

# HIGHLIGHTS OF THE SINGAPORE STUDY ON INTELLECTUAL PROPERTY RIGHT (IPR)-INTENSIVE INDUSTRIES AND ECONOMIC PERFORMANCE

## Key Findings<sup>1</sup>

- Between 2017 and 2021, **more than one-third of all industries** in Singapore were IPR-intensive.
- IPR-intensive industries **generated one-third of Singapore's total economic activity** as measured by gross value-added, with patent-intensive industries being the top contributor (at 22.4%). This was followed by trade mark-intensive industries and design-intensive industries, which contributed 11.3% and 1.5% of gross value-added respectively.
- **One in five jobs** in Singapore were generated from IPR-intensive industries. Among the different IPRs, trade mark-intensive industries had the highest contribution to local employment (12.9%), followed by patent-intensive industries (6.5%) and design-intensive industries (3.0%).
- Employees in IPR-intensive industries were **paid 9.2% more** than those in non IPR-intensive industries.

## Introduction

Innovation is a key driver of the Singapore economy, and intangible assets play an increasingly important role in the protection and commercialisation of new and innovative products. According to a study by the Ministry of Trade and Industry (MTI) Singapore<sup>2</sup> (Toh, B. and Ting, J., 2022), the share of intangible assets - comprising research and development (R&D) and computer software - in Singapore has risen over time, and accounted for 7.9% of our gross domestic product (GDP) and 38.6% of our gross fixed capital formation in 2021. Between 2009 and 2021, the growth in gross fixed capital formation of intangible assets (9.7% per annum) exceeded the growth in gross fixed capital formation of physical assets (1.6% per annum).

Intellectual property rights (IPRs), including patents, trade marks and designs, are key intangible assets. Referencing earlier international studies carried out by other intellectual property (IP) offices including the EUIPO, UKIPO, and USPTO, this study seeks to provide insights on the contributions of IPRs to Singapore's economy. Specifically, it investigates the contributions of IPR-intensive industries to Singapore's gross value-added, employment and wages.

## Key Findings

### 1. Between 2017 to 2021, more than one-third of all industries in Singapore were IPR-intensive

Between 2017 and 2021, there were 80 IPR-intensive industries<sup>3</sup> in Singapore. These IPR-intensive industries accounted for more than one-third of all industries.

Top patent owners were from institutes of higher learning (IHLs) and enterprises in the manufacturing industry, particularly in areas such as the manufacturing of special purpose machinery, glass products, pharmaceuticals and biological products. This reflects the Singapore Government's continual efforts under the Research, Innovation, and Enterprise (RIE) plan<sup>4</sup> to build robust research capabilities, nurture research and innovation talents and accelerate enterprise innovation.

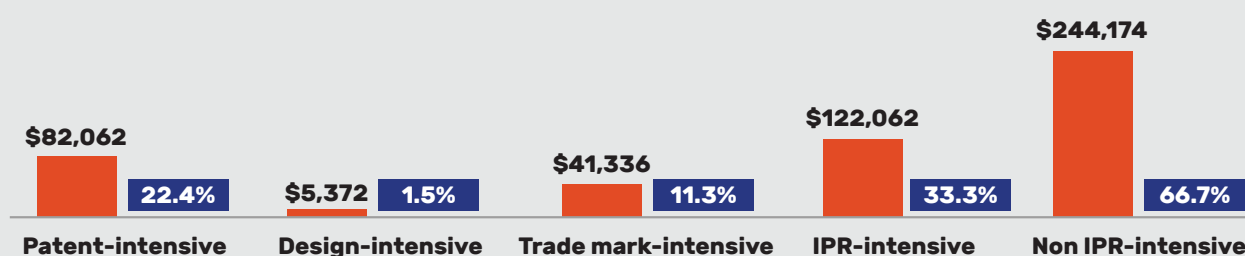
High design-intensity was found in the retail sales industry that focused on products such as jewellery, watches and clocks. In addition, high trade mark-intensities were found in non-specialised wholesale trade and management consultancy industries.

### 2. IPR-intensive industries contributed one-third of Singapore's total economic activity<sup>5</sup>

This study found that IPR-intensive industries generated one-third (33.3%) of Singapore's gross value-added. Figure 1<sup>6</sup> shows the contribution of IPR-intensive industries to Singapore's gross value-added. Patent-intensive industries contributed the most to Singapore's gross value-added (22.4%), followed by trade mark-intensive industries and design-intensive industries, which contributed 11.3% and 1.5% of gross value-added respectively.

Figure 1

Gross Value-added of Relative IPR-intensive Industries (in millions) (Average of 2017 - 2021)



### 3. One in five jobs in Singapore were contributed by IPR-intensive industries

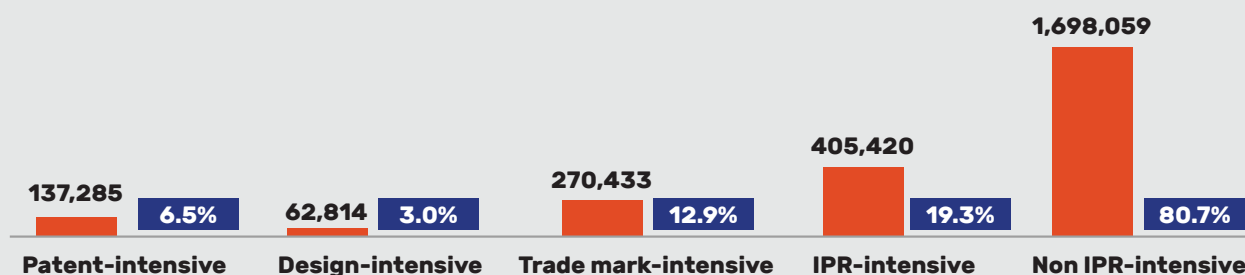
Between 2017 and 2021, IPR-intensive industries contributed to 19.3% of the total local employment.<sup>7</sup> Figure 2<sup>6</sup> shows the contributions of the different IPR-intensive industries to Singapore's local employment. Trade mark-intensive industries had the highest contribution to local employment (12.9%), followed by patent-intensive industries (6.5%) and design-intensive industries (3.0%).

### 4. Employees in IPR-intensive industries were paid 9.2% more than those in non IPR-intensive industries

This study found that, overall, IPR-intensive industries paid a wage premium. Figure 3<sup>8</sup> shows the average wage for employees in different IPR-intensive industries.<sup>9</sup> Between 2017 and 2021, employees in the IPR-intensive industries were paid 9.2% more than those in non IPR-intensive industries. Employees in the patent-intensive industries saw the largest wage premium (27.7%), followed by employees in the trade mark-intensive industries (2.8%). There was a negative wage premium of 12.8% for the design-intensive industries and this could be due to the small number of designs being filed and granted in Singapore.<sup>10,11,12</sup>

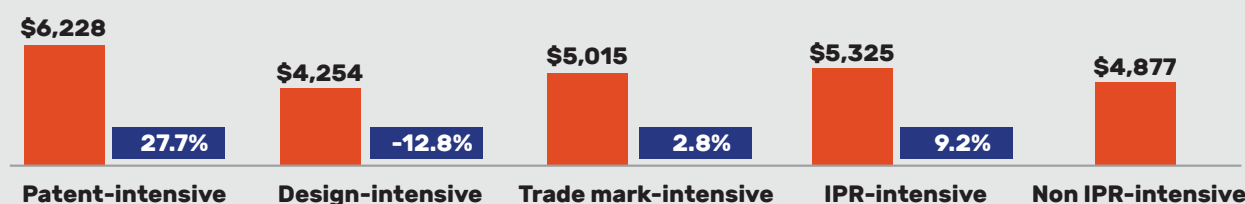
**Figure 2**

**Total Local Employment of Relative IPR-intensive Industries (Average of 2017 - 2021)**



**Figure 3**

**Average Monthly Wage of Relative (and Absolute) IPR-intensive Industries (Average of 2017 - 2021)**



#### Footnotes

- All figures were based on the relative intensity scores of industries. However, in relation to wages, to ensure that the computed average wages of different IPR-intensive industries were not affected by industries with below average IP counts, the 'above average absolute intensity' criterion was also applied. For details on the differences between relative intensity and absolute intensity, refer to footnote 3 and footnote 9.
- Toh, B. and Ting, J. (2022). The Contribution of Intangible Assets to Labour Productivity Growth in Singapore, 2009 - 2019. Economic Survey of Singapore First Quarter 2022, 60 - 75.
- IPR-intensive industries refer to industries with number of granted IP (patent, trade mark, or design) per 1000 employees greater than the overall average for all industries. They are also referred to as relative IPR-intensive industries. There was a total of 233 industries covered by this study.
- Under the Research, Innovation, and Enterprise (RIE) 2025, Singapore will invest \$25 billion to continue developing Singapore's vibrant research and innovation ecosystem. It builds on earlier investments to support areas of national priority to develop a more resilient, sustainable, and digital Singapore. For more details, refer to RIE Ecosystem, <https://www.nrf.gov.sg/rie-ecosystem/ecosystem/>.
- The metric used to measure economic activity is "gross value-added". Gross value-added refers to the value of goods and services produced in the economy minus intermediate consumption (output approach), or the sum of incomes generated from the domestic production of goods and services (income approach). Due to data availability constraints, 182 out of the 233 industries were considered in the analysis of value-added contributions made by IPR-intensive industries.
- The percentage figures in Figure 1 refer to the shares of gross value-added for the different types of IPR-intensive industries relative to all industries and the percentage figures in Figure 2 refer to the employment shares of the different types of IPR-intensive industries relative to all industries. IPR-intensive industries refer to industries that are either relative patent-intensive, relative trade mark-intensive, or relative design-intensive. The percentages for the different IPR types do not add up to the overall IPR-intensive figure as some industries are intensive in two or more IPR types.
- Local employment refers to Singapore citizens and permanent residents (PRs) who were employed between 2017 and 2021.
- The percentage figures in Figure 3 refer to the wage premium of employees in the different types of IPR-intensive industries relative to non IPR-intensive industries. IPR-intensive industries refer to industries that are either relative (and absolute) patent-intensive, relative (and absolute) trade mark-intensive, or relative (and absolute) design-intensive. The percentages for the different IPR types do not add up to the overall IPR-intensive figure as some industries are intensive in two or more IPR types.
- Absolute IPR-intensive industries refer to industries that have a greater number of granted IPRs than the overall average for all industries. In considering the average wage of employees in the different types of IPR-intensive industries (for patents, designs and trade marks), in addition to the industries being relative IPR-intensive, we also required for the industries to be absolute IPR-intensive to ensure that the results were not affected by industries with below average IP counts. 36% of the relative patent-intensive industries, 29.4% of the relative design-intensive industries and 62.3% of the relative trade mark-intensive industries were found not to be absolute IPR-intensive.
- 55.2% of all granted designs were concentrated in one industry - Retail Sale of Personal Effects in Specialised Stores. The remaining 44.8% (1,860) of all granted designs were spread over 232 industries.
- It was noted in the EUIPO report (EUIPO, 2022) that using the 'above average relative intensity' criterion meant 'that industries with a relatively small number of valuable IPRs but a large number of employees would not be identified as IPR-intensive according to this methodology' (pp. 28). The flipside of this narrative is that for an industry with a relatively small number of IPRs but an 'even smaller' number of employees, it could result in that industry being identified as IPR-intensive. Therefore, to mitigate this effect, the additional 'above average absolute intensity' criterion was applied. For further explanation, refer to footnote 9 for details.
- According to Zhang (2020), one limitation of the methodology is that the result (which industries are being considered intensive) depends on the "cut off" point (average value) which in turn is dependent on the distribution of the relative intensities. For more details, refer to Zhang, H. (2020), Intellectual Property Rights, Business Profitability and Competition in the Australian Economy, IP Australia Economic Research Paper 10, Australia Government, IP Australia, Office of the Chief Economist, pp. 27.

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