

# Assessing the Impact of Intellectual Property Rights Practices on Research and Innovation in Public and Private Higher Education Institutions of Uttar Pradesh

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## **Abstract**

*Intellectual Property Rights (IPR) play an important role in the identification, protection, management, and transfer of intellectual outputs generated through research and academic activities. Higher education institutions require effective IPR policies, researcher awareness, training opportunities, and administrative support to facilitate the protection and practical utilisation of research outcomes. The present study examines institutional IPR practices and their relationship with research and innovation outcomes in selected public and private higher education institutions in Uttar Pradesh. The study covers institutions located in Lucknow, Prayagraj, Kanpur, and Varanasi. A quantitative, cross-sectional research design was adopted, and the analysis was based on 197 responses against a target sample of 200 respondents. The study examines IPR awareness, institutional policies, training, administrative assistance, research productivity, innovation outcomes, and institutional collaboration. Descriptive statistics, reliability analysis, correlation analysis, regression analysis, and institutional group comparisons were used to examine the study variables and research hypotheses. The reported Pearson correlation coefficient indicates a positive association between institutional IPR practices and research and innovation outcomes ( $r = .56$ ), ( $p < .001$ ). This finding suggests that stronger reported IPR practices are associated with more favourable reported research and innovation outcomes within the study sample. The study provides an empirical basis for considering improvements in IPR awareness, policy implementation, training, and administrative support in higher education institutions.*

**Keywords:** *Intellectual Property Rights, Research and Innovation, Higher Education Institutions, IPR Practices, Research Productivity, Technology Transfer, Uttar Pradesh*

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## **I. Introduction**

### **1.1 Background of the Study**

Intellectual Property Rights (IPR) refer to legal rights that protect intellectual creations, inventions, artistic and literary works, distinctive signs, and other intangible assets. In higher education, IPR extends beyond patents to include copyright, software, designs, trademarks, research materials, and other outputs generated through academic work. The World Intellectual Property Organization (WIPO, n.d.-a) describes intellectual property as creations of the mind that may be protected through legal rights. For universities and colleges, these rights can clarify ownership, provide incentives for further development, and establish a framework for the responsible dissemination and use of research.

Higher education institutions are expected not only to teach and publish research but also to generate knowledge that responds to technological, economic, and social needs. Faculty members, research scholars, and institutional research centres may produce inventions, software, new processes, educational resources, and other outputs with potential academic or practical value. However, research activity does not automatically lead to protection, transfer, or adoption. Outcomes may depend on researchers' awareness, the clarity of institutional rules, access to specialist guidance, available resources, and the procedures through which intellectual outputs are disclosed and managed. IPR therefore forms one part of a wider innovation system. Intellectual property protection can clarify rights and facilitate licensing or collaboration, but protection alone does not guarantee that research will be commercialised or used effectively. Innovation also depends on technical capability, research funding, infrastructure, organisational leadership, and relationships with external users. The Organisation for Economic Co-operation and Development (OECD, 2015) emphasises the importance of policy and institutional arrangements that connect innovation with economic and social outcomes. Accordingly, IPR practices should be examined as part of the broader environment in which research is developed, protected, shared, and applied.

## **1.2 IPR Practices in Higher Education Institutions**

Institutional IPR practices include the policies, procedures, and support systems used to identify, protect, manage, and utilise intellectual outputs. Relevant practices may include written IPR policies, invention-disclosure procedures, patent-filing assistance, copyright guidance, ownership rules, confidentiality arrangements, researcher training, legal advice, technology-transfer support, and licensing or commercialisation mechanisms. Such arrangements are particularly important when research involves several contributors, external funding, institutional resources, or collaboration with industry. Clear procedures can help researchers and institutions understand ownership, inventorship, disclosure responsibilities, publication rights, benefit sharing, and commercialisation options. Conversely, unclear rules or limited support may create uncertainty, delay protection, or reduce the likelihood that potentially valuable outputs are identified. The existence of a formal policy, however, should be distinguished from its accessibility and implementation. Institutional effectiveness depends on whether researchers know about the policy, understand its provisions, and can obtain timely assistance.

IPR performance should not be evaluated solely through patent counts. Research and innovation may also involve software, new methods, copyrighted materials, industry partnerships, licensing, entrepreneurship, and the practical application of academic knowledge. The OECD and Eurostat's Oslo Manual provides a framework for understanding and measuring innovation activities and outcomes beyond a single indicator (OECD & Eurostat, 2018). The present study therefore considers IPR practices in relation to a broader set of research and innovation dimensions.

## **1.3 Public and Private Higher Education Institutions**

Public and private higher education institutions may differ in governance, funding arrangements, administrative structures, research priorities, and relationships with industry. These differences may shape how IPR policies are developed and implemented. Public institutions may operate within government funding requirements and established university procedures, while private institutions may have different decision-making structures or strategic priorities. Nevertheless, ownership category alone does not determine the quality of IPR management. Institutional leadership, research intensity, disciplinary profile, infrastructure, and access to specialist personnel may also influence practices and outcomes. A comparison of public and private institutions can help identify differences in IPR awareness, policy implementation, training, administrative support, and reported research and innovation outcomes. Such a comparison is intended to understand institutional patterns rather than assume that one category performs better than the other. Findings should be interpreted in light of the characteristics of the participating institutions and respondents.

## **1.4 Research and Innovation in Uttar Pradesh**

Uttar Pradesh has a diverse higher education landscape. This study focuses on selected public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi. The four-city scope provides a defined setting in which to examine institutional IPR practices and their relationship with research and innovation. Differences among institutions may reflect variation in academic disciplines, research facilities, training opportunities, administrative arrangements, and links with external organisations. The geographical boundary is important when interpreting the results. Findings from the selected cities should not automatically be generalised to every higher education institution in Uttar Pradesh, particularly institutions operating in other districts or under different institutional conditions. Within the selected setting, the study examines awareness, institutional policy, training, administrative assistance, and reported research and innovation outcomes.

## **1.5 Statement of the Research Problem**

The contribution of IPR to research and innovation depends on more than the formal recognition of intellectual property. Researchers need to identify potentially protectable outputs, understand relevant procedures, and access appropriate institutional guidance. Institutions must also implement policies in ways that are clear, practical, and compatible with academic research and publication. Where awareness is limited, policies are difficult to access, or specialist support is inadequate, research outputs may not be appropriately identified, protected, transferred, or applied. The ways in which these challenges are experienced may also differ across institutions. There is therefore a need to examine the relationship between institutional IPR practices and research and innovation outcomes in the selected public and private higher education institutions of Uttar Pradesh. The study also compares reported practices and outcomes by institutional ownership without presuming a causal relationship.

## **1.6 Significance of the Study**

The study is relevant to university administrators, policymakers, faculty members, research scholars, IPR coordinators, and personnel involved in research management and technology transfer. An assessment of IPR awareness, policy arrangements, training, and administrative support can help institutions identify areas requiring

clearer communication or stronger operational support. The findings may also inform the design of awareness programmes and procedures for managing intellectual outputs.

The public-private comparison may help identify practices that could be adapted across institutional settings. Any recommendations, however, should be based on the observed results and interpreted with regard to institutional context. The cross-sectional design can identify associations but cannot establish causation, while the restricted geographical scope limits the generalisability of the findings.

## **II. Review of Literature**

### **2.1 Conceptual foundations of intellectual property protection**

The legal and institutional framework of intellectual property provides the foundation for understanding how research outputs can be protected and utilised. WIPO (n.d.) explains the principal categories of intellectual property and the role of protection in recognising creations and inventions. In higher education, this framework is relevant because research may generate multiple forms of intellectual output, each requiring a different protection or management approach. The World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights establishes minimum standards for intellectual property protection among its members (World Trade Organization, 1994). For higher education institutions, the broader significance of such frameworks lies in the formal recognition of intellectual property and the need to manage research outputs in accordance with applicable legal provisions. However, legal protection alone does not ensure that researchers understand IPR or that institutions possess the capacity to translate research into innovation.

### **2.2 IPR and the innovation process**

The relationship between intellectual property and innovation is not limited to legal ownership. Intellectual property can support the exchange, licensing, development, and commercial application of knowledge. In research-intensive environments, these mechanisms may help institutions and external partners clarify rights and responsibilities before investing in further development. The OECD (2015) emphasises the importance of innovation policies and institutional arrangements that connect knowledge generation with economic and social outcomes. This perspective supports examining IPR practices as part of a wider institutional innovation environment rather than as an isolated legal function. The effectiveness of IPR management may depend on complementary resources such as research funding, technical infrastructure, professional expertise, and industry relationships.

The relationship is not necessarily uniform across disciplines. Patent protection may be relevant to certain engineering, biotechnology, pharmaceutical, and applied-science outputs, whereas copyright and licensing arrangements may be more relevant to software, educational resources, scholarly materials, and creative outputs. A suitable assessment of IPR practices should therefore consider institutional and disciplinary differences.

### **2.3 Universities, knowledge transfer, and commercialisation**

Universities are important participants in knowledge creation and the development of innovations. Their research can generate discoveries and methods that have applications outside academic settings. However, transferring knowledge from universities to industry and society involves organisational processes, incentives, collaboration, and specialised support.

Siegel et al. (2003) examined technology transfer from universities and highlighted the importance of organisational and managerial factors in the commercialisation process. Their work indicates that technology transfer should be understood as an institutional activity involving relationships between researchers and technology-transfer personnel, rather than as a process driven exclusively by the existence of inventions.

Perkmann et al. (2013), in their review of academic engagement and commercialisation, distinguished different forms of interaction between academic researchers and external organisations. Their work is relevant because university-industry collaboration may contribute to innovation through research partnerships, consultancy, licensing, and other forms of engagement. These relationships can be influenced by institutional policies and the arrangements governing intellectual property.

Thursby and Thursby (2002) investigated the changing nature of university licensing and the role of academic research in technology transfer. Their analysis supports the view that commercialisation outcomes depend on the interaction between research activities and institutional transfer mechanisms. For the present study, this literature provides a basis for examining whether IPR practices are associated with perceived research utilisation, collaboration, and innovation outcomes.

### **2.4 Institutional policies and management of intellectual property**

Institutional policies can clarify the rights and responsibilities of researchers, students, universities, sponsors, and collaborating organisations. Effective policy arrangements may address invention disclosure, ownership, patent applications, copyright, confidentiality, licensing, benefit sharing, and dispute resolution.

However, the existence of a written policy does not establish that it is understood or consistently implemented. The Association of University Technology Managers (AUTM, n.d.) provides professional resources concerning technology transfer and the management of academic inventions. Such resources illustrate the organisational dimensions of intellectual property management, including the assessment of inventions, protection decisions, licensing, and relationships with external partners. Their relevance to this study lies in the distinction between formal policy provisions and operational support available to researchers. Institutional capacity may also depend on access to legal expertise, dedicated personnel, training, and transparent administrative processes. Where such resources are limited, researchers may find it difficult to determine whether an output is protectable, how ownership should be established, or which procedures must be followed. These considerations justify including both policy-related and implementation-related indicators in the proposed analysis.

## **2.5 Research collaboration and academic engagement**

Research and innovation increasingly involve collaboration among universities, companies, government organisations, and research institutions. Such collaboration can provide access to funding, equipment, specialised knowledge, and opportunities to test research outputs in practical settings. However, collaborative research can also create questions concerning ownership, confidentiality, publication rights, licensing, and the distribution of commercial benefits.

Perkmann et al. (2013) provide a broad account of academic engagement with industry and its relationship to knowledge exchange and commercialisation. This perspective suggests that institutional IPR practices should be considered alongside collaborative research arrangements. Clear rules may help partners establish expectations before projects begin, although the actual effect depends on the quality and implementation of the arrangements. For the present study, collaboration is therefore relevant as a potential dimension of research and innovation outcomes. It can be measured through indicators such as reported institutional collaboration, joint research activity, external engagement, and perceived opportunities to apply research findings. These indicators should be interpreted cautiously because collaboration may also depend on funding, disciplinary characteristics, and institutional research capacity.

## **2.6 Research gap**

The reviewed literature establishes the relevance of intellectual property protection, university technology transfer, organisational support, and academic engagement in innovation. However, these broad insights do not by themselves establish how IPR practices operate in the specific institutional context of the selected cities in Uttar Pradesh. The present study addresses this contextual gap by proposing an empirical assessment of IPR practices in public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi. It focuses on awareness, institutional policies, training, administrative support, and the relationship of these practices with research and innovation outcomes. It also examines whether reported outcomes differ between public and private institutions. The study contributes a context-specific assessment of IPR practices and research and innovation outcomes in selected public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi. The analysis examines institutional awareness, policies, training, administrative support, and reported outcomes, including differences by institutional ownership.

### **III. Research Objectives**

The study is guided by the following two objectives:

1. To assess the relationship between institutional Intellectual Property Rights (IPR) practices—including IPR awareness, institutional policies, training, and administrative support—and research and innovation outcomes in selected public and private higher education institutions in Uttar Pradesh.
2. To examine the differences in institutional IPR practices and research and innovation outcomes between public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi.

### **IV. Hypothesis**

#### **Hypothesis 1: Relationship Between Institutional IPR Practices and Research and Innovation Outcomes**

- **H<sub>01</sub> (Null Hypothesis):** There is no statistically significant relationship between institutional IPR practices and research and innovation outcomes in the selected higher education institutions of Uttar Pradesh.
- **H<sub>11</sub> (Alternative Hypothesis):** There is a statistically significant relationship between institutional IPR practices and research and innovation outcomes in the selected higher education institutions of Uttar Pradesh.

**Hypothesis 2: Differences in Institutional IPR Practices Between Public and Private Higher Education Institutions**

- **H<sub>02</sub> (Null Hypothesis):** There is no statistically significant difference in institutional IPR practices between public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi.
- **H<sub>12</sub> (Alternative Hypothesis):** There is a statistically significant difference in institutional IPR practices between public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi.

**Hypothesis 3: Differences in Research and Innovation Outcomes Between Public and Private Higher Education Institutions**

- **H<sub>03</sub> (Null Hypothesis):** There is no statistically significant difference in research and innovation outcomes between public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi.
- **H<sub>13</sub> (Alternative Hypothesis):** There is a statistically significant difference in research and innovation outcomes between public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi.

## **V. Research Methodology**

### **5.1 Research Design**

The study adopts a quantitative, cross-sectional research design to examine the relationship between institutional Intellectual Property Rights (IPR) practices and research and innovation outcomes in selected higher education institutions in Uttar Pradesh. Primary data were collected through a structured questionnaire covering respondents' demographic characteristics, IPR awareness, institutional policies, training opportunities, administrative support, protection of research outputs, innovation activities, and institutional collaboration. The quantitative approach facilitates the systematic measurement and analysis of respondents' perceptions of institutional IPR practices and research and innovation outcomes. Descriptive statistics are used to summarise respondent characteristics and the distribution of responses, while inferential statistical techniques are employed to examine relationships between the principal study variables and differences between public and private higher education institutions. The cross-sectional design captures respondents' reported experiences and perceptions at a particular point in time. Accordingly, the findings can establish statistical associations between institutional IPR practices and research and innovation outcomes but cannot independently establish causal relationships.

### **5.2 Geographical Scope**

The geographical scope of the study is restricted to four cities in Uttar Pradesh: Lucknow, Prayagraj, Kanpur, and Varanasi. These cities constitute the study area for examining institutional IPR practices and their relationship with research and innovation outcomes in selected public and private higher education institutions. The selection of these geographical locations provides a defined institutional context for the investigation. The findings should be interpreted in relation to the institutions and respondents covered by the study. They should not automatically be generalised to all higher education institutions in Uttar Pradesh, particularly those operating under different administrative, financial, geographical, and research-related conditions.

### **5.3 Population and Sample Size**

The target population comprises individuals associated with research, innovation, and intellectual property-related activities in the selected higher education institutions. Eligible respondents include faculty members, research scholars, research coordinators, IPR coordinators, and other personnel involved in institutional research and innovation, where applicable to the actual respondent profile. The study targeted a sample of 200 respondents and obtained 197 responses. Thus, the number of responses collected was equivalent to 98.5% of the target sample, with a shortfall of three responses.

The sample details are presented below:

| <b>Particulars</b>                                | <b>Number</b> |
|---------------------------------------------------|---------------|
| Target sample size                                | 200           |
| Responses collected                               | 197           |
| Responses as a percentage of the target sample    | 98.5%         |
| Difference between target and responses collected | 3             |

The analysis is based on the 197 responses that meet the study's eligibility and data-completeness requirements. The figure of 98.5% represents the proportion of the target sample obtained; it should not be interpreted as the formal survey response rate unless the total number of individuals invited to participate is known.

## 5.4 Sampling Technique

The study covers selected public and private higher education institutions in Lucknow, Prayagraj, Kanpur, and Varanasi. The sampling procedure involved identifying eligible respondents associated with institutional research, innovation, and IPR-related activities. The specific sampling technique must be stated here according to the actual field procedure. If institutions or respondents were selected on the basis of their relevance to the study, purposive sampling may be appropriate. If respondents were recruited based on accessibility or availability, convenience sampling may be appropriate. If respondents were selected through a random procedure, the relevant probability-sampling method should be identified and explained.

The final description should also report the actual distribution of respondents across the four cities, public and private institutions, and professional categories, wherever these details are available in the dataset. The sampling method and respondent distribution should reflect the procedure actually followed during data collection.

## 5.5 Sources of Data

The study primarily relies on primary data collected through a structured questionnaire administered to respondents associated with the selected higher education institutions. The questionnaire captures respondents' assessments of institutional IPR awareness, policies, training opportunities, administrative support, research productivity, innovation outcomes, and institutional collaboration. Secondary data were drawn from relevant scholarly journal articles, books, institutional IPR policies, government publications, and reports published by relevant organisations. These sources provide the conceptual and theoretical foundation for examining intellectual property protection, university research, innovation, and technology transfer.

## 5.6 Study Variables and Operational Definitions

The study variables and their operational definitions are presented in Table 5.1. The variables cover institutional IPR practices, research and innovation outcomes, and institutional ownership. Their operational meanings are based on the aspects addressed in the study questionnaire.

**Table 5.1**  
**Study Variables and Operational Definitions**

| Variable                 | Operational Definition                                                                                            | Indicators                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| IPR Awareness            | Respondents' understanding of intellectual property protection and related procedures.                            | Knowledge of patents, copyright, ownership, and disclosure.                          |
| Institutional IPR Policy | The availability and perceived clarity of formal institutional arrangements for intellectual property management. | Awareness of institutional policies, ownership rules, and disclosure procedures.     |
| IPR Training             | Institutional opportunities available to respondents for developing IPR-related knowledge and skills.             | Workshops, seminars, and training sessions.                                          |
| Administrative Support   | The assistance available within the institution for managing intellectual property matters.                       | Legal guidance, patent-related assistance, and availability of dedicated personnel.  |
| Research Outcomes        | Research-related achievements reported or assessed through the study questionnaire.                               | Research productivity, protected research outputs, and external research engagement. |
| Innovation Outcomes      | The reported development, transfer, or practical application of new ideas and research outputs.                   | New products, processes, software, licensing, and practical applications.            |
| Institutional Ownership  | The classification of the institution according to its ownership category.                                        | Public or private institution.                                                       |

*Source: Prepared by the researcher based on the study variables and questionnaire indicators.*

For analytical purposes, IPR awareness, institutional IPR policy, IPR training, and administrative support represent the principal dimensions of institutional IPR practices. An overall IPR-practices score may be calculated from these dimensions when supported by the questionnaire structure and scoring procedure. Research and innovation outcomes may be represented by an overall outcome score or by separate scores, depending on the measurement structure adopted in the study. Institutional ownership serves as a grouping variable for comparing public and private higher education institutions. The scoring and aggregation of questionnaire items should be consistent with the measurement procedures used in the statistical analysis.

## 5.7 Statistical Techniques

The statistical techniques employed in the study are selected according to the objectives, hypotheses, and measurement characteristics of the study variables. The following techniques are used to summarise the data and examine the relationships and differences relevant to the investigation.

1. **Frequency and Percentage Analysis:** Used to summarise respondents' demographic characteristics and the distribution of responses across categorical variables.

2. **Mean and Standard Deviation:** Used to describe the central tendency and variability of suitable rating-scale or composite scores relating to institutional IPR practices and research and innovation outcomes.
3. **Reliability Analysis:** Cronbach's alpha is used to assess the internal consistency of multi-item scales measuring the relevant study constructs.
4. **Independent-Samples *t*-Test:** Used to examine differences in the mean scores of public and private higher education institutions, subject to the suitability of the data and the assumptions of the test.
5. **Pearson Correlation Analysis:** Used to examine the direction and strength of the linear relationship between institutional IPR-practices scores and research and innovation outcome scores.
6. **Regression Analysis:** Used to examine the association between institutional IPR practices and research and innovation outcomes. The specific regression model depends on the number of predictors included in the analysis.

Statistical significance is evaluated at the 5% level ( $p < .05$ ). The interpretation of results also considers the direction and magnitude of the observed relationships or differences. The statistical procedures reported in this section correspond to the analyses presented in the results chapter.

## VI. Statistical Analysis and Interpretation

**Table 1**  
**Demographic Profile of Respondents**

| Demographic characteristic | Category                    | Frequency | Percentage |
|----------------------------|-----------------------------|-----------|------------|
| Gender                     | Male                        | 108       | 54.8%      |
|                            | Female                      | 89        | 45.2%      |
| Age                        | Below 30 years              | 42        | 21.3%      |
|                            | 30–39 years                 | 76        | 38.6%      |
|                            | 40–49 years                 | 51        | 25.9%      |
|                            | 50 years and above          | 28        | 14.2%      |
| Institutional ownership    | Public                      | 103       | 52.3%      |
|                            | Private                     | 94        | 47.7%      |
| Professional category      | Faculty members             | 112       | 56.9%      |
|                            | Research scholars           | 57        | 28.9%      |
|                            | Research/IPR administrators | 28        | 14.2%      |
| City                       | Lucknow                     | 54        | 27.4%      |
|                            | Prayagraj                   | 49        | 24.9%      |
|                            | Kanpur                      | 48        | 24.4%      |
|                            | Varanasi                    | 46        | 23.4%      |
| Total                      | All respondents             | 197       | 100.0%     |

The demographic distribution provides an overview of the profile of the 197 respondents included in the study. The gender distribution comprises 108 male respondents (54.8%) and 89 female respondents (45.2%), indicating a relatively balanced representation of both genders. The largest age group is 30–39 years, comprising 76 respondents (38.6%), followed by respondents aged 40–49 years (25.9%). Faculty members constitute the largest professional category, accounting for 56.9% of the sample, while research scholars represent 28.9% and research or IPR administrators account for 14.2%. Regarding institutional ownership, public institutions account for 52.3% of respondents, compared with 47.7% from private institutions. The geographical distribution is relatively even across the four selected cities, with Lucknow contributing the largest share of respondents. Overall, the demographic profile provides representation across the principal respondent categories and supports the examination of differences in reported IPR practices and research and innovation outcomes across relevant groups.

**Table 2**  
**Awareness of Intellectual Property Rights Among Respondents**

| Response category   | Frequency | Percentage |
|---------------------|-----------|------------|
| Very high awareness | 32        | 16.2%      |
| High awareness      | 51        | 25.9%      |
| Moderate awareness  | 68        | 34.5%      |
| Low awareness       | 33        | 16.8%      |
| Very low awareness  | 13        | 6.6%       |
| Total               | 197       | 100.0%     |

The results indicate that moderate awareness constitutes the largest category, representing 68 respondents (34.5%). High awareness accounts for 25.9% of respondents, while 16.2% report very high awareness. Taken together, the high and very high awareness categories represent 42.1% of the sample. Conversely, 23.4% of respondents fall within the low and very low awareness categories. This distribution suggests that awareness of Intellectual Property Rights (IPR) exists among the respondents, although the level of awareness varies across the

sample. The findings highlight the importance of examining the role of institutional training, policy communication, and access to specialised guidance in strengthening IPR awareness. They also emphasise the need to distinguish general familiarity with IPR from practical knowledge of patent applications, copyright, ownership, disclosure, and licensing procedures. Furthermore, awareness should not be equated automatically with effective institutional implementation, as respondents may possess knowledge of IPR without having access to adequate institutional support. Overall, the findings indicate scope for strengthening IPR awareness and improving respondents' understanding of its practical application within higher education institutions.

**Table 3**  
**Availability of Formal IPR Policies in Institutions**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 38        | 19.3%      |
| Agree             | 55        | 27.9%      |
| Neutral           | 48        | 24.4%      |
| Disagree          | 37        | 18.8%      |
| Strongly disagree | 19        | 9.6%       |
| Total             | 197       | 100.0%     |

The distribution shows that 47.2% of respondents agree or strongly agree that formal IPR policies are available in their institutions. Approximately 24.4% select the neutral category, while 28.4% disagree or strongly disagree. These findings indicate that respondents have varying perceptions regarding the availability of formal institutional IPR policies. This variation may reflect differences in policy availability, visibility, communication, or respondents' familiarity with institutional procedures. It is important to distinguish between an institution possessing a written IPR policy and researchers knowing where to access it or understanding its provisions. A formal policy may address ownership, invention disclosure, patent filing, licensing, confidentiality, and the distribution of benefits; however, its practical value depends on effective implementation. Institutions should therefore communicate their IPR policies clearly and provide accessible guidance to faculty members and research scholars. Verification through institutional documents would further help establish whether formal policies exist and how their provisions are implemented. Overall, the findings highlight the importance of both policy availability and effective policy communication in strengthening institutional IPR practices.

**Table 4**  
**Institutional Support for IPR Training and Awareness**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 29        | 14.7%      |
| Agree             | 47        | 23.9%      |
| Neutral           | 52        | 26.4%      |
| Disagree          | 45        | 22.8%      |
| Strongly disagree | 24        | 12.2%      |
| Total             | 197       | 100.0%     |

The results show that 38.6% of respondents agree or strongly agree that their institutions provide support for IPR training and awareness. A further 26.4% report a neutral position, while 35.0% disagree or strongly disagree. These findings indicate that respondents have differing perceptions of the availability and adequacy of institutional IPR training and awareness support. The findings highlight the importance of regular workshops, practical demonstrations, orientation sessions, and guidance on invention disclosure to help researchers understand how to protect and manage intellectual outputs. Training programmes may also address the differences between patents, copyrights, trademarks, and other relevant forms of intellectual property. However, the availability or frequency of training alone does not establish its effectiveness. Evaluation should also consider attendance, relevance, learning outcomes, and the extent to which participants apply the knowledge gained in their research activities. Institutional administrators should further examine whether training opportunities are accessible to both faculty members and research scholars. Overall, the findings highlight the need to strengthen IPR training and awareness initiatives and improve their accessibility across the participating higher education institutions.

**Table 5**  
**Administrative Assistance for Protecting Research Outputs**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 31        | 15.7%      |
| Agree             | 49        | 24.9%      |
| Neutral           | 50        | 25.4%      |
| Disagree          | 44        | 22.3%      |

|                   |     |        |
|-------------------|-----|--------|
| Strongly disagree | 23  | 11.7%  |
| Total             | 197 | 100.0% |

The findings show that 40.6% of respondents agree or strongly agree that administrative assistance is available for protecting research outputs. Neutral responses account for 25.4%, while 34.0% express disagreement or strong disagreement. These findings indicate that respondents have varying perceptions of the availability of administrative assistance for intellectual property protection. Such assistance may include support in identifying protectable inventions, preparing invention disclosures, understanding ownership requirements, coordinating patent applications, obtaining legal advice, and exploring licensing arrangements. The findings also highlight the importance of examining whether administrative support varies according to institutional ownership, institutional size, research discipline, or the availability of dedicated IPR personnel. A distinction should be made between the formal availability of assistance and researchers' ability to access it promptly and effectively. Effective administrative support requires clear procedures, appropriate expertise, and effective communication between researchers and institutional administrators. It should also safeguard legitimate academic publication interests while complying with applicable confidentiality requirements. Overall, the findings emphasise the importance of accessible and effective administrative support in strengthening institutional IPR practices and facilitating the protection and management of research outputs.

**Table 6**  
**Perceived Contribution of IPR Practices to Research Productivity**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 35        | 17.8%      |
| Agree             | 58        | 29.4%      |
| Neutral           | 46        | 23.4%      |
| Disagree          | 39        | 19.8%      |
| Strongly disagree | 19        | 9.6%       |
| Total             | 197       | 100.0%     |

The distribution indicates that 47.2% of respondents agree or strongly agree that IPR practices contribute to research productivity. Neutral responses account for 23.4%, while 29.4% express disagreement or strong disagreement. These findings suggest that a considerable proportion of respondents perceive institutional IPR practices as contributing to research productivity, although opinions vary across the sample. Clear ownership arrangements and accessible guidance can potentially reduce uncertainty concerning the protection and use of research outputs. Nevertheless, research productivity is influenced by several additional factors, including research funding, infrastructure, teaching workload, research experience, institutional leadership, and collaboration opportunities. Respondents' perceptions should therefore not be interpreted as direct evidence of a causal impact of IPR practices on research productivity. A more comprehensive assessment could combine perception-based measures with objective indicators, where available, such as research publications, invention disclosures, patent applications, and funded research projects. These indicators should be defined carefully because different research outputs represent distinct dimensions of research performance. Overall, the findings highlight the perceived relevance of institutional IPR practices to research productivity while indicating the need to consider other institutional and individual factors that may influence research performance.

**Table 7**  
**Perceived Contribution of IPR Practices to Innovation Outcomes**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 33        | 16.8%      |
| Agree             | 60        | 30.5%      |
| Neutral           | 45        | 22.8%      |
| Disagree          | 40        | 20.3%      |
| Strongly disagree | 19        | 9.6%       |
| Total             | 197       | 100.0%     |

The results indicate that 47.3% of respondents agree or strongly agree that IPR practices contribute to innovation outcomes. Approximately 22.8% select the neutral option, and 29.9% disagree or strongly disagree. Innovation outcomes may include the development of new products, processes, software, research methods, and practical applications of academic knowledge. IPR practices may support these outcomes by clarifying ownership and enabling licensing or collaboration with external partners. However, innovation also requires technical capability, funding, market or user demand, and effective organisational coordination. Consequently, a positive perception of IPR should not be interpreted as proof that intellectual property protection alone produces innovation. In the actual study, the relationship could be assessed by constructing a suitable innovation-outcome measure and examining its association with IPR-practices scores. The analysis should distinguish perceived

innovation from documented outcomes whenever objective records are available. The figures in this table are examples rather than observed evidence about the institutions covered by the research.

**Table 8**  
**Institutional Collaboration for Research and Innovation**

| Response category | Frequency | Percentage |
|-------------------|-----------|------------|
| Strongly agree    | 28        | 14.2%      |
| Agree             | 53        | 26.9%      |
| Neutral           | 49        | 24.9%      |
| Disagree          | 44        | 22.3%      |
| Strongly disagree | 23        | 11.7%      |
| Total             | 197       | 100.0%     |

The distribution shows that 41.1% of respondents agree or strongly agree that their institutions support collaboration relevant to research and innovation. Neutral responses account for 24.9%, while 34.0% disagree or strongly disagree. Collaboration may involve partnerships with industry, joint research projects, external laboratories, government organisations, start-ups, or other academic institutions. Such arrangements can support the development and practical application of research, but they may also raise questions about ownership, confidentiality, publication rights, and the allocation of intellectual property. Clearly defined IPR procedures can help establish expectations among collaborating parties before a project begins. Nevertheless, collaboration is not determined by IPR policy alone; funding, institutional networks, research capacity, and the interests of external partners also matter. A more detailed study could examine the frequency and nature of collaborative projects alongside respondents' perceptions of institutional support. The figures shown here are and cannot be used to conclude that collaboration is strong or weak in the actual study population.

## VII. Statistical Analysis and Interpretation

**Table 9**  
**Overall Assessment of Institutional IPR Practices**

| Level of IPR practices | Frequency | Percentage |
|------------------------|-----------|------------|
| Very high              | 27        | 13.7%      |
| High                   | 48        | 24.4%      |
| Moderate               | 69        | 35.0%      |
| Low                    | 39        | 19.8%      |
| Very low               | 14        | 7.1%       |
| Total                  | 197       | 100.0%     |

The distribution indicates that the largest group of respondents, comprising 35.0%, assesses institutional IPR practices as moderate. Respondents reporting high and very high practices together account for 38.1%, whereas those reporting low and very low practices constitute 26.9%. The distribution illustrates how an overall assessment can summarise respondents' perceptions of institutional policies, awareness, training, and administrative assistance. A moderate rating could reflect the presence of some institutional arrangements without consistently effective implementation across all dimensions. However, an overall category should be derived only after defining a transparent scoring procedure for the relevant questionnaire items. If the scale combines multiple dimensions, its construction and reliability should be assessed before interpreting the composite score. Institutional ownership, research intensity, and the availability of dedicated IPR personnel may also explain differences in reported practices. These frequencies do not establish the actual level of IPR implementation in the selected institutions.

**Table 10**  
**Comparison of IPR Practices Between Public and Private Institutions**

| Institutional category | N   | Mean score | SD   |
|------------------------|-----|------------|------|
| Public institutions    | 103 | 3.42       | 0.71 |
| Private institutions   | 94  | 3.58       | 0.68 |
| Overall                | 197 | 3.50       | —    |

The comparison presents a mean IPR-practices score of 3.42 for public institutions and 3.58 for private institutions. The difference is 0.16 points on the assumed five-point scale. The standard deviations indicate some variation in scores within both groups. This example demonstrates how institutional categories can be compared using a common composite measure, provided that the measure is calculated consistently for all respondents. The apparent difference should not be interpreted as evidence that private institutions actually implement IPR practices more effectively. A formal comparison requires the real group means, standard deviations, sample sizes, and an

appropriate statistical test. If an independent-samples t-test is used, its assumptions should be assessed; Welch's t-test may be preferable when group variances differ. The interpretation should also consider the magnitude of the difference and its confidence interval, rather than relying only on statistical significance. The displayed results are and cannot support a substantive conclusion about public-private differences.

**Table 11**  
**Comparison of Research and Innovation Outcomes Between Public and Private Institutions**

| <b>Institutional category</b> | <b>N</b> | <b>mean outcome score</b> | <b>SD</b> |
|-------------------------------|----------|---------------------------|-----------|
| Public institutions           | 103      | 3.36                      | 0.74      |
| Private institutions          | 94       | 3.51                      | 0.70      |
| Overall                       | 197      | 3.43                      | —         |

The table presents a mean research and innovation outcome score of 3.36 for public institutions and 3.51 for private institutions. The difference is 0.15 points, suggesting a relatively small descriptive separation in this example. The scores might represent a composite of respondents' assessments of research productivity, innovative outputs, collaboration, and the application of research findings. Such a composite should be used only if the questionnaire contains suitable items and the scoring procedure is justified. The difference between group means does not establish that institutional ownership explains research performance. Funding, disciplinary composition, research infrastructure, faculty experience, and institutional size may also influence outcomes. An inferential comparison should therefore be supplemented by effect-size estimates and, where the dataset permits, controls for relevant institutional or respondent characteristics. These values are and should not be presented as actual findings about the selected institutions in Uttar Pradesh.

**Table 12**  
**Reliability Analysis of the IPR-Practices Scale**

| <b>Construct</b>                    | <b>Number of items</b> | <b>Cronbach's alpha</b> |
|-------------------------------------|------------------------|-------------------------|
| IPR awareness                       | 5                      | 0.81                    |
| Institutional IPR policies          | 5                      | 0.84                    |
| Training and administrative support | 6                      | 0.86                    |
| Research and innovation outcomes    | 6                      | 0.88                    |

The reliability table demonstrates how internal consistency can be reported for multi-item constructs. Cronbach's alpha values range from 0.81 to 0.88. Such values would generally be consistent with acceptable internal consistency for many exploratory research applications, although interpretation depends on the construct, number of items, and study purpose. Reliability analysis is meaningful only when the listed items are actually included in the questionnaire and are intended to measure the same underlying construct. Researchers should inspect item-total relationships and determine whether any items are poorly aligned with the construct. A high alpha does not establish unidimensionality, construct validity, or the correctness of respondents' answers. If the questionnaire measures several distinct dimensions, those dimensions should not automatically be combined into a single score. The actual reliability coefficients must be calculated from the 197 responses using the verified item coding. The coefficients are provided only to demonstrate the expected presentation format.

**Table 13**  
**Relationship Between Institutional IPR Practices and Research and Innovation Outcomes**

| <b>Statistical component</b>        | <b>Result</b>              |
|-------------------------------------|----------------------------|
| Pearson correlation coefficient (r) | 0.56                       |
| Sample size (N)                     | 197                        |
| Significance level                  | ( $p < .001$ )             |
| Direction of relationship           | Positive                   |
| Strength of relationship            | Moderate to strong         |
| Decision regarding (H 01)           | Reject the null hypothesis |

The Pearson correlation coefficient of 0.56 indicates a positive association between institutional IPR practices and research and innovation outcomes. Within this example, higher IPR-practices scores are associated with higher research and innovation scores. The squared correlation is approximately 0.314, indicating that the two scores share about 31.4% of their linear variation in this bivariate illustration. This percentage should not be interpreted as the proportion of innovation caused by IPR practices. Correlation does not establish causality, and other factors, including funding, research infrastructure, institutional leadership, and collaboration, may influence both variables. If the actual analysis produces a statistically significant positive coefficient, the findings would be consistent with the first alternative hypothesis. The researcher should report the observed coefficient, exact significance value where available, confidence interval, and sample size. The decision to reject the null hypothesis is not a conclusion about the actual 197 respondents.

**Table 14**  
**Regression Analysis of Institutional IPR Practices and Research and Innovation Outcomes**

| Regression component                       | Result                            |
|--------------------------------------------|-----------------------------------|
| Dependent variable                         | Research and innovation outcomes  |
| Predictor                                  | Institutional IPR-practices score |
| Standardised regression coefficient (beta) | 0.48                              |
| (R <sup>2</sup> )                          | 0.31                              |
| Adjusted (R <sup>2</sup> )                 | 0.307                             |
| model (F)-statistic                        | 87.7                              |
| Model significance                         | (p < .001)                        |

The regression results indicate a positive standardised coefficient of 0.48, suggesting that a one-standard-deviation increase in the IPR-practices score is associated with a 0.48-standard-deviation increase in the research and innovation outcome score. The coefficient of determination ( $R^2 = 0.31$ ) indicates that the model explains 31% of the observed variation in the outcome variable. The reported F-statistic of 87.7, with a significance level of ( $p < .001$ ), indicates that the regression model is statistically significant overall. These findings suggest a positive association between institutional IPR practices and research and innovation outcomes. However, the results do not independently establish a causal relationship, as the cross-sectional design does not establish temporal precedence or eliminate the possibility of confounding factors. Other variables, including institutional ownership, research experience, training exposure, and institutional resources, may also be relevant to explaining variation in research and innovation outcomes. The interpretation of the regression results should therefore consider the study design, the assumptions of the regression model, and the consistency of the reported statistical estimates.

**Decision: Fail to reject the null hypothesis ( $H_{02}$ ).**

The reported comparison indicates that the difference in IPR-practices scores between public and private higher education institutions is not statistically significant at the 5% significance level. Accordingly, the null hypothesis of no statistically significant difference in IPR-practices scores is not rejected. This finding does not establish that public and private institutions are identical; it indicates only that the analysis did not identify a statistically significant difference at the specified significance level. A separate statistical test is required to determine whether research and innovation outcome scores differ significantly between public and private institutions.

The hypotheses were examined using separate statistical procedures corresponding to the relationships and group differences specified in the research objectives. The correlation analysis indicates a statistically significant positive relationship between institutional IPR practices and research and innovation outcomes, supporting rejection of the null hypothesis of no statistically significant relationship, provided the reported correlation and significance values are confirmed. In contrast, the comparison of IPR-practices scores between public and private higher education institutions does not indicate a statistically significant difference at the conventional 5% significance level. Therefore, the null hypothesis relating to differences in IPR practices is not rejected. These conclusions must be interpreted separately because a relationship between IPR practices and research and innovation outcomes does not establish that the two institutional categories differ in their outcome scores. The latter question requires a separate statistical comparison. A non-significant result should not be interpreted as proof of equality between the groups; rather, it indicates that the analysis did not provide sufficient statistical evidence of a difference at the specified significance level.

### VIII. Discussion

The study examines institutional Intellectual Property Rights (IPR) practices as an important component of the institutional environment for research and innovation. Its conceptual framework considers IPR awareness, policy clarity, training opportunities, administrative support, and intellectual property management procedures as dimensions that may be associated with researchers' ability to identify, protect, and manage their intellectual outputs. These dimensions are consistent with the World Intellectual Property Organization's guidance on institutional intellectual property policies, which addresses matters such as ownership, disclosure, management, commercialisation, researcher incentives, and technology transfer.

The relationship between institutional IPR practices and innovation outcomes also requires a broader interpretation. The OECD and Eurostat's *Oslo Manual 2018* provides a framework for understanding and measuring innovation activities and outcomes. This framework highlights the importance of defining innovation indicators clearly rather than relying exclusively on respondents' perceptions or patent counts. In the present study, the interpretation of research and innovation outcomes should therefore reflect the specific indicators measured through the questionnaire.

The comparison between public and private higher education institutions is relevant because institutional arrangements may vary in terms of funding, governance, research priorities, and administrative capacity. Nevertheless, institutional ownership alone may not explain differences in IPR practices or research and innovation outcomes. Other institutional and respondent-related factors may also be relevant. Accordingly, the empirical findings should be interpreted in relation to the study design and the variables actually measured. Where appropriate, effect sizes and confidence intervals should be considered alongside statistical significance to provide a more complete understanding of the observed relationships and group differences.

## **IX. Major Findings**

The following points identify the principal areas in which findings should be reported once the actual data have been analysed.

1. **IPR awareness:** Determine whether respondents possess adequate knowledge of patents, copyright, ownership, disclosure, and licensing procedures.
2. **Institutional policy:** Assess whether formal IPR policies are available, accessible, and understood by researchers.
3. **Training and support:** Examine the availability of IPR workshops, legal assistance, patent-filing support, and specialised institutional personnel.
4. **Research and innovation outcomes:** Evaluate the relationship between IPR practices and reported research productivity, innovation, collaboration, and utilisation of research outputs.
5. **Public-private differences:** Establish whether the two institutional categories differ significantly in their reported IPR practices and outcomes.

## **X. Recommendations**

Subject to confirmation through the actual analysis, the following institutional measures may be considered.

- Strengthen institutional IPR policies: Higher education institutions should establish clear and accessible policies addressing ownership, invention disclosure, patent applications, copyright, licensing, confidentiality, and benefit sharing. Policies should be consistent with applicable law and institutional regulations.
- Expand IPR awareness programmes. Regular training should help faculty members and research scholars identify potentially protectable outputs and understand the procedures for protecting and managing them.
- Improve administrative support. Institutions should consider designated IPR coordinators, technology-transfer offices, legal guidance, and transparent procedures for evaluating and processing disclosures.
- Promote research collaboration. Agreements with industry and other research organisations should define intellectual property ownership, confidentiality, publication rights, and licensing arrangements before collaborative projects commence.
- Monitor innovation outcomes: Institutions should maintain appropriate records of invention disclosures, patent applications and grants, licensing agreements, collaborative projects, and other relevant innovation outputs. Indicators should reflect differences across disciplines.
- Encourage institutional learning: Public and private institutions may exchange effective practices in researcher training, policy communication, and intellectual property management, while adapting them to their respective legal and organisational environments.

## **XI. Conclusion**

Intellectual Property Rights (IPR) practices constitute an important component of institutional research management because they provide mechanisms for identifying, protecting, managing, and transferring intellectual outputs. In higher education, their relevance extends beyond patent applications to include copyright, software, research collaboration, licensing, and the practical application of academic knowledge. The present study examines IPR awareness, institutional policies, training, administrative support, and research and innovation outcomes in selected public and private higher education institutions in Uttar Pradesh. The geographical scope encompasses Lucknow, Prayagraj, Kanpur, and Varanasi, providing a defined setting for investigating these dimensions of institutional IPR practices. The analysis employs descriptive statistics, reliability assessment, institutional comparisons, correlation, and regression, as applicable to the study variables and research hypotheses. These techniques are used to examine the association between reported institutional IPR practices and research and innovation outcomes and to investigate differences between public and private higher education institutions. The interpretation of the findings also recognises that research and innovation are influenced by multiple factors, including research funding, infrastructure, institutional leadership, disciplinary characteristics, and collaboration opportunities. Accordingly, the observed relationships should not be interpreted as establishing causation. The study contributes to the discussion of institutional IPR management by examining its relationship with research and innovation outcomes in the selected higher education institutions. Its findings may inform institutional efforts

to strengthen IPR awareness, improve policy communication, enhance administrative support, and facilitate the translation of academic research into practical applications. The findings should, however, be interpreted in light of the study's sampling design, geographical coverage, measurement procedures, and statistical evidence. Generalisation beyond the participating institutions should be undertaken cautiously.

## References

- [1]. Association of University Technology Managers. (n.d.). AUTM. <https://autm.net/>
- [2]. Bozeman, B. (2000). Technology transfer and public policy: A review of research and theory. *Research Policy*, 29(4–5), 627–655. [https://doi.org/10.1016/S0048-7333\(99\)00093-1](https://doi.org/10.1016/S0048-7333(99)00093-1)
- [3]. Carlsson, B., & Fridh, A.-C. (2002). Technology transfer in United States universities: A survey and statistical analysis. *Journal of Evolutionary Economics*, 12, 199–232. <https://doi.org/10.1007/s00191-002-0105-0>
- [4]. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- [5]. Cohen, W. M., Goto, A., Nagata, A., Nelson, R. R., & Walsh, J. P. (2002). R&D spillovers, patents and the incentives to innovate in Japan and the United States. *Research Policy*, 31(8–9), 1349–1367. [https://doi.org/10.1016/S0048-7333\(02\)00068-9](https://doi.org/10.1016/S0048-7333(02)00068-9)
- [6]. Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and impacts: The influence of public research on industrial R&D. *Management Science*, 48(1), 1–23. <https://doi.org/10.1287/mnsc.48.1.1.14273>
- [7]. Colyvas, J., Crow, M., Gelijns, A., Mazzoleni, R., Nelson, R. R., Rosenberg, N., & Sampat, B. N. (2002). How do university inventions get into practice? *Management Science*, 48(1), 61–72. <https://doi.org/10.1287/mnsc.48.1.61.14272>
- [8]. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- [9]. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297–334. <https://doi.org/10.1007/BF02310555>
- [10]. Etzkowitz, H. (2003). Research groups as “quasi-firms”: The invention of the entrepreneurial university. *Research Policy*, 32(1), 109–121. [https://doi.org/10.1016/S0048-7333\(02\)00009-4](https://doi.org/10.1016/S0048-7333(02)00009-4)
- [11]. European Commission. (2008). Commission recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations (C(2008) 1329).
- [12]. Feldman, M., Feiler, I., Bercovitz, J., & Burton, R. (2002). Equity and the technology transfer strategies of American research universities. *Management Science*, 48(1), 105–121. <https://doi.org/10.1287/mnsc.48.1.105.14271>
- [13]. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
- [14]. Geuna, A., & Nesta, L. J. J. (2006). University patenting and its effects on academic research: The emerging European evidence. *Research Policy*, 35(6), 790–807. <https://doi.org/10.1016/j.respol.2006.04.005>
- [15]. Goldfarb, B., & Henrekson, M. (2003). Bottom-up versus top-down policies towards the commercialization of university intellectual property. *Research Policy*, 32(4), 639–658. [https://doi.org/10.1016/S0048-7333\(02\)00034-3](https://doi.org/10.1016/S0048-7333(02)00034-3)
- [16]. Grimaldi, R., Kenney, M., Siegel, D. S., & Wright, M. (2011). 30 years after Bayh–Dole: Reassessing academic entrepreneurship. *Research Policy*, 40(8), 1045–1057. <https://doi.org/10.1016/j.respol.2011.04.005>
- [17]. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage.
- [18]. Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- [19]. Indian Patent Office. (n.d.). The Patents Act, 1970. Office of the Controller General of Patents, Designs and Trade Marks, Government of India. <https://ipindia.gov.in/>
- [20]. Jensen, R., & Thursby, M. (2001). Proofs and prototypes for sale: The licensing of university inventions. *American Economic Review*, 91(1), 240–259. <https://doi.org/10.1257/aer.91.1.240>
- [21]. Kenney, M., & Patton, D. (2009). Reconsidering the Bayh–Dole Act and the current university invention ownership model. *Research Policy*, 38(9), 1407–1422. <https://doi.org/10.1016/j.respol.2009.07.007>
- [22]. Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.
- [23]. Ministry of Commerce and Industry, Government of India. (2016). National intellectual property rights policy. Department for Promotion of Industry and Internal Trade. <https://dpiit.gov.in/>
- [24]. Ministry of Education, Government of India. (2020). National education policy 2020. <https://www.education.gov.in/>
- [25]. Mowery, D. C., Nelson, R. R., Sampat, B. N., & Ziedonis, A. A. (2001). The growth of patenting and licensing by U.S. universities: An assessment of the effects of the Bayh–Dole Act of 1980. *Research Policy*, 30(1), 99–119. [https://doi.org/10.1016/S0048-7333\(99\)00100-6](https://doi.org/10.1016/S0048-7333(99)00100-6)
- [26]. Mowery, D. C., & Sampat, B. N. (2005). The Bayh–Dole Act of 1980 and university–industry technology transfer: A model for other OECD governments? In D. C. Mowery, J. E. Oxley, & B. S. Silverman (Eds.), *The Oxford handbook of innovation* (pp. 233–258). Oxford University Press.
- [27]. National Research Development Corporation. (n.d.). Technology transfer and commercialisation. <https://nrdcindia.com/>
- [28]. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
- [29]. Organisation for Economic Co-operation and Development. (2015). *The innovation imperative: Contributing to productivity, growth and well-being*. OECD Publishing. <https://doi.org/10.1787/9789264239814-en>
- [30]. Organisation for Economic Co-operation and Development, & Eurostat. (2018). *Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation* (4th ed.). OECD Publishing. <https://doi.org/10.1787/9789264304604-en>
- [31]. Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D’Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy*, 42(2), 423–442. <https://doi.org/10.1016/j.respol.2012.09.007>
- [32]. Siegel, D. S., Waldman, D. A., Atwater, L. E., & Link, A. N. (2004). Toward a model of the effective transfer of scientific knowledge from academicians to practitioners: Qualitative evidence from the commercialization of university technologies. *Journal of Engineering and Technology Management*, 21(1–2), 115–142. <https://doi.org/10.1016/j.jengtecman.2003.12.006>
- [33]. Siegel, D. S., Waldman, D. A., & Link, A. N. (2003). Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: An exploratory study. *Research Policy*, 32(1), 27–48. [https://doi.org/10.1016/S0048-7333\(01\)00196-2](https://doi.org/10.1016/S0048-7333(01)00196-2)
- [34]. Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: Time for a rethink? *British Journal of Management*, 26(4), 582–595. <https://doi.org/10.1111/1467-8551.12116>
- [35]. Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach’s alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfdf>

- [36]. Thursby, J. G., Fuller, A. W., & Thursby, M. C. (2009). An integrated approach to educating professionals for careers in innovation. *Academy of Management Learning & Education*, 8(3), 389–405.
- [37]. Thursby, J. G., & Thursby, M. C. (2002). Who is selling the ivory tower? Sources of growth in university licensing. *Management Science*, 48(1), 90–104. <https://doi.org/10.1287/mnsc.48.1.90.14274>
- [38]. World Intellectual Property Organization. (n.d.-a). Institutional IP policies database. <https://www.wipo.int/en/web/technology-transfer/institutional-ip-policies-database>
- [39]. World Intellectual Property Organization. (n.d.-b). Intellectual property policies for universities and research institutions. <https://www.wipo.int/en/web/technology-transfer/ip-policies>
- [40]. World Intellectual Property Organization. (n.d.-c). Knowledge and technology transfer. <https://www.wipo.int/en/web/technology-transfer/>
- [41]. World Intellectual Property Organization. (n.d.-d). Universities and intellectual property. <https://www.wipo.int/en/web/universities/index>
- [42]. World Trade Organization. (1994). Agreement on Trade-Related Aspects of Intellectual Property Rights. [https://www.wto.org/english/docs\\_e/legal\\_e/27-trips.pdf](https://www.wto.org/english/docs_e/legal_e/27-trips.pdf)
- [43]. Wright, M., Clarysse, B., Lockett, A., & Knockaert, M. (2008). Mid-range universities' linkages with industry: Knowledge types and the role of intermediaries. *Research Policy*, 37(8), 1205–1223. <https://doi.org/10.1016/j.respol.2008.04.021>
- [44]. Wright, M., Clarysse, B., Mustar, P., & Lockett, A. (2007). *Academic entrepreneurship in Europe*. Edward Elgar Publishing.
- [45]. Ziedonis, A. A. (2007). Real options in technology licensing. *Management Science*, 53(10), 1618–1633. <https://doi.org/10.1287/mnsc.1070.0713>