, GOI (2016) has internalized the significance of IPR in national Research and Development (R&D) ecosystem. The policy envisages academia industry interface in collaborative research along with joint validation, up-scaling, refinement, and trading of critical research outcomes. The ‘model guidelines on implementation of IPR policy in academic institutions’ drafted by the Cell for IPR Promotion and Management (2019), setup under the Department for Promotion of Industry and Internal Trade, also emphasizes the role of Intellectual Property (IP) ownership and licensing in ensuring financial self-sustenance of research infrastructure in academic institutions. Further, the establishment of IPR regime in R&D organizations pertaining to agriculture and animal sciences has revolutionized the ethos and norms of technology management in these realms.

Indian Council of Agricultural Research (2018), the nodal institution of National Agricultural Research System (NARS), has put in place an institutional mechanism and policy framework for the protection and management of its intellectual property resources since 2006. ICAR (2018). The institutional machinery is characterized by a three-tier system with ‘Institute Technology Management Units’ (ITMUs) at individual institutes constituting the bottom layer, five ‘Zonal Technology Management Centers’ (ZTMCs) in specific institutes at zonal level forming intermediate tier and ‘Agro-Technology Management Centre’ (ATMC) at central level as the uppermost layer. At headquarters, the ‘Intellectual Property and Technology Management unit’ functions as the apex monitoring body. The ZTMCs located in different zones coordinate the functioning of ITMUs in respective zones. The ZTMC, south zone, located in the Central Institute of Fisheries Technology (CIFT) facilitates functioning of the ITMUs of 22 ICAR research institutes, among which four are Animal Sciences Institutes. The functional decentralization strategy has bestowed the Intellectual Property Management Systems (IPMSs) of individual institutes with sufficient internal capabilities for IP management.

The study makes a critical analysis of the perception among scientists of the four south zone Animal Science research institutes of ICAR about the potential of IPR enforcement in institutional technology management. An insight in this regard is important to devise and implement appropriate IPR management strategies that address the unique requisites pertaining to IPR in livestock sector.

Materials and Methods

The study was conducted among scientists of the four south zone animal science research institutes of ICAR (Figure 1). The institutes comprised of ‘National Research Centre on Meat’ (NRCM), Boduppal, Telangana; ‘Directorate of Poultry Research’ (DPR), Rajendranagar, Telangana; ‘National Institute of Veterinary Epidemiology and Disease Informatics’ (NIVEDI), Yelahanka, Karnataka and National Institute of Animal Nutrition and Physiology (NIANP), Adugodi, Karnataka. Out of total number of eighty-three scientists working in the institutes, seventy-two responded to the study (Figure 2).

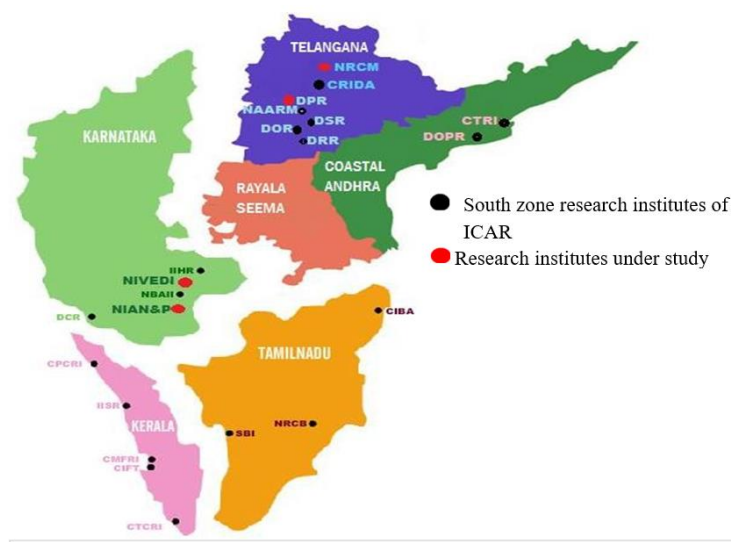


Figure 1: Locale of Study

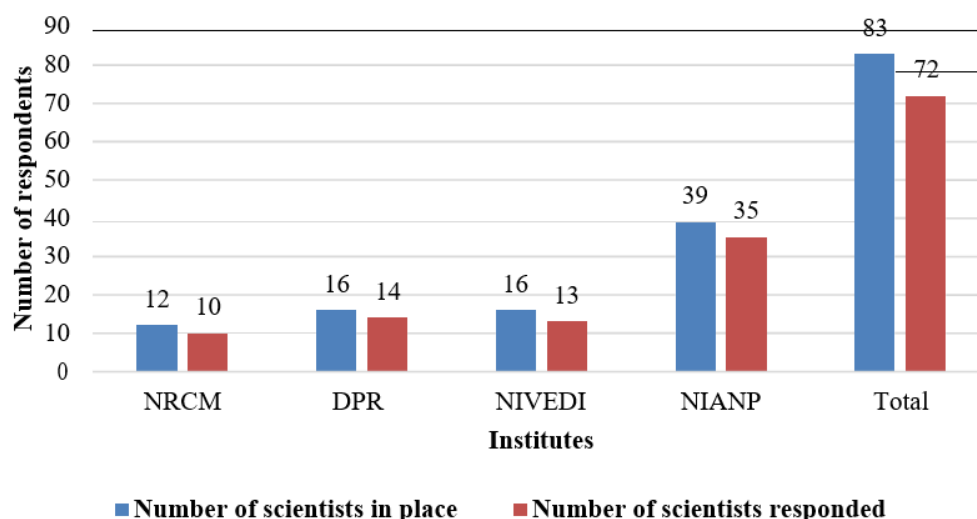


Figure 2: Number of scientists from institutes under study

The empirical measurement of this variable encompassed the following phases -

Phase 1: Operationalization of the Variable: ‘Potential of IPR enforcement in institutional technology management’ was operationally defined as the prospects of implementation of institutional IPR policy framework for the development, protection and transfer/commercialization of technologies.

Phase 2: Development of Preliminary Scale: After conceptualization of the variable and subsequent identification of relevant domains, items pertinent to the domains were generated. The process was accomplished under expert guidance and review of germane literature so as to cover the entire conceptual space. To ensure clarity, the domains were defined as follows –

Technology Generation: Meant the development of Intellectual Property (IP) in the form of technologies by the institute. Scientists’ perception regarding the prospects of institutional IPR policy implementation for the development of IP was measured under this facet. Altogether, the domain comprised of 21 items in the preliminary scale.

Technology Protection: Implied the protection and maintenance of institutional IP through seeking and safeguarding Intellectual Property Rights (IPR). Scientists’ perception regarding the prospects of institutional IPR policy implementation for the protection of IP was analyzed under this facet. Altogether, the domain comprised of 18 items in the preliminary scale.

Technology Transfer/Commercialization: Meant the transfer/marketing of institutional IP to clients through private, cooperative, and public routes on execution of pertinent license agreements. The scientists’ perception regarding the prospects of institutional IPR policy implementation for the transfer/commercialization of IP was assessed under this facet. Altogether, the domain comprised of 16 items in the preliminary scale. Thus, the preliminary scale included 55 items in toto.

Phase 3: Content Validation of the Scale: Based on the definitions given by various research methodology scholars, Waltz *et al.* (2005) and Polit and Beck (2006), content validity can be conceptualized as the extent to which the items in the measuring instrument are appropriate enough to represent the domain of content. The quantitative measure of content validity referred as ‘Content Validity Index (CVI)’ was put forward by Waltz and Bausell (1981). The CVI is an index of inter-rater agreement based on experts’ rating of the items in terms of its relevance to the variable measured, on a continuum. Based on the analysis of a variety of indices that measured interrater agreement, Polit and Beck (2006) has come out with a clear-cut computational method for CVI. This method was used in this study to validate the scale. Accordingly, two types of CVIs *viz*; ‘Item CVI’ (I-CVI) and ‘Scale CVI’ (S-CVI) were computed, the former indicating the content validity of individual items and the latter that of the overall scale. A panel of nine experts in the subject matter area of IPR management was selected to assess the content validity of the scale. The number of experts was determined based on the guidelines of Lynn (1986)

and Di Iorio (2005). The content experts were selected based on their experience, training received, qualifications, history of publications in refereed journals, national presentations, and research on the phenomena. Accordingly, the experts' panel comprised of two scientists from the National Academy of Agricultural Research Management (NAARM), Hyderabad; one scientist from Southern Regional Station, National Dairy Research Institute (NDRI), Bengaluru; one expert from the Madras Veterinary College, Chennai, Tamil Nadu; two experts from the College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala; one from the College of Veterinary and Animal Sciences, Pookode, Wayanad, Kerala and two from the College of Horticulture, Vellanikkara, Thrissur, Kerala.

The experts were requested to rate the items in terms of its relevance to the variable measured on a four-point continuum *viz.*, highly relevant, relevant, somewhat relevant and not relevant, with scores four, three, two and one, respectively.

The Item Content Validity Index (I-CVI) was computed as follows –

$$I - CVI = \frac{\text{Number of experts giving a range of 3 or 4}}{\text{Total number of experts}}$$

On the basis of results of content validation, the items with I-CVIs of 0.78 and above were retained and the rest were deleted as specified by Lynn (1986). Thus, the number of items in item validated scale was reduced to 49. For the items retained in the scale, the I-CVI values ranged from 0.78 to 1.

Further, the item validated scale was subjected to scale level content validation. The scale level Content Validity Index (S-CVI) was computed using the formula –

$$S - CVI = \frac{\text{Sum of I - CVIs}}{\text{Total Number of Items}}$$

Accordingly, the S-CVI of the scale was found to be 0.91. This indicated that the content validity of the scale was acceptable as per the standard criterion suggested by Waltz *et al.*, (2005).

Phase 4: Reliability Analysis of the Scale: The reliability of scale was assured based on internal consistency assessment by Cronbach's alpha coefficient. Data gathered in the pilot study were used at this phase. Pilot study was carried out among the scientists of Central Institute of Fisheries Technology (CIFT), Kochi, Kerala. The content validated scale was administered among respondents. The institute was selected on virtue of its status of having the Zonal Technology Management Centre (ZTMC) of ICAR, south zone. ZTMC, CIFT had the responsibility to coordinate and facilitate IP management of the ICAR institutions in south zone.

In subsequent item analysis, item scores were correlated with the total scale score. As per the guidelines of Di Iorio (2005), items having correlation values below 0.2 or above 0.8 were excluded. Thus, two items were deleted from the content validated scale. Subsequently, the internal consistency of the scale was measured by Cronbach's alpha coefficient. On computation, an alpha coefficient of 0.92 was obtained, that was found to be acceptable as per Hair *et al* (2006). Thus, the final scale comprised of 47 items.

Phase 5: Administration of the scale: The scale developed was administered among respondents who were requested to record their response to the statements on a four-point continuum *viz*; strongly agree, agree, somewhat agree and disagree with scores four, three, two and one, respectively.

The sum of scores assigned to all the items by each respondent constituted his or her perception score. The mean score of the respondent was calculated using the formula –

$$\text{Mean Score of the Respondent} = \frac{\text{Score of the Respondent}}{\text{Total number of items}}$$

Based on the mean scores obtained, respondents were classified into three categories. For the technology generation domain that included 18 items, the expected minimum of total score would be 18 and the expected maximum would be 72. This expected score range on division into three equal parts would constitute three categories *viz*: low

perception group (18-35), medium perception group (36-53) and high perception group (54-72). In similar manner, categories for the other two domains and those for the composite scale were devised as depicted in Table 1.

Table 1: Classification of respondents based on mean scores

S. No.	Domain	Categories		
		Low	Medium	High
1	Technology generation	18-35	36-53	54-72
2	Technology protection	16-31	32-47	48-64
3	Technology transfer/commercialization	13-25	26-38	39-52
	Total	47-93	94-140	141-188

Summation of scores assigned by all the respondents for a particular item constituted the item score. Further, item mean scores were worked out using the formula –

$$\text{Mean score of the item} = \frac{\text{Score of the item}}{\text{Number of the respondents}}$$

Also, the mean scores of domains were calculated using the formula –

$$\text{Mean score of domain} = \frac{\text{Sum of scores of all items under the domain}}{\text{Number of the items in the domain}}$$

Subsequently, domains were ranked based on the mean scores.

Results and Discussion

The perception of scientists in overall technology management as well as their perception in subdivided domains of technology generation, protection and transfer/commercialization are depicted in Figures 3, 4, 5 and 6, respectively.

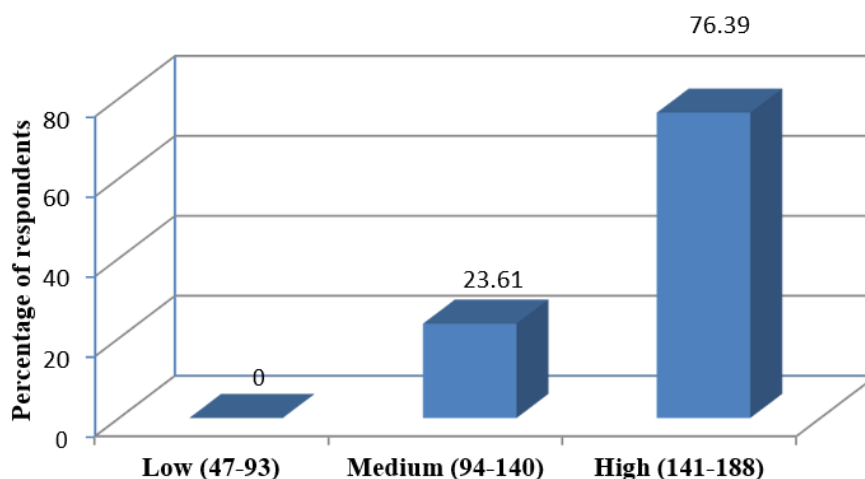


Figure 3: Scientists' perception of potential of IPR enforcement in overall technology management

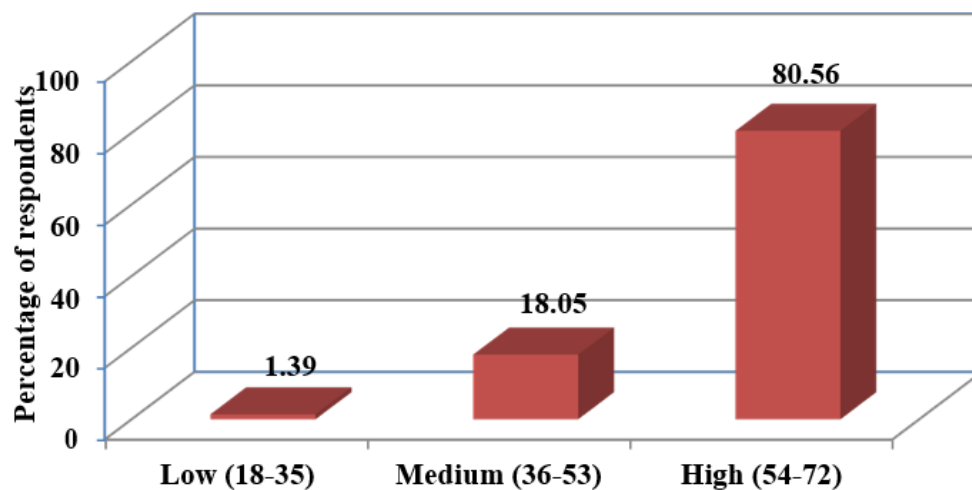


Figure 4: Scientists' perception of potential of IPR enforcement in technology generation domain

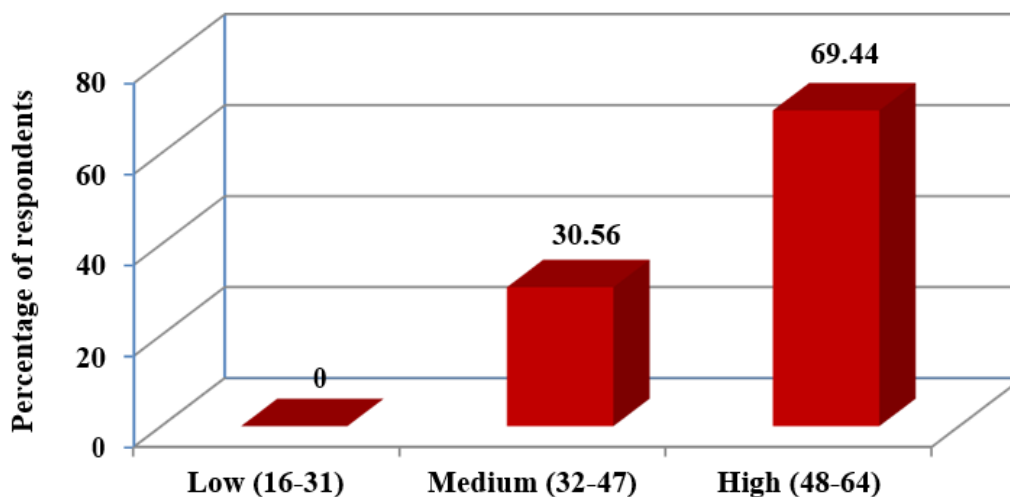


Figure 5: Scientists' perception of potential of IPR enforcement in technology protection domain

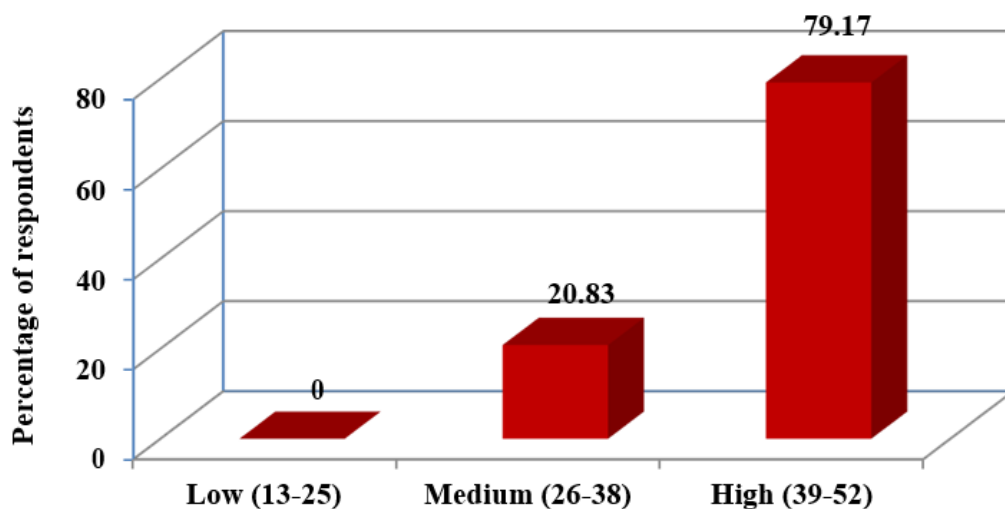


Figure 6: Scientists' perception of potential of IPR enforcement in technology transfer/commercialization domain

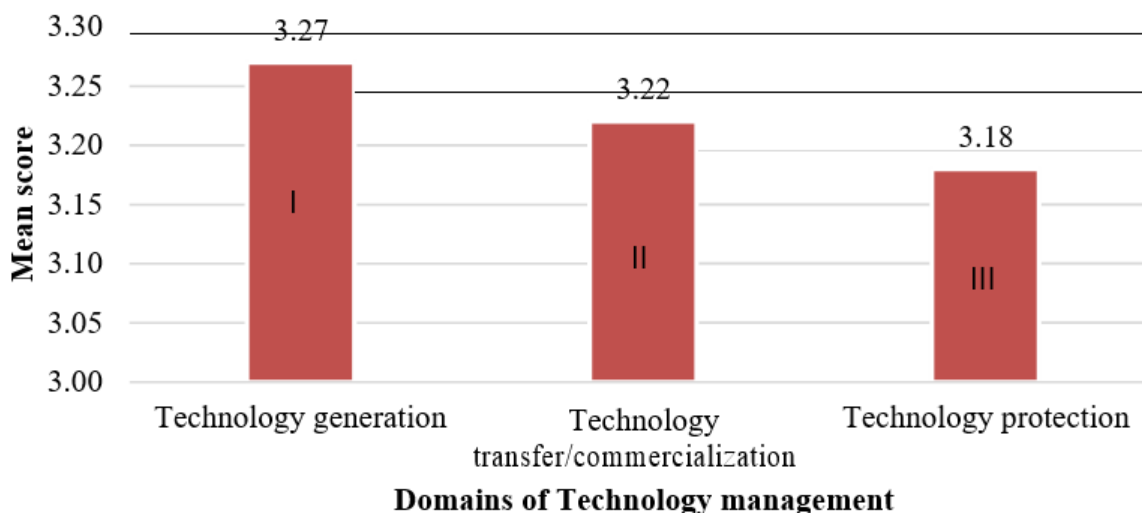


Figure 7: Ranking of domains based on mean scores

As evinced by theoretical and empirical literature, there have been mixed conclusions on the impact of IPR on technology management. Apart from views on the facilitating role of patents in incentivizing research and enhancing technology diffusion by researchers, Graff (2007); Kochhar (2008) and Kannan (2010), there have been criticisms of patents impeding research, raised by Taylor and Cayford (2002), lack of openness in sharing of research results by Blumenthal *et al* (1996); Campbell *et al* (2002) and Schacht (2012) and conflicts of interests Schacht (2012).

The present study analyzed perception of academia about potential of a strong IPR portfolio for technology management including technology generation, protection, and transfer/commercialization. It is noteworthy that a significantly high percentage of scientists displayed high level of perception in this regard. The results unequivocally bring out unanimous discernment of scientific community regarding promising prospects of IPR policy environment for promoting innovations, patenting culture, industry-academia collaborations, entrepreneurial spirit in academic spheres and a well-funded premier research system.

In the technology generation domain that displayed highest mean score, it could be observed that scientists had high appreciation towards the practice of rewarding inventors with due share of benefits accrued from commercialized patented technologies. Also, researchers expressed a strong feeling that IPRs could be instrumental in boosting their morale, creativity, and innovativeness. There was general agreement on the view that authenticated research records under IPR regime enhanced accountability in research. Also, there was consensus among the faculty about potential of IPR protection in promotion of market driven research and generation of globally competent technologies. Jain and Sharma (2006) reported that establishment of IPMS in IIT, Bombay resulted in introduction of new research programmes and increased number of patent filings.

As for technology protection, there was considerable acceptance for the view that IPR enforcement safeguards institutional IP from infringement. There was high recognition for the execution of Joint Intellectual Property Management Plan in collaborative research to ensure fair practices in technology protection. Also, the disclosure of the origin and source of biological material and Indigenous Technical Knowledge (ITK) in patent applications was contemplated as an effective mechanism to benefit ITK holders. The importance of confidentiality agreement as an effective tool to protect strategic know how was also widely recognized.

Admittedly, there was immense appreciation for commercialization of IP among the scientific community. The utility of industry and extension linkage for up-scaling lab level technologies to industrially applicable products was largely appreciated. Ganguli (2003) ascertained that academic and public research institutions needed to work with and share their scientific knowledge and resources with industry to create, manage and disseminate value added intellectual assets. The need for business incubation facilities to develop innovative technology commercialization models was also recognized. Channappagouda and Sasidhar (2018) suggested that the quality of livestock service delivery by State Animal Husbandry Departments could be enhanced through public private

participation strategy. Sinha *et al* (2019) reported ‘training for managers/directors to co-ordinate linkage’, ‘allocating staff time to linkage activities’, ‘forming integrated field teams’ and ‘adopting improved personnel management practices’ as effective strategies to strengthen Research-Extension linkages in veterinary universities.

Conclusion

The results of the study imply the scientists’ regard for an IP regime that spurs technological advancement. On a broader perspective, the results reflect scientists’ appreciation for the values, ethos, policies, and practices of an innovation economy. Graff (2007) highlights academic innovation as a priority area for developing countries to embrace the standards of knowledge-based economy. There was consensus among the faculty about the potential of IPR generation, protection and commercialization in promoting innovations, industry-academia collaborations, entrepreneurial spirit in academic spheres and a well-funded premier research system with accountability and globally competent technologies.

Acknowledgement

The authors acknowledge thankfully, the services and facilities, including research grant offered by ‘Kerala Veterinary and Animal Sciences University’. We are extremely grateful to the authorities of ICAR, scientists, and other stakeholders for their wholehearted support and cooperation for collection of necessary information and data.

Conflict of Interests

There is no conflict of interest.

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