NIST Economic Analysis Brief 10

NIST Customer Demographics: Patent Licenses

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Abstract

This economic analysis brief summarizes the efforts and results of the data collection and analysis of NIST's patent licensee information. Summary statistics for licensees are provided for fiscal years 2006 through 2015. Included in the analysis are demographically descriptive variables such as the age, location, North American Industry Classification System (NAICS) codes, number of employees and geographic distribution of NIST licensees. Overall, this publication provides demographics of companies that licensed NIST technologies.

Key Findings

- NIST licensees are geographically well-dispersed across the United States and tend to be in urban/suburban areas.
- NIST licensees tend to be with companies at least 5 years old.
- The clear majority of NIST licensees have fewer than 500 employees at their locations.

Key Words

demographics; license; patent; technology transfer.

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1 INTRODUCTION

Patent licenses are agreements that make intellectual property rights in patented technologies available to a licensee by defining aspects such as the duration, field of use and geography of the use of the technology. A patent gives the owner the right to exclude others from using a patented invention, while a patent license authorizes the use of an invention by excusing the licensee from any claim of infringement (Patent Licensing, 2017). Patent licenses are used at the National Institute of Standards and Technology (NIST) to allow an entity access to an invention for a research or commercial purpose. Therefore, an important piece of NIST's technology transfer activities include licensing technologies created in its laboratories.

The license types used at NIST are exclusive and non-exclusive licenses. While the two license types are differentiated by the level of exclusivity of the intellectual property, there are other defining characteristics of license agreements that reflect the intent or purpose of obtaining access to a patented invention. Research licenses are a type of non-exclusive license that can allow testing of commercial viability and foster continued development of an invention. Assessing the demographics of the entities that license NIST technologies allows NIST to become knowledgeable of the diverse types of businesses, academic institutions and other organizations that become licensees.

This brief offers a formal, first-look into the geographic and demographic nature of NIST's licensees.

2 HYPOTHESES

As NIST seeks to better understand its licensees, we look to find answers to several questions about the composition and location of these entities. Where are NIST's licensees geographically located in the U.S.? Furthermore, can we classify the locations of these licensees into categories that help to understand the likelihood of engagement in licensing NIST technologies? What are the ages of the entities that enter into licensing agreements with NIST? Lastly, are NIST's licensees primarily small or large in employment size?

Prior to answering these questions, the following hypotheses and reasons behind them are offered below.

1. The geographic location of NIST's licensees will be randomly distributed across the United States. Due to patent information being publicly available, entities throughout the U.S. have the ability to submit a license application to NIST.
2. In addition to geographic location, the majority of NIST's licensees will be in urban areas due to the belief that these are often the areas where high-tech and innovative firms are located (Maggioni, 2002).

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3. The majority of NIST's licensees will have established themselves 5 years or more before entering a licensing agreement. This is based on the belief that licensees at least 5 years old have market knowledge and experience in technological areas that further their missions or goals.
4. The majority of NIST's licensees will have fewer than 500 employees at their locations. This prediction is based on the trends initialized by the passing of the Technology Transfer and Commercialization Act of 2000, 15 USC 3710a(4)(A) that gives additional consideration to small businesses when licenses are established. Small businesses are considered those with 500 employees or less, as defined by the Small Business Administration (Small Business Administration, n.d.).

Answering the questions posed earlier will aid NIST in understanding the characteristics of the licensees that license NIST technologies.

3 METHODOLOGY

Data regarding licensing agreements were extracted from NIST's internal database, which included both exclusive and non-exclusive license information[1]. Information for each agreement included: licensee name, license type, license title, start date, point of contact (POC) name, POC address and POC phone number.

With the assistance of Dunn and Bradstreet (D&B), a single DUNS number was selected for each agreement. A DUNS number is a unique identifier that is used in creating a credit file and maintaining a record of information for many businesses and organizations[2]. The process of obtaining data included reviewing each agreement individually, contacting companies directly to update their D&B profiles and assigning the most appropriate DUNS for each licensee.[3]

Dun and Bradstreet returned a dataset that included information about the industry classification, geographic location, urban and rural classification, the year in which the licensee was founded and the number of employees for each licensee. From the licensee data originally extracted from NIST's internal database, the dataset was refined to 40 licensees from 50 license agreements that were executed in fiscal years 2006 through 2015[4].

[1] The Bayh Dole Act facilitates commercialization of federally funded technologies through compulsory licensing to universities, small businesses and nonprofit organizations that collaborate on research with NIST. The consolidations of Federally funded technologies can then be sublicensed from the universities. Within this dataset, there were approximately 7 Bayh-Dole consolidation licenses.

[2] What is a D-U-N-S Number?

[3] The quantity and quality of the data retrieved from D&B were based upon D&B's respondents. Unfortunately, some DUNS numbers did not provide any information and others were incomplete. For DUNS numbers that were labeled as "out of business", every effort was made to find the appropriate match.

[4] Licenses were removed from the dataset if they were custody transfers, incoming licenses or had an international address. Foreign companies were excluded due to the unavailability of foreign DUNS numbers.

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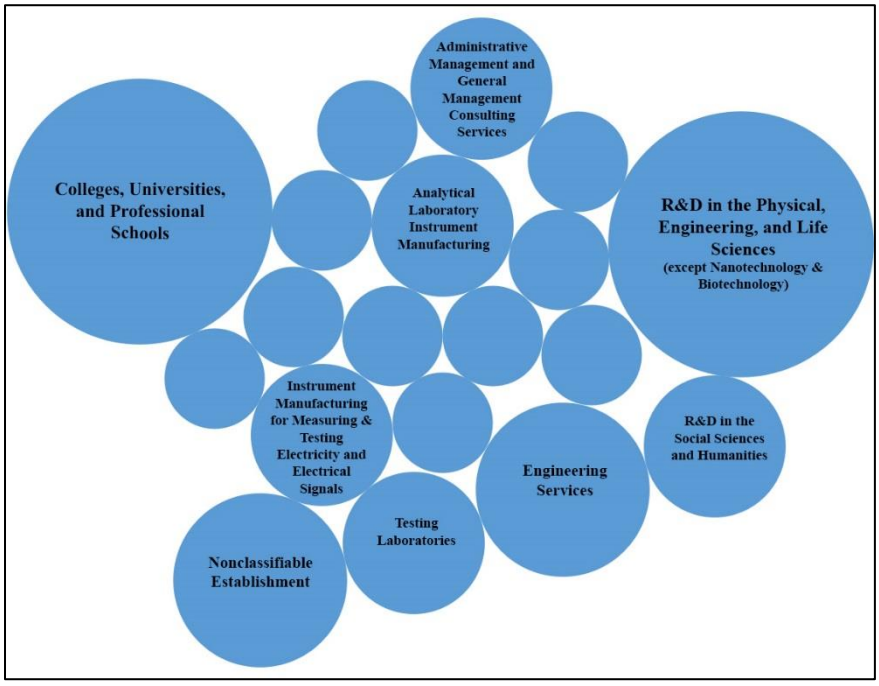
4 DATA AND RESULTS

4.1 LICENSEE BUSINESS CLASSIFICATION: THE NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS)

For each licensee, the primary NAICS code was identified. Nineteen primary NAICS codes were identified for the 40 licensees. Considering NIST conducts research and development in the physical and engineering sciences, it is reasonable for many licensees of NIST inventions to be primarily classified in the NAICS code, "Research and Development in the Physical, Engineering and Life Sciences." This NAICS code accounted for 18% of the licensees. Accounting for an additional 18% of the licensees was the NAICS code, "Colleges, Universities and Professional Schools". The frequency of this NAICS code in the dataset was likely due to research licenses and exclusive license granted to colleges/universities that may be Bayh-Dole consolidations[5].

A packed bubble chart of licensee NAICS codes can be found below in *Figure 1*. The bubbles with a frequency greater than or equal to 2 are identified. From the chart, we can begin to see that, while NIST licensed technologies to multiple types of industries, there were select industries where NIST's licensees were focused.

Figure 1 - Packed Bubble Chart of Licensee NAICS Codes



[5] For this study, licensee data includes universities that hold licenses for NIST technologies under Bayh-Dole consolidations. No sub-licensee data was obtained from the universities.

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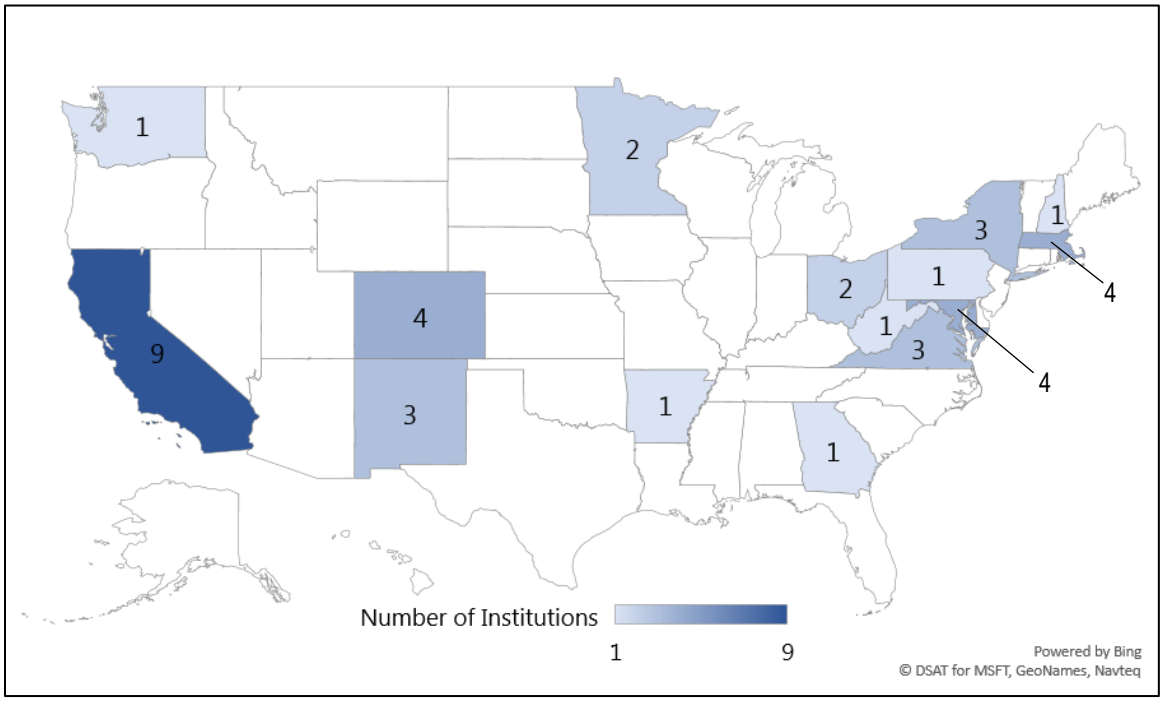
4.2 LICENSEE LOCATION: GEOGRAPHIC LOCATION AND CLASSIFICATION

The 40 licensees were located throughout 15 states, as shown in *Figure 2* below. California hosted the largest number of licensees of NIST technologies (9). Maryland, Colorado, and Massachusetts tied for second, with four licensees from each state. These four states account for over 53% of licensee geographic locations.

In addition, geographic classifications were identified for 14 licensees. 71% of these licensees were in urban or suburban environments (5 and 5 respectively). Two licensees were established in industrial environments, and the remaining two identified themselves in undefined, or "other", geographic locations.

The hypothesis was that licensees would be randomly spread throughout the United States. The evidence is not enough to suggest that a geographic pattern exists among the data. Therefore, the hypothesis cannot be validated.

Figure 2 - Geographic Location of Licensees[6]



[6]Certain commercial equipment, instruments, or materials are identified in this paper in order to specify the experimental procedure adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the materials or equipment identified are necessarily the best available for the purpose.

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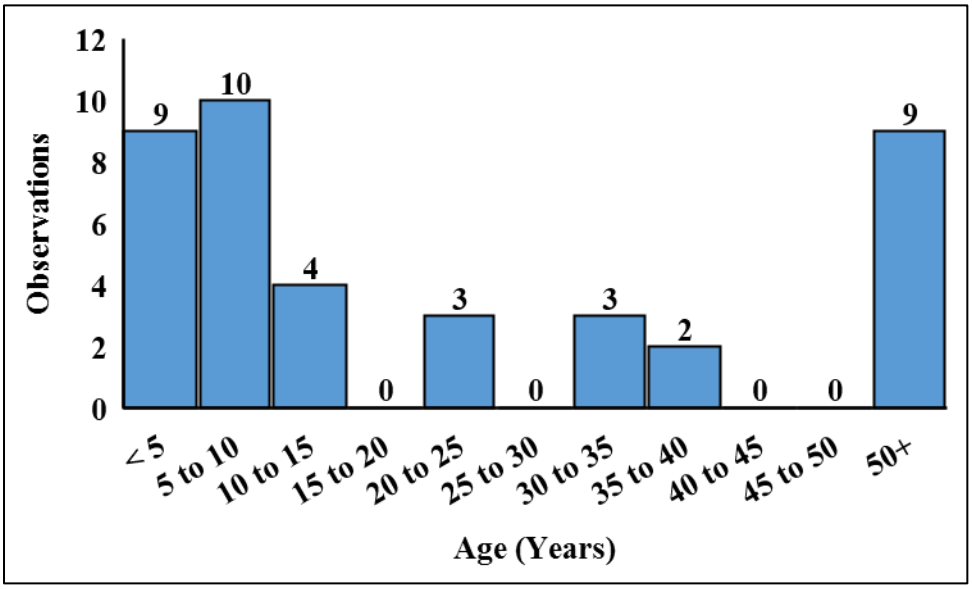
4.3 LICENSEE AGE: AGE AT BEGINNING OF LICENSE

The age of the entity when the patent license began was reported for 40 licensees, where data contained both the date the licensee was established and the date on which the license was executed. As shown in *Figure 3* below, 23% of licensees were less than 5 years old at the time of license execution. Start-ups or young companies are those in existence for 5 years or less as defined within the U.S. Department of Commerce Annual Report on Technology Transfer. Licensees aged 5 to 15 years comprised 35% of the sample, while those 15 to 40 years of age represented 20%. Licensees that were 50 years or older made up 23% of those represented in the data. The data had a positive skewness of 2.38 i.e.; therefore, it was not normally distributed. The mean of this data subset was 36, the median age was 15 and the standard deviation was 53.44.[7] The results for the distribution of ages of these entities were consistent with the hypothesis that most licensees would be at least 5 years old.

Figure 3 - Licensee Age at Time of License Execution

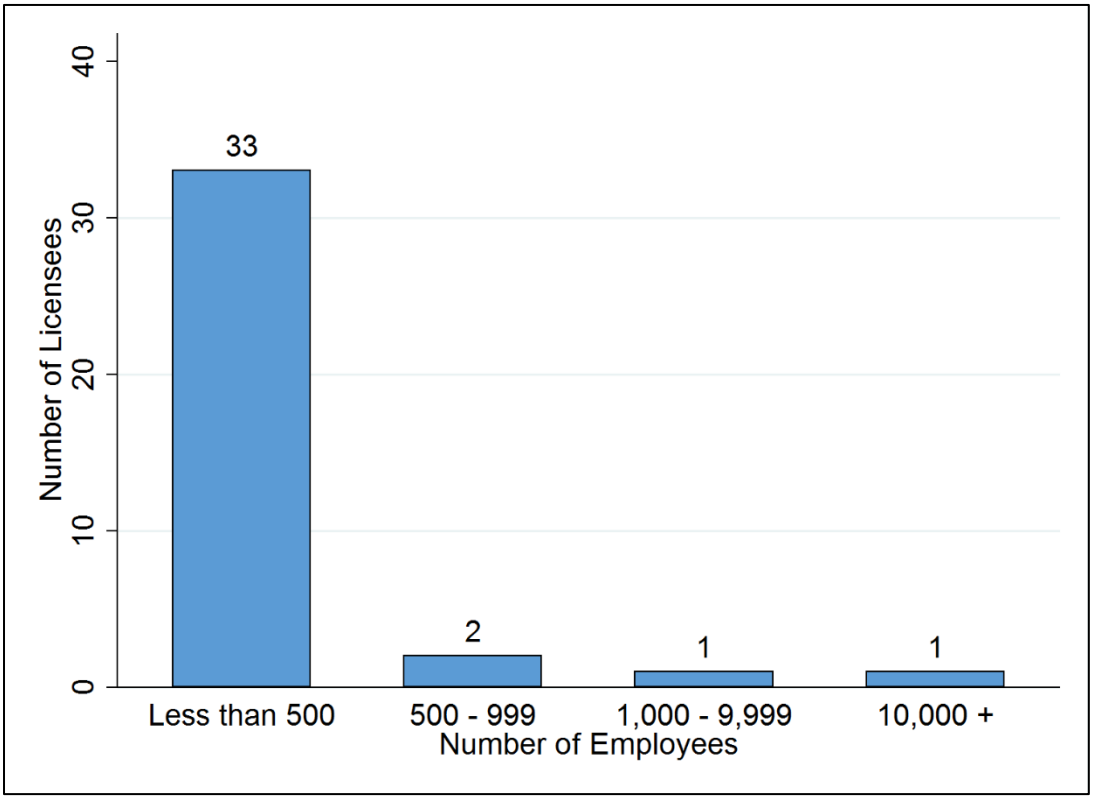


[7] Evidence of a representative sample of the age of NIST Licensees could not be obtained due to the non-normal distribution of the subset of data on partner age and a lack of information about the ages of the larger dataset.

4.4 LICENSEE SIZE: NUMBER OF EMPLOYEES ON LOCATION

Thirty-seven licensees identified the number of employees located at the specific location associated with the DUNS number.[8] Almost 90% of the licensees had fewer than 500 employees at the specific site, see *Figure 4* below. Using the definition provided by the Small Business Administration, the size of these partners was considered small based on the number of employees reported at the specific location. These findings were congruent with the hypothesis that most licensees would have less than 500 employees on-site.

Figure 4 - Number of Employees at Each Location



5 CONCLUSION

To provide information about NIST licensees, this publication highlighted characteristics of those that obtained access to NIST's intellectual property. There were industries that NIST licensees were commonly classified under such as "Research and Development in the Physical, Engineering and Life Sciences" and "Colleges, Universities and Professional Schools." The analysis of geographic locations revealed that NIST's licensees are not concentrated in specific states or areas. Furthermore, one fifth of NIST licensees that provided geographic classifications operated in urban or suburban areas.

[8] If a company has multiple locations, only the number of employees at the specific location associated with the DUNS number is reported.

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NIST's licensees were typically established long before they licensed a NIST technology; the majority were at least 5 years old at the time of license execution. Most licensees were also considered small by measure of the number of on-site employees.

Future analyses may utilize these characteristics to produce case studies regarding the impact of licenses on NIST licensees over time. Each case study could focus on a specific company and look at different variable types (sales, demographics, employees, finances, social media, etc) to examine NIST licensee performance before and after licensing NIST technology. These variables would come from the D&B-provided data, as well as additional surveying.

An additional analysis might also examine the joint inventions between the Federal government and universities, where rights are consolidated to transfer out the technologies. An examination might uncover demographic information about entities to which universities may sub-license joint inventions.

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