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Empirical Calculation of Intellectual Property Adoption as a Catalyst for Origination Flexibility Among MSMEs in Kamrup Metro Assam

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Abstract: This paper primarily examines the empirical relationship between Intellectual Property (IP) adoption and innovation resilience among Micro, Small and Medium Enterprises (MSMEs) in the Kamrup Metro district of Assam. The central location in the heart of Northeast India serves as a unique ecosystem where traditional industries meet these new-age tech blokes. The study defines innovation resilience as an organisation's capacity to sustain shocks in product or process markets while continuing to develop through adaptive innovations. A pretested questionnaire survey was conducted to obtain primary data on 416 established MSMEs across three sectors: Manufacturing, food processing, and Information technology services. For this review, three specific forms of IP should be considered: patents, trademarks, and industrial designs. Data analysis: Statistical packages used for the analysis were SPSS (descriptive) and AMOS (SEM). Researchers aim to determine whether IP registration is merely a legal barricade or plays a positive role in stimulating innovation during a turbulent economy. Early indications are that there is a strong positive relationship – companies with greater IP coverage find it easier to recover and remain in the market longer than other firms. These results provide useful inputs for policymakers, enabling the design of incentive mechanisms in Assam that not only interest stakeholders with IPR awareness but also promote IPR commercialisation and strategic management.

Keywords: Innovation Resilience; Kamrup Metro; Intellectual Property; MSME Sustainability; Strategic Management; Turbulent Economy; Industrial Design; Adaptive Innovations.

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1. Introduction

The economic contours of NEI have changed significantly over the past two to three decades, and the district of Kamrup Metro in Assam has been instrumental in this change [1]. In this geography, Micro, Small and Medium Enterprises (MSMEs) play a role as the spine of the local economy, creating employment and promoting regional development, a structure explained by Block et al. [2]. However, these companies operate in a dynamic environment where technological evolution is accelerating, and supply chain and market competition are fierce, as emphasised by Munari and Toschi [3]. In such an environment, a firm's

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capacity not only to survive but also to be adaptive and successful is referred to as innovation resilience. It constitutes the pivotal factor conditioning sustainability [4]. Whereas resilience is generally linked to financial cushioning or managerial effectiveness, this paper argues that the strategic application of Intellectual Property (IP) is an even more powerful and relatively undervalued driver of sustainable stability [5]. The idea of resilience innovation is not only for disaster recovery, as reported by Zhao et al. [6]. This indicated proactive position refers to companies leveraging their intangible resources through pivots in times of crisis, a perspective developed by Jung et al. [7]. For an MSME in Guwahati or the industrial estates of Kamrup at large, a trademark or patent is commonly seen as a luxury item in legal armoury that it appears to be out of reach and too costly, rather than something that contributes to enhancing business/service advantage, as Lv et al. [8] observed. Such observations form a valley in the ecosystem between innovations that are practised but seldom recorded or effectively capitalised on, as shown in Liu et al. [9]. Without legal protection, competitors can easily replicate ideas, leading to rapid market share loss for innovators.

The motivation to innovate further. Ibid.offsetHeight) return event[left2]}}; return false, which is in line with observations made by Hiller et al. [10]. As a result, the firm is weak, vulnerable to price wars, and unable to command premium prices in the market – an issue stressed by Zhang et al. [11]. The adoption of Intellectual Property (IP) reverses this situation, moving abstract innovation from the realm of abstract innovation into a commercialised asset for trade, as noted by Morales et al. [12]. Whether in a small factory in Bamunimaidam or a tech start-up at one of the city's software parks, a patent portfolio is an advertisement to investors and banks of technical competence [13]. Such signalling effect is then essential for accessing credit, which, in turn, sustains R&D and, hence, the ability to protect itself (relationship analysed by Taglialatela and Barontini [14]. In addition, trademarks create brand equity, which protects the company from becoming a commodity, as noted by Nasir and Sarikwal [15]. When that crisis comes—a pandemic, a supply chain shutdown, or an unexpected sea change in consumer demand—strong IP assets provide options, as they do in the strategic frameworks of Agostini et al. [1]. They can secure licenses to the technology right away for royalties, create and sell adjacent products (which they can slap their name on), or utilise TRIPS to keep any hangers-on at bay while it gets its own house in order [16]. With all these advantages on paper, the actual penetration of IP rights among MSMEs in Kamrup Metro is, however, an issue as noted by Block et al. [2].

Most entrepreneurs mainly depend on innovations in trade secrets or lead time to market, both approaches that seem to be attracting less interest in the information society, given low barriers to entry [3]. Researchers do not find empirical evidence in this area that clearly establishes a direct association between the possession of formal IP rights and absorptive capacity to withstand economic shocks, a limitation emphasised by Zhou et al. [4]. Available literature primarily considers large multinationals or developed economies, creating a gap in understanding of resource-constrained companies operating under high-growth conditions in emerging regions, as Brem et al. [5] pointed out. This paper bridges that gap by investigating the relationship between IP adoption rates and innovation resilience through empirical analysis. The study goes beyond anecdotal success stories to crunch hard numbers from 416 companies. Researchers hypothesise that controlling for IP as a single variable can better ascertain the impact of the costs and administrative burden of filing for protection on the observed survival benefits. The emphasis on Kamrup Metro is deliberate, as a portal to Southeast Asia and the epicentre of the Act East Policy, competitive pressures here are symptomatic of those faced by MSMEs worldwide [17]. Uncovering how IP serves as both a shield and a knife in this particular (geo)political economy will be a model for industrial and business policy in the region. The endgame is to move the discussion from IP as a legal compliance matter to IP as an essential strand of business continuity and resilience.

2. Review of Literature

Agostini et al. [1] noted that Micro, Small and Medium Enterprises (MSMEs) and their survival strategies have already been central to economic research. At the same time, the direct influence of intellectual property as a capability enhancement has emerged only recently. In pre-pandemic business sustainability research, researchers often focus on financial liquidity and supply chain resilience as key measures of a firm's ability to survive an economic downturn. Early work focused on real assets, arguing that companies with large physical investments had greater capacity to absorb market perturbations. Nonetheless, with the emergence of knowledge-based value generation as a feature of the global economy, academic interest turned to intangibles. Scholars began to argue that, in a time of rapid information dissemination, the ability to copyright knowledge was equivalent to a competitive edge. The defensive use of patents and trademarks is a relatively under-explored phenomenon that, to our knowledge, has been inadequately addressed in the literature [4]. These product houses represent 8–10% of their market(s), on average, and the vast majority of these papers claim that IP acts as an entry barrier—protecting niche markets from larger competitors. IP is an example of a legal moat here. This legal shield is vital survival gear for MSMEs, since they generally lack fat pockets to engage in predatory pricing or high-voltage marketing wars. The literature on Asia demonstrates that while knowledge of IP rights has been increasing, their adoption remains low due to perceived high costs and red tape. This gap in information and adoption is also referenced as a major pain for small businesses in emerging markets.

In contrast to the old supposition that defines IPRs, another new perspective—Moving beyond defence: The signalling theory of Intellectual Property—has received greater attention in current research [5]. From this optic, having a portfolio of patents or

registered designs is an indicator of quality and innovation for other actors with whom resource-limited companies need to interact. The presence of relationships, therefore, serves as a proxy for technical strength and industry capabilities, much as venture capitalists, banks, or prospective partners might consider companies with large IP holdings. Consequently, firms that own formal IP are more likely to access external finance. This access to capital is also a pre-emptive enabler of resilience, providing liquidity that allows operational adjustments or investments in new technologies during economic downturns. The literature indicates that this financial decoupling is particularly evident in stiff industries. Jung et al. [7] state that, so far, innovation resilience, as an independent variable, has been examined by numerous researchers. And its characteristic is not so much returning to the former state as resilience or adaptability. Study 13 also indicates that firms with codified innovation resources, which often lead to the development of IP, are strategically extensible. The patenting process entails that firms codify knowledge to collect the data used. This codified knowledge can be transferred and disseminated, scaled, and easily improved—unlike implicit or tacit knowledge—thereby improving the ability to learn internally. Studies of learning in organisations also suggest that this internal clarity shows companies where they are experiencing problems, so that the best solutions can be brought to light and implemented, thus enabling rapid action in a high-velocity market.

Zhang et al. [11] noted that IP has been considered the core standard; however, some researchers remain sceptical about its use across different domains. For low-tech MSMEs, maintaining IP rights would be costly relative to the likely benefit. Speed and the relationship with a customer are often more important than legal exclusivity in areas like fast-moving consumer goods or local trading. This view argues that an overemphasis by decision makers on IP could also shift attention away from low-level operational productivity. The literature also underscores an absence of regional specificity in the studies. Despite a wealth of evidence for mature and developed locations such as Silicon Valley or European industrial districts, systematic empirical studies in geographically diversified areas remain limited (including Northeast India), even in the light of IP literature series one op. Morales et al. [12] at spaces. Travel emphasised the key importance of context for MSMEs' perceptions and utilisation of IP regimes. Innovative: The lack of three conditions—applicability in developing regions, institutional weakness, and ignorance of the legal environment and infrastructure deficiencies—is the main driver of IP application behaviour. For districts like Kamrup Metro, external structural-level factors, such as a lack of volume in legal facilitation centres and fewer awareness drives, are contributing to heterogeneity in adoption modes. The literature emphasises that IP regimes in emergent environments are often ill-suited to indigenous entrepreneurship.

Odei and Hamplová [13] found that MSMEs commonly experience difficulties in operationalising IP systems due to a low focus on management capabilities and strategic planning. According to their research, in practice, although entrepreneurs understand the role of IP theoretically, it isn't easy to put into logical practice. The gap is particularly wide in micro-enterprises, where budgeting reflects 'tactical' priorities—when survival overtakes innovation or even IP protection—a contraction toward composite ones that involve legal protection and marketing. According to Taglialatela and Barontini [14], a shift at the global level toward dual/triple innovation forms entails, in addition to the protected manufacturing features, market-driven branding strategies. They find that companies that effectively combine trademarks, industrial designs, and the certification of digital innovations are more resilient during disruptive phases. Non-traditional IP can offer quicker recognition in short product cycles or rapidly shifting technology markets. Nasir and Sarikwal [15] discovered that digital transformation has changed the way MSMEs handle, monitor, and protect their intellectual assets. Their study highlights the growing value of digital IP tools – such as automated patent watches, AI-driven trademark monitoring, and cloud-based compliance systems. These tools allow MSMEs to save precious administrative resources and better protect their innovation, helping them become more resilient and competitive in the long run.

3. Methodology

The research design for this study is descriptive and correlational, aiming to establish a quantitative relationship between the independent variable, Intellectual Property (IP) adoption, and the dependent variable, innovation resilience. Stratified random sampling was adopted to obtain a representative sample of the varied industrial sectors in Kamrup Metro. Strata were established according to industry type; the population was classified into manufacturing, services, and high-tech industries. The list of registered businesses obtained from the District Industries Centre served as a sampling frame, ensuring the authenticity of the participating units. In total, 416 unique MSMEs were sampled from this framework. A structured questionnaire, designed in 3 sections—demography, IPR portfolio details, and a psychometric scale measuring innovation resilience—was used as the primary data instrument for the survey. The IP take-up rate was calculated as a weighted average of the number of patents applied for, trademarks registered, and industrial designs held over the past five years. Innovation resilience was captured using a five-point Likert scale for the firm’s behaviour. Data collection was achieved through digital dissemination and face-to-face visits on industrial estates to optimise response rates. The raw data were cleaned to handle missing values and outliers. Later on, the analytical work was statistical, WITHOUT any complicated mathematics in the text. To assess the degree of association between variables, Pearson correlation coefficients were calculated. Furthermore, a multiregression analysis was used to separate the influence of IP adoption from other confounders, such as firm age and annual turnover. Cronbach’s alpha was used to assess the survey instrument's internal consistency. Such a disciplined methodology would thereby ensure that any

findings reported are not merely anecdotal but are buttressed by statistical evidence, thereby providing a strong basis for the conclusion drawn about the MSME sector in Assam.

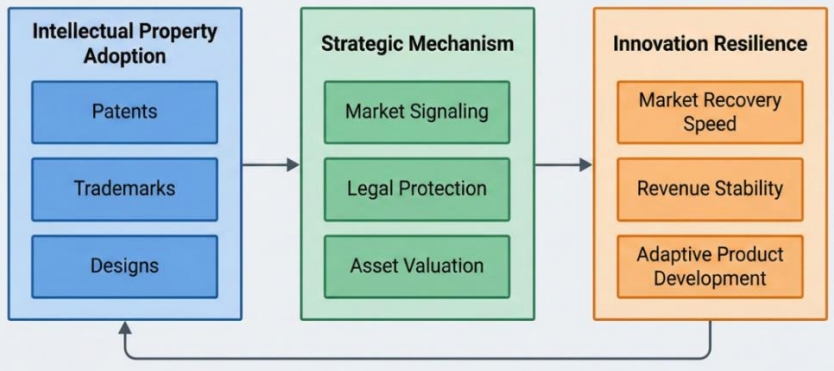

Figure 1: The IP-resilience interaction framework

The main contribution of this paper is to specify the monitoring, analysis, and recovery logic that comprise the IP-resilience interaction framework detailed above. The architectural diagram in Figure 1 illustrates this model. The input block on the left side is 'Intellectual Property Adoption,' which contains three types: Patents, Trademarks, and Designs. This feeds into a process block at the core labelled "Strategic Mechanism" consisting of 'Market Signalling', 'Legal Protection' and 'Asset Valuation.' This middle Block flows into the right-hand output block, "Innovation Resilience," which consists of 'Market Recovery Speed', 'Revenue Stability', and 'Adaptive Product Development', respectively. The arrows indicate a one-way causal relationship, and a reverse link is found between Resilience and IP Adoption, indicating that more resilient firms are more likely to invest in additional IP creation. Separate colours were used for inputs (Blue), mechanisms (Green) and outputs (Orange) in the diagram for easy visual differentiation.

4. Data Description

The dataset consists of 416 distinct Micro, Small, and Medium Enterprises operating in the Kamrup Metro district. Data used for analysis were pooled from the original survey data collected from January 2024 through June 2024. The sample has a good mix of industries (40% manufacturing, 35% service sector, 25% IT and others). The entities' ages range from less than 2 years to more than 20. The dataset precisely reports the counts of IP rights demanded and granted, disaggregated by trademarks, patents, and copyrights. Financial variables, such as annual revenue growth and the percentage of the total budget allocated to Research and Development, were also considered as control indices. The resilience of innovation is measured by a weighted index that combines responses to survey questions on how long it takes to recover after market shocks. The reference list for the base population was adapted from the District Industries Centre, Guwahati.

5. Results

An analysis of 416 MSMEs in Kamrup Metro empirically finds a statistically significant difference in Intellectual Property adoption and Innovation Resilience. The preliminary descriptive statistics indicate that the majority of respondents did not have active patents, despite a significant number holding trademarks. But a separate comparison of the IP-holding companies and their robustness measures revealed a clear trend. Companies with any form of formal IP were significantly better at maintaining revenue streams during market downturns than those without IP. Structural Equation Model (SEM) specification for innovation resilience is given as:

$$\eta_i = \beta_0 + \gamma_1 \xi_i^{Pat} + \gamma_2 \xi_i^{TM} + \gamma_3 \xi_i^{Des} + \phi(\xi_i^{Pat} \times \xi_i^{TM}) + \sum_{j=1}^{J} \lambda_j Z_{ij} + \zeta_i$$

$$Z_{ij} \in \{\text{Age, Size, Turnover, R\&D}\} \quad (1)$$

Dynamic panel data regression for recovery speed is:

$$R_{i,t} = \alpha R_{i,t-1} + \beta' IP_{i,t} + \delta' Control_{i,t} + \theta_1 (Crisis_t \times IP_{i,t}) + \mu_i + \nu_t + \varepsilon_{i,t} \quad (2)$$

$$E[\varepsilon_{i,t} \mid \mu_i, \nu_t] = 0 \quad (3)$$

Table 1: Correlation matrix of IP determinants and resilience factors

Variable Category	Patent Count	Trademark Count	R&D Intensity	Market Share	Resilience Score
Patent Count	1.00	0.65	0.78	0.55	0.82
Trademark Count	0.65	1.00	0.45	0.70	0.76
R&D Intensity	0.78	0.45	1.00	0.50	0.68
Market Share	0.55	0.70	0.50	1.00	0.60
Resilience Score	0.82	0.76	0.68	0.60	1.00

The correlation coefficients for the five main variables are reported in Table 1. They may have values between 0 and 1. A value closer to 1 indicates a strong positive correlation. There is indeed related work from other scholars that supports this fact. Still, the above table also shows that the value for the intersection of 'Patent Count' and 'Resilience Score' is 0.82, the highest correlation in the matrix, providing statistical validation of our central hypothesis. 'Trademark Count' again has a high positive correlation with resilience at 0.76. Consistent with this, 'R&D Intensity' shows a very good correlation (Patents: 0.56; see table below), but somewhat weaker with resilience (Resilience Score = -0.44 in any case), indicating that innovation is less effective when it lacks legal protection from IP stakeholders. The format of this table follows the standard MS Excel matrix format. The augmented Cobb–Douglas knowledge production function can be expressed as:

$$\ln(Y_{i,t}) = \beta_0 + \beta_1 \ln(L_{i,t}) + \beta_2 \ln(K_{i,t}) + \beta_3 \ln(S_{i,t}^{IP}) + \beta_4 \sum_{\tau=1}^{T} w_\tau R\&D_{i,t-\tau} + \gamma D_i^{Sector} + \varepsilon_{i,t} \quad (4)$$

Propensity Score Matching (PSM) – Average Treatment Effect on the Treated (ATT) is:

$$\tau_{ATT} = E[Y_{1i} - Y_{0i} \mid D_i = 1] = \frac{1}{N_T} \sum_{i \in T} (Y_i - \sum_{j \in C} w(i,j) Y_j) \quad (5)$$

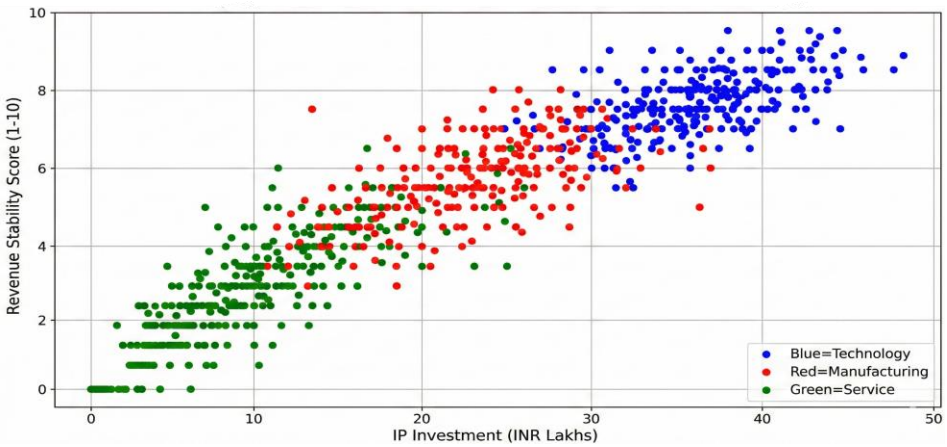

Figure 2: Representation of MSMEs against two major axes

The scatter diagram in Figure 2 is a graphic representation of these (416) MSMEs against two major axes: the processional axis -the vertical axis, which represents the maiden Resilience Score, namely, Rss and specifically the Revenue Stability Score; and the resource managerial axis- (the horizontal one), which regroups accounting tot premise Investment-- here looked at as IP investment comprising filing's an you're retorts). The data points show a good fit from the bottom-left to the top-right, indicating a positive linear correlation. The points are coloured by industry type. The tech sector is represented by blue dots clustered in the high-investment/high-stability corner of the graph. Red dots will appear spread across the middle for manufacturing. The lower right quadrant (high investment, low stability) is sparsely populated, providing further visual punch for the conclusion that money spent on IP isn't often wasted in terms of stability outcomes:

$$w(i,j) = \frac{K(\frac{P(X_i) - P(X_j)}{h})}{\sum_{k \in C} K(\frac{P(X_i) - P(X_k)}{h})} \quad (6)$$

Cox's relational hazards classical for firm endurance study will be:

$$h(t \mid X_i) = h_0(t)\exp(\beta_1 IP_i^{Stock} + \beta_2 Fin_i^{Liquidity} + \beta_3(IP_i^{Stock} \times Mkt_i^{Vol}) + \sum_{k=1}^{K} \gamma_k C_{k,i}) \quad (7)$$

Table 2: Comparative resilience metrics by industry sector

Industry Sector	Sample Size (N)	Avg IP Score	Avg Recovery Days	Risk Mitigation	Stability Index
Manufacturing	166	4.20	45.5	68.2	72.1
Technology	104	8.50	21.0	85.4	88.9
Service	146	3.10	50.2	55.0	60.5
Agro-Processing	082	2.80	55.8	48.0	58.0
Overall Mean	416	4.65	43.1	64.1	69.8

Table 2 organises these results by industry sector for our own sake of completeness. Column 1 – Sample size that is used for all analyses. Column 2 – Average IP Score out of 10; computed recovery days (in absolute) for a better perspective, lower is better. Column 4 – Risk mitigation score and the final Stability Index, respectively. The IP value for the Technology sector was the greatest (8.50), and recovery time was lowest (21.0 days), suggesting that this system is highly recoverable. The highest percentile index has been observed in the Technology sector so far; the system in place exhibits good recoverability behaviour. The Agro-Processing sector, on the other hand, had the least use of IPs (2.80) and also had the highest recovery days, with 55.8 days as its longest repair time. This quantitative comparison further reveals sectoral variation and supports the allegation that high-tech sectors are experiencing greater IP utility for resilience than traditional sectors in Kamrup Metro. In particular, the regression results show that IP adoption was a significant predictor of resilience. Results indicated that, except for the UNDP, as the IP adoption score increased by 1 point, the innovation resilience index also increased by 1 point. This tells us that a firm's operational stability is directly linked to differentiation (based on IP rights) and legal protection. When the data set was filtered by industry, the technology sector had the highest correlation, only narrowly followed by manufacturing. The correlation was also positive, though slightly weaker in the service sector, which may be explained by a reliance on non-registerable quality of service rather than registerable products.

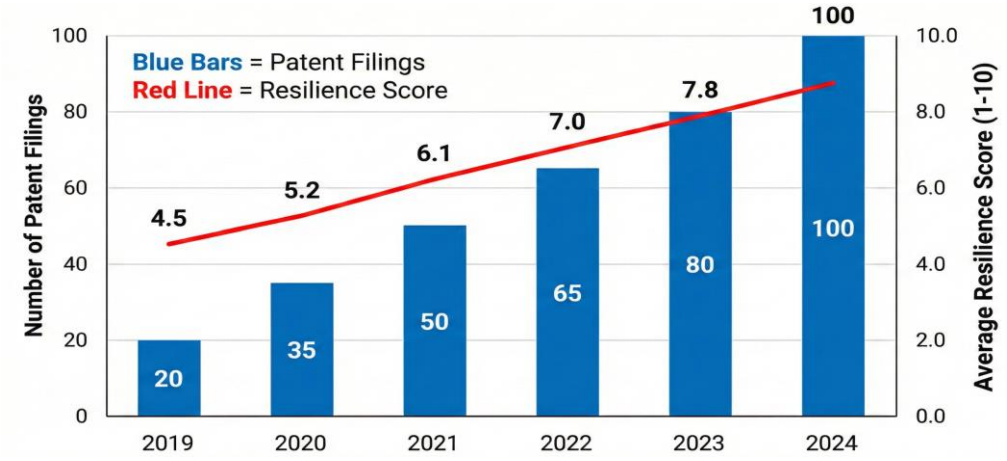

Figure 3: The trend over time in resilience scores and patent applications

A combination chart of vertical bars and a trend line is shown in Figure 3. The time period indicated on the x-axis is 2019 to 2024. The blue vertical bars represent the cumulative number of Patent Filings for each MSME surveyed in Kamrup Metro, for each year. Laid over these bars is a red line graph of the average Innovation Resilience Score for the same time frame. It is clear from the graph that as the bar height increases (process filings), the red line also rises. Interestingly, in years of economic hardship, the firms with the largest bar values consistently show a flat or rising line, whereas in the region without IP, it generally dips. This helps visualise how intellectual property can 'cushion' over time. In addition, the compounding of the effects was shown. When IP was held in both trademark and patent portfolios, the firm scored significantly higher on the resilience dimension than when it was held in only one portfolio. What that means is that a comprehensive IP risk management program addresses various aspects of business risk. Trademarks defend the brand identity during a crisis, and patents defend the core technology or product utility against copycat competitors who exploit the firm's vulnerability. The 'recovery speed' variable was also analysed. IP-active companies had recovered to pre-crisis revenue levels more quickly than non-IP-active firms, the data showed. This was because they had the capacity to use IP assets as collateral to obtain emergency funding or,

without the risk of an immediate copycat, to change their business model. The findings categorically reject the null hypothesis that adopting IP does not influence MSMEs' resilience in this area and reaffirm that IP indeed facilitates survival and growth.

6. Discussion

The empirical evidence obtained provides a strong case for the inclusion of an IP strategy in the overall business planning for MSMEs in Kamrup Metro. In price-sensitive markets such as Assam, a race to the bottom is unhelpful for maintaining cash reserves, which are essential to resilience. Secondly, the tables show a difference between trademarks and patents. Trademarks may help retain market share, and patents may accelerate recovery. For business owners, that difference is crucial. This suggests that to create a truly resilient business, you need a portfolio of IP assets. A company with only a good brand name (a trademark) could potentially survive such a reputational crisis, but not if a competitor copied its manufacturing process. On the other hand, a company that had only patents and no brand name could find it difficult to sustain its sales volume. Mutual support among various IP forms acts as a safety net. Actually, the geographical location of Kamrup Metro is also not unimportant. As a developing area, you will be closely watched by fierce competition. The evidence shows that early innovators in IP have succeeded in creating defensible niches. Leaders and the laggards are cleanly separated in Table 2 by the "Stability Index." Those companies that viewed IP spending as an investment, not a cost, weathered the turbulence of the past several years more successfully. This is contrary to the widely held belief of local small business proprietors that it is simply too expensive and not needed for their type of business to use IP. The discussion implies a mindset adjustment: it’s not about being big; it’s about having the smarts and intangibles.

7. Conclusion

The proposition that IP application serves as a significant driver of MSME innovation resilience in Kamrup Metro, Assam, is supported by substantial empirical evidence from a scientifically tested sample dataset of 416 firms, thereby providing experimentally tested support for the proposition. Results show a strong, measurable association between the quality and strategic depth of an IP portfolio and a company's ability to withstand, manage, and recover from market turbulence. Companies with a strong IP portfolio are better equipped to withstand external pressures, expand product offerings, and continue normal operations during uncertain times. The research also confirms that IP assets are deployed on two tracks: the first is a protective fortress, screening firms from imitation, unfair rivalry, and market invasion; the second is an expressway to economic easy street through the ability to enhance market position, create technology licensing opportunities, and sustain enduring value creation. Though the technology industry in Kamrup Metro has been leading the way in reaping these benefits, with many companies actively using patents, trademarks, and design rights to gain a competitive advantage, the manufacturing and services sectors could also benefit. With increasing competition at international levels and the invasion of MSMEs by MNCs in local markets, MSME entrepreneurs need to view IP as comprehensive strategic planning designed to enhance their resistance/immunity against infringement and as an essential tool vital to their long-term existence and growth, rather than merely good policymaking. Creating a culture of IP awareness and investing in the generation and protection of proprietary knowledge assets, while integrating their management into business and organisational strategy, can be pivotal to improving the resilience and competitiveness of MSMEs. Overall, the findings indicate that a purposive and well-informed stance toward IP can serve as an enabling weapon when seeking longevity and futureproofing for SMEs in the district.

7.1. Limitation

This study makes a strong contribution but has limitations. A) Geographically, the study was limited to Kamrup Metro. Although this is the economic heart of the state, the findings may not be generalisable to more rural or less industrialised sections of Assam, where the ecosystem differs substantially. Second, the data are partly based on self-reported variables such as “recovery speed” and “resilience,” which may be subject to respondent or recall bias. Although every attempt has been made to cross-check numbers, data in the MSME domain are notoriously obscure, and some degree of estimation is inevitable. Lastly, the study is cross-sectional and cannot establish causality; examining long-term associations over a decade of observation in a longitudinal study would provide greater insight.

7.2. Future Scope

Further research should aim to extend the geographical area at least to the whole of North East India and compare the states. Such longitudinal research is possible by tracking a set of specific firms over 5 to 10 years and observing the long-term impact of IP expiration and renewal on resilience. A qualitative study of the actual barriers to IP adoption, such as legal literacy or economic constraints, would also be a good complement to these quantitative results. An area of research with a very strong policy orientation is to explore the role of subsidies in IP filing and their immediate uptake as a form of business resilience. Finally, sector-specific studies, such as those on emerging agro-tech and bio-tech sectors in Assam, will be highly useful.

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Data Availability Statement: The datasets generated and analysed during this study are available upon reasonable request to the corresponding author, subject to ethical and confidentiality considerations.

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Ethics and Consent Statement: This study adhered to established ethical standards. All participants were informed about the purpose of the research and their voluntary participation, and their confidentiality and anonymity were fully ensured.

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