Global Benchmark Report

Key Trends in the Global Software Development Industry

Q2 2021

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Introduction

Report Summary:

The BlueOptima Global Benchmark is a quantitative analysis of the performance of the software development industry, done on a quarterly basis. This report highlights some of the key findings in the 2021 Q2 analysis covering the period 01-07-2020 to 30-06-2021.

Key Findings:

- Global Productivity has started to grow again - See Global Trends
- How Economic Sectors performance has varied/Healthcare's Productivity Drop - See Economic Sector Performance
- How regions performance has varied/Asia-Pacific's Productivity Gain - See Regional Performance
- Covid-19 & Performance in India - See our Special Report on India in the last quarter

Global Trends

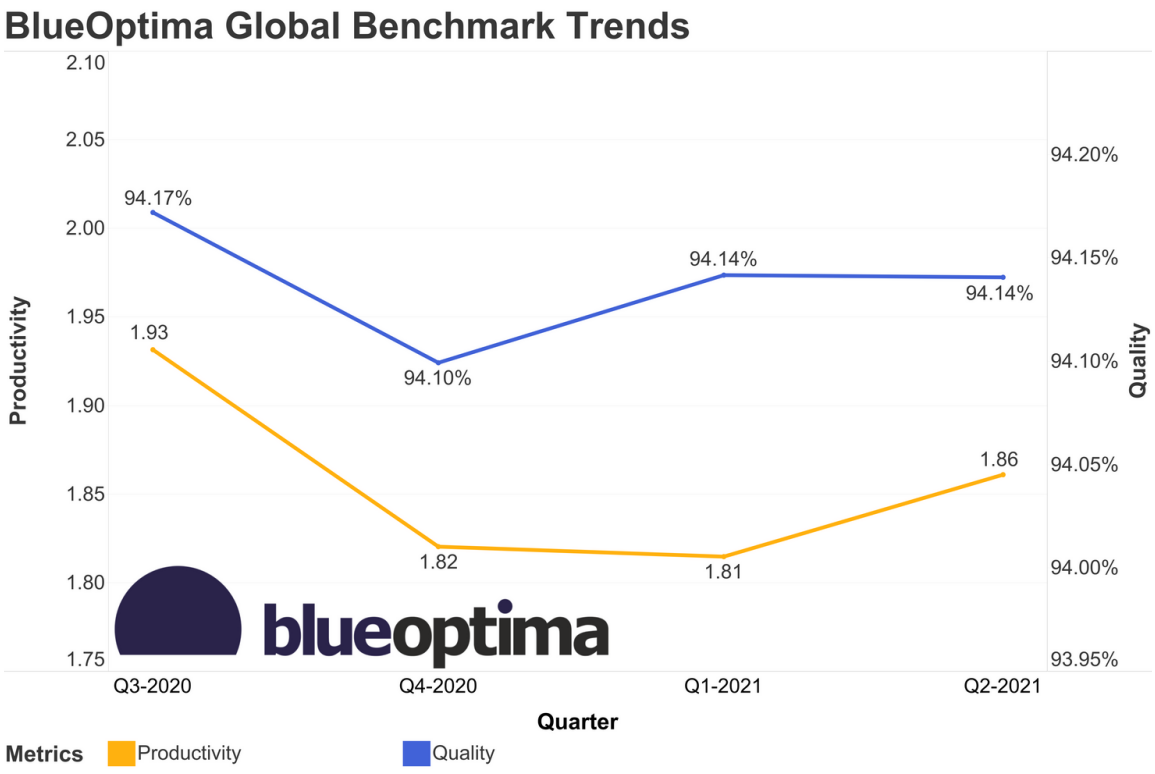

Figure 1: Shows the Global Productivity and Quality Trend in Software development over the last 4 quarters. Productivity (Yellow) is expressed in Billable Coding Effort per Developer per Day. Quality (Blue) is expressed as the percentage of maintainable code delivered.

In our Special Report “Pandemic Holidays - Lower for longer” last quarter we highlighted the drop in productivity. This quarter there has been a significant return to productivity growth with Global productivity rising by nearly 3%. This is still below the pre-pandemic levels and with the impacts of Covid-19 likely to stay with us for some time...

A similar trend observed in last quarter's report showed quality had dropped. This drop was shorter lived, quality has levelled off while slightly lower than the pre-pandemic level, the stabilization is a reassuring sign, especially when considered with the productivity growth.

Economic Sector Performance

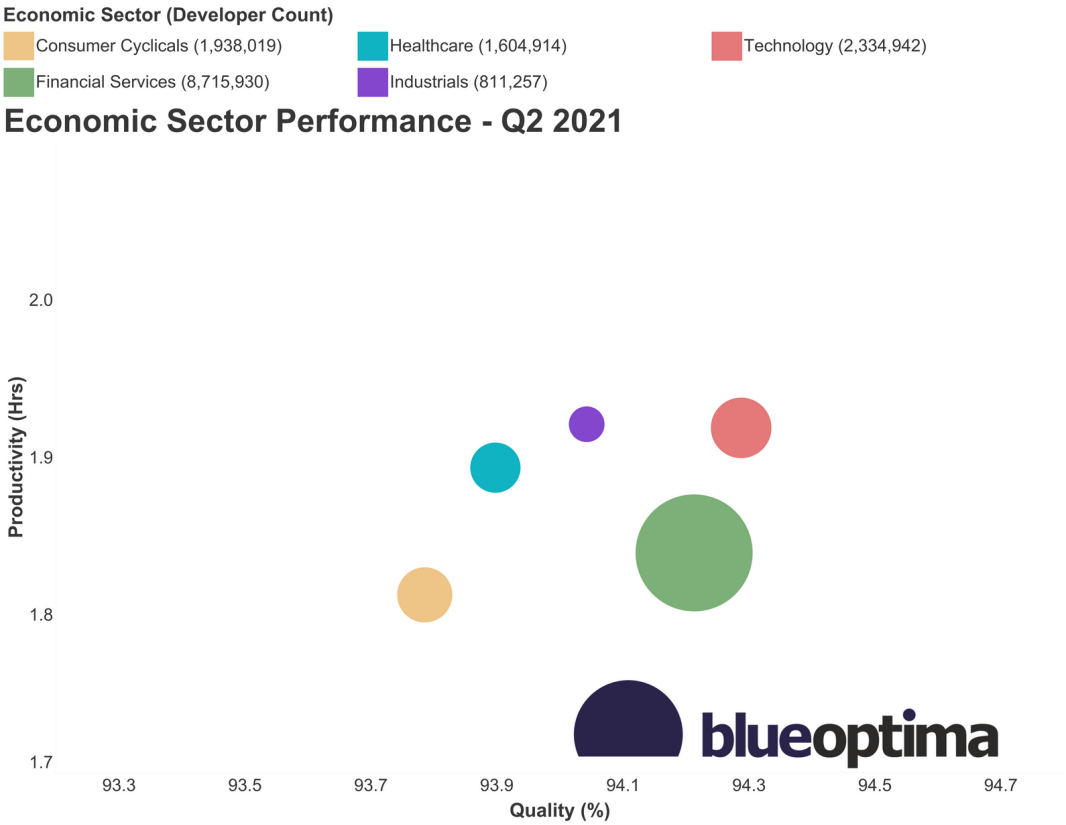

Figure 2: The size of the bubbles represents the global population of software developers in each industry. The colour represents the different Economic Sectors[1].

Technology has continued to be the fastest to return to productivity growth, with a noticeable increase in Q1, and is now the second most productive economic sector delivering 1.92 BCE/Day. This rate of delivery is even more impressive as they are producing the most maintainable code of any of the assessed sectors. However, during the last quarter their quality has started to decline, whether this continues remains to be seen.

Nearly all the economic sectors have increased their productivity in the last quarter, with the notable exception of Healthcare where productivity has continued to drop, this has resulted in them losing the top spot, while their quality has remained consistent.

Financial Services, the largest sector consisting of 8.2M developers, achieved the fastest increase in productivity. When compared to the Q2 to Q1 they managed a 3.26% increase, while maintaining a very consistent quality.

[1] Note: Insufficient sample size prevents the estimation of Output and Quality for the following Economic Sectors: Basic Materials, Consumer Non-Cyclicals, Energy, Telecommunications Services, and Utilities. While Output and Quality are not provided for these Economic Sectors enterprise software developer population estimates have been provided.

Regional Performance

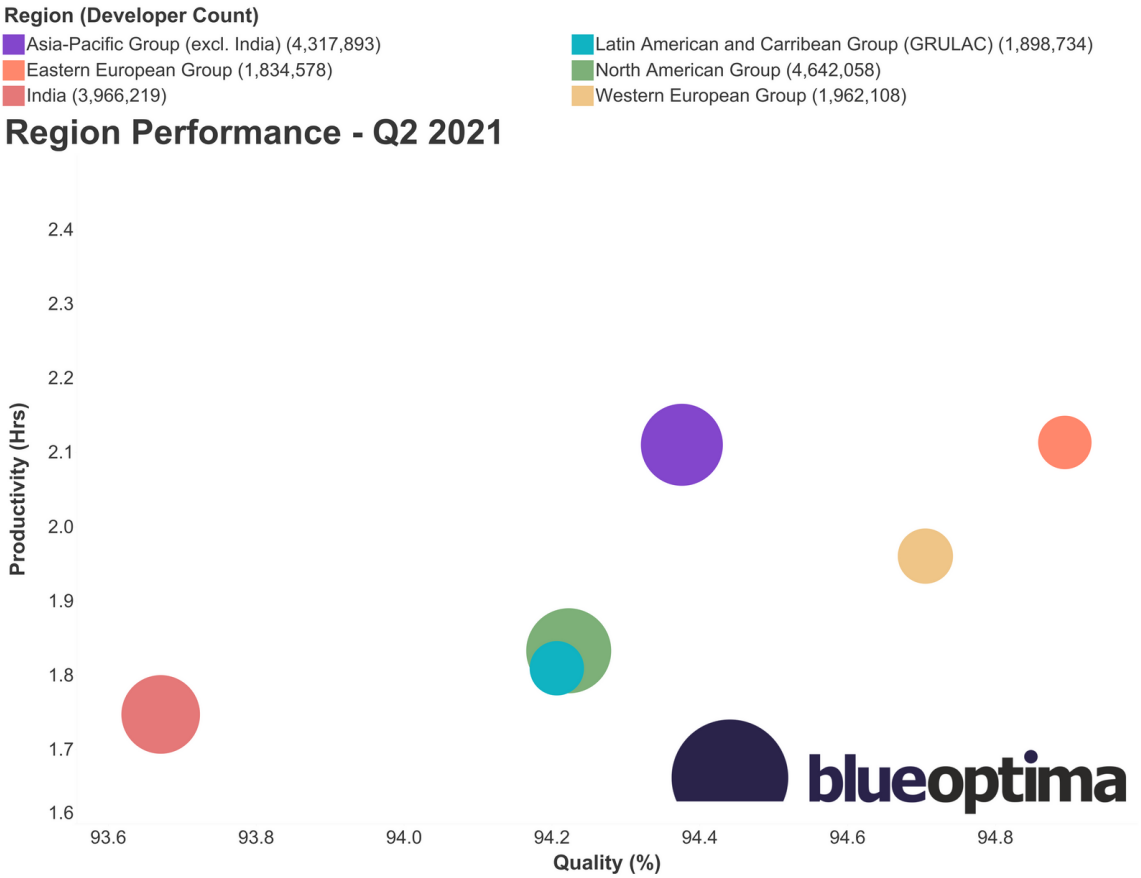

Figure 3: The size of the bubbles represents the global population of software developers in each region. The colour represents the different geographical regions, see legends above.

India, with 3.9M developers, has had an interesting quarter, see the Special Report. However, India continues to be the least productive and lowest quality region.

The Eastern European region continues to be the most productive region; however, the last quarter has resulted in an unusual drop in productivity compared to the previous quarter. The Asia-Pacific region has increased in productivity and has become very close to overtaking the Eastern European region as the most productive region.

As shown above, quality was flat last quarter. There was some variation across the regions with the Western European region dropping slightly.

Both the North American and the Western European regions continue to have productivity growth; approximately 1% each in the last quarter.

Regional Cost Efficiency

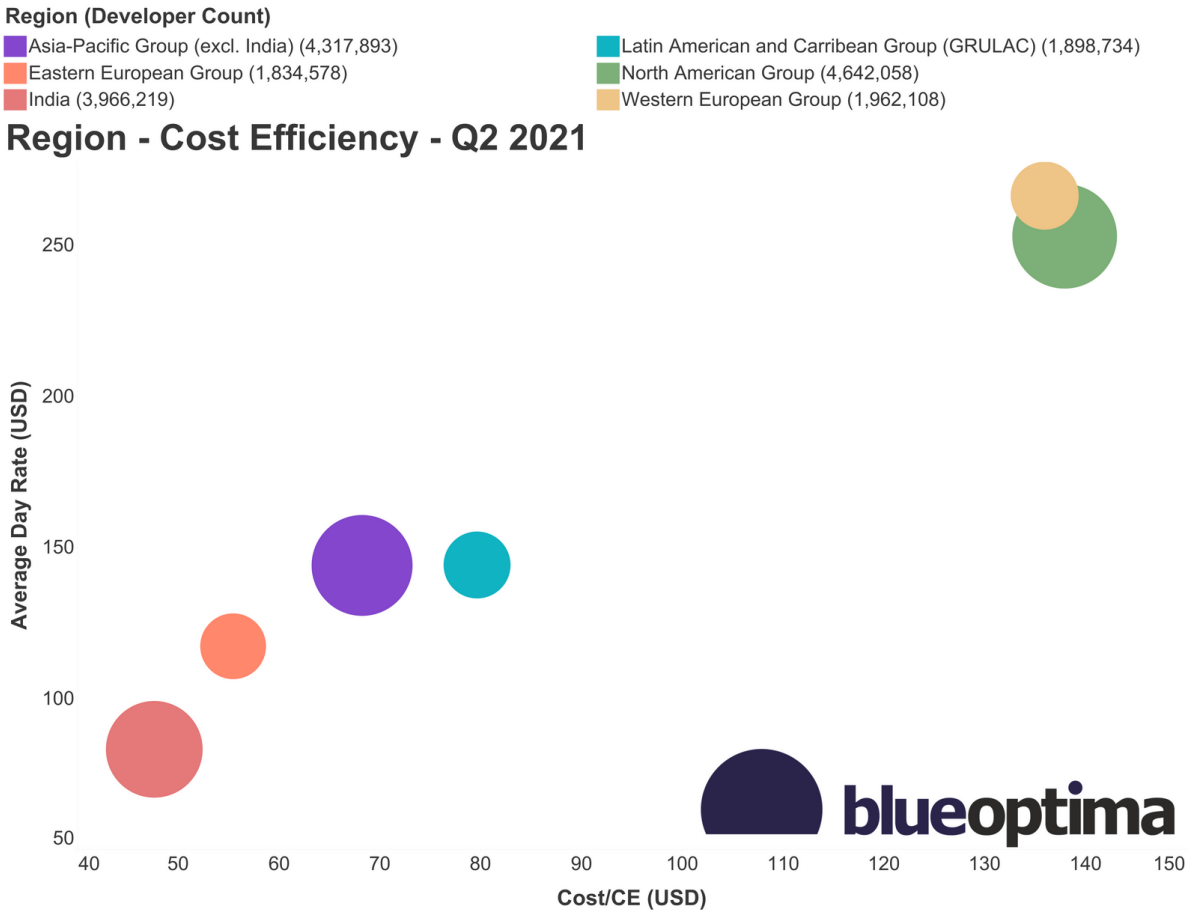

Figure 4: The size of the bubbles represents the global population of software developers in each industry. The colour represents the different geographical regions, see legends above.

The Western European region continues to have the highest Average Day Rate, this is approximately 5% higher than the North American Region. However, due to their higher rate of delivery the cost to deliver a unit of Coding Effort is nearly $2 cheaper.

In the low-cost regions, India remains the cheapest region both for the average day rate and the cost per unit of Coding Effort delivered. The Asia-Pacific region and the Latin American and Caribbean region have very similar average rates, with less than $0.10 between them. However, the cost to deliver a unit of Coding Effort is more than $10 lower in Asia-Pacific.

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Top Enterprise Technologies

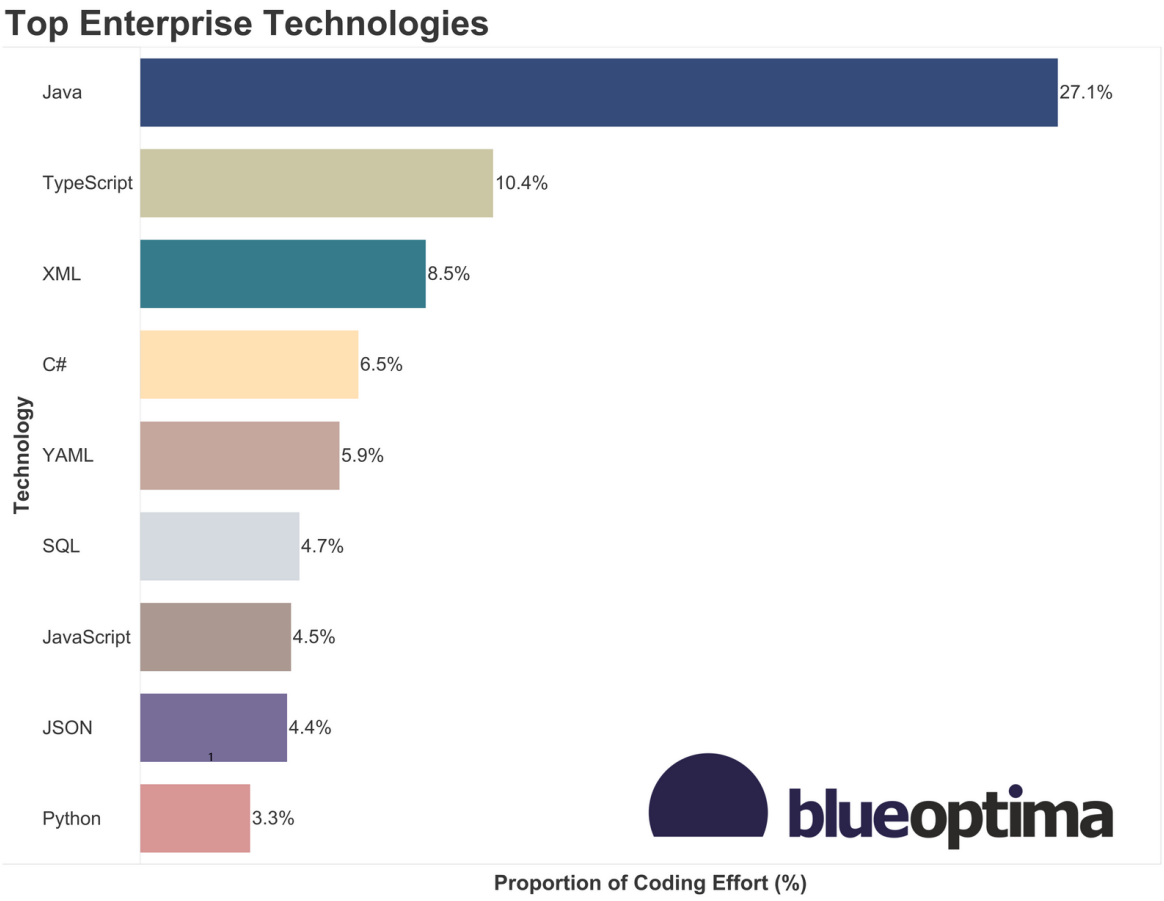

Figure 5: Shows the source file types within which Coding Effort is invested by enterprise software developers.

TypeScript has become the second most commonly used language and is continuing to grow[2]. Java continues to be the language of choice for enterprise software development, accounting for over a quarter of the Coding Effort delivered globally.

XML remains the dominant mark-up format convention for configuration and has increased slightly. YAML has continued to rise in popularity and has increased by twice the rate of XML.

[2] Note: Some of this increase comes from improvements where the various TypeScript files have been better consolidated.

Special Report: India's Productivity Resilience

By Thomas Hunter

India, which accounts for 4.3 million developers and is often used by larger enterprises as a key software development location, has faced a huge second Covid-19 wave throughout the last quarter. The 7-day average number of cases was 15,442 on 1st of March 2021 and had already risen to 65,211 by the 1st of April before peaking at 391,232 on the 8th of May[3]. This special report investigates the impact of this period on the Indian software development industry and it's developers.

In our previous reports on the COVID-19 we observed that software development in India adapted very well to the new working conditions initially. However, like the rest of the world there was a significant and sustained drop in productivity over the new year.

The below chart shows the BCE/Day variation against the average each year to July. It should be noted that because of the drop in productivity in 2020/21, the baseline for that period is significantly lower than in previous years.

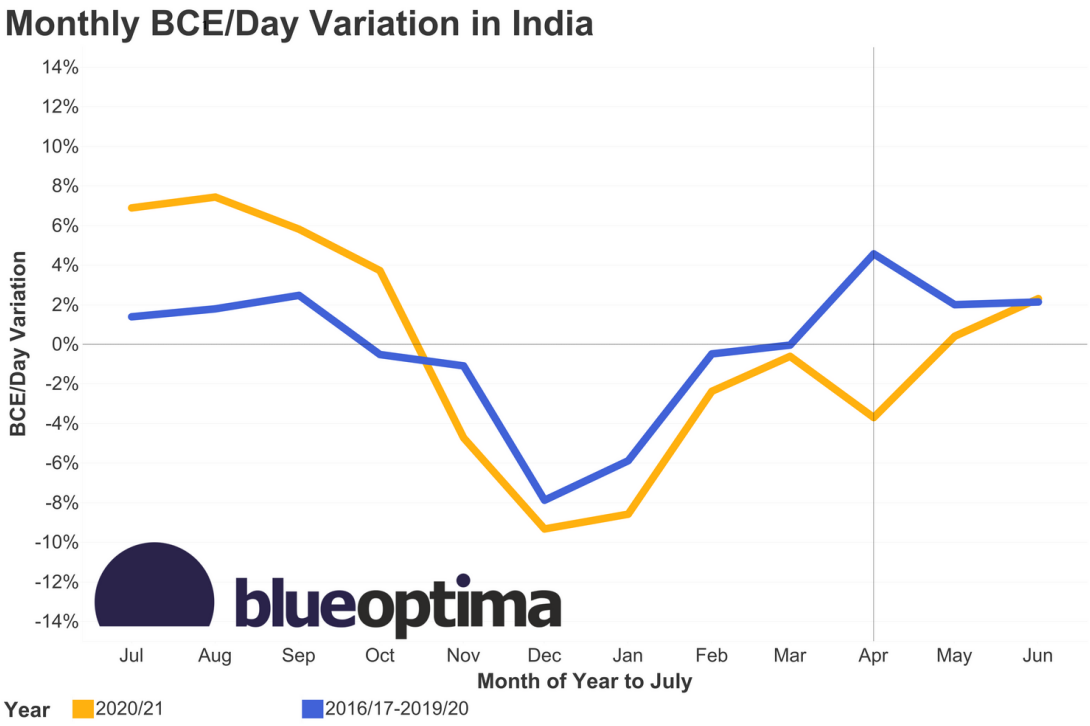

Figure 6: The percentage differences from the average productivity measured in BCE/Day between the yearly average (July to June) and the monthly productivity for India. The blue line shows the average from 2016/17 to 2019/20 and the yellow shows the trend 2020/21 highlighting the difference.

[3] Source: https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30120-1/fulltext

Harsher COVID-19 Restrictions = Higher Productivity

February and March saw Productivity increase, however, on the 3rd of April the Oxford Stinency index jumped by 20 points signalling a significant increase in restrictions[4]. Productivity dropped again following this event by 3.1% for the Month of April. In the week following the 3rd of April productivity dropped by 5.7% and 14.5% the week after that.

Surprisingly, following this productivity grew. May, which saw the peak of the pandemic, also saw an increase in productivity by 4.25% higher than any month since October last year. Although productivity continues to rise, it still lags below the pre-pandemic levels. The Indian software development industry has shown incredible resilience to the challenges of working through a pandemic.

The preceding drop in productivity occurred during a period when cases were low in India but high in North America and Europe, yet when this trend was reversed Indian developers managed to increase productivity. This surprising result correlates with historical trends relating to the drop in productivity during the new year period. This period is not as significant in India as in the Western world but the impacts on productivity can be easily seen.

There are other impacts that can be seen during April and May, the number of days with a meaningful commit per developer fell slightly during April and May.

[4] Source: https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker

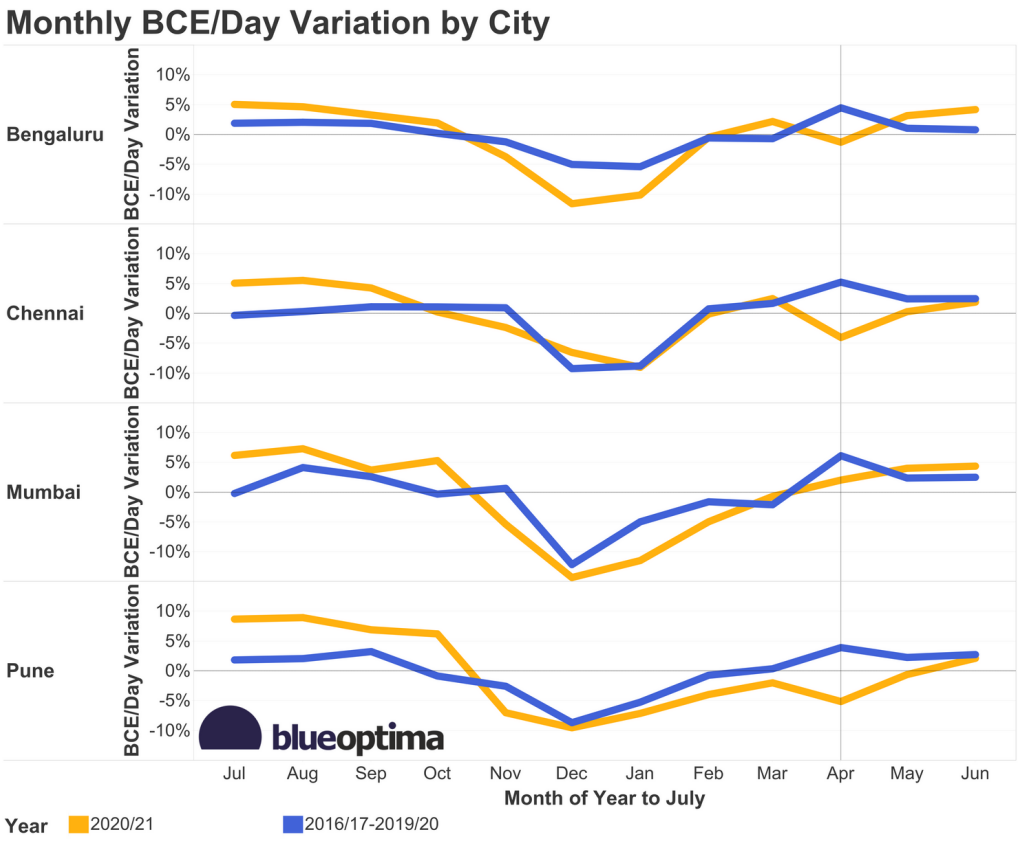

Figure 7: The percentage differences from the average productivity measured in BCE/Day between the yearly average (July to June) and the monthly productivity for four key cities for the Indian Software Development Industry. The blue line shows the average from 2016/17 to 2019/20 and the yellow shows the trend 2020/21 highlighting the difference[5].

Similar Results can be seen across the different key software development cities in India.

Mumbai didn't show a drop in April in line with the rest of India although their productivity dropped much lower in the December/January period, at 14.4% below their average for 2020/21. Historically they have been one of the slower cities to return to productivity in the New Year. The developer headcount in Mumbai dropped significantly in April, perhaps requiring the other developers in Mumbai to pick up more work in the short-term, and following this there was also a drop in quality.
Pune had one of the slowest growth rates in productivity following the New Year, as a result Pune has only just reached an above average productivity, for the year, by June.

Interestingly, Bengaluru's developers have achieved growth, bringing it nearly on par with their rate of delivery in July before the significant drop seen later in the year. No other major Indian City in the BlueOptima Global Benchmark has achieved this yet.

India has once again shown incredible resilience to the Covid-19 pandemic, and the developers there have proven that they are able to work very well under these conditions. Achieving growth in productivity during this period is an impressive feat, showing how well Indian developers have adapted to working from home.

[5] Note: Four key cities within India have been selected from the BlueOptima Global Benchmark based on the sample sizes available.

Notes About the Data

This report identifies key trends in the global software development industry, as observed through the BlueOptima Global Benchmark. The BlueOptima Global Benchmark contains a quantitative analysis of the performance of a sample of more than 100,000 professional software engineers developing enterprise software located in over 50 different countries.

The BlueOptima Global Benchmark is published quarterly, and each Benchmark publication contains data for the previous 12 months (01-07-2020 to 30-06-2021). This report highlights some of the key findings. The data is analysed using BlueOptima's Developer Analytics platform to calculate Coding Effort (CE), which sets a global standard for measuring software developer productivity. CE is a metric derived from objective measures of software developer work outputs, specifically source code changes, based on decades of academic and industry research. Coding Effort is used by large global enterprises to compare the productivity of software engineers across technologies and software development methodologies.

Alongside productivity, the maintainability of source code change delivered by software developers is measured using BlueOptima's Analysis of Relative Thresholds (ART) which is an objective measure of source code maintainability. The maintainability of source code change which is described as quality in this report is the proportion of Billable Coding Effort hours spent delivering maintainable source code change.

This analysis deliberately excludes part-time and hobbyist software developers, such as those contributing to open-source projects, as the economic cost and impact of their participation in these projects are indirect and unclear. The data employed in this analysis represents an approximated 2% sampling of the global enterprise software developer population.

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Glossary of Terms

Coding Effort
Coding Effort is calculated by statistically evaluating every source code change made by developers in terms of 36 static source code metrics measuring various aspects of Volume, Complexity, and Inter-relatedness while considering the context worked in e.g. a complex legacy software component or a brand new project.

Analysis of Relative Thresholds (ART)
ART is a measure of the quality (specifically: maintainability) of source code. It is calculated by evaluating the proportion of code which is aberrant, relative to the codebase in which it sits. Code is flagged as aberrant when it violates certain internally benchmarked statistical thresholds, across a number of static source code metrics.

BlueOptima Population Sample
The analysis in this report is based on a sample of more than 100,000 software developers across the world, including 50,000 in India, 21,000 in North America, 24,000 in Eastern Europe, 14,000 in Western Europe, 8,000 in the APAC region (excl. India), and 3,500 in Latin America and the Caribbean. Africa and the Middle East, which represent an estimated 6.8% of the global developer population, have been omitted from this analysis due to insufficient sample size. All data used is anonymised and aggregated.

Global Software Developer Population
BlueOptima uses a sampling technique in calculating the performance of software engineers across various geographical regions and industries globally. BlueOptima has estimated the global software developer population using a combination of accredited sources and predictive modelling.

The global population of software engineers across various geographical regions according to the BlueOptima Global Benchmark are 3,966,219 in India, 4,642,058 in North America, 1,834,578 in Eastern Europe, 1,962,108 in Western Europe, 4,317,893 in the APAC region (excl. India), and 1,898,734 in Latin America and the Caribbean. Africa and the Middle East, which represent an estimated 6.8% of the global developer population, have been omitted from this analysis due to insufficient sample size. All data used is anonymised and aggregated.

Estimates of the total number of developers per region are derived from the following sources using a process of harmonising the data sources and arriving at a best-estimate across all sources: IDC Worldwide Developer Census, Evans Data Global Developer Population and Demographic Study, Stack Overflow State of European Tech, Statista, and World Bank Open Data.

Business Classification

The classification of organisations into Economic Sectors, Industry Groups, and Industries is done using The Refinitiv Business Classification. Estimates of the numbers of enterprise software developers in Economic Sectors, Industry Groups, and Industries is done by measuring various proxies of software developers in a firm (e.g. annual revenue, profit, assets, and headcount of each organisation) on a per industry basis and optimising estimation of this against the known developer population in a subset of the those organisations that are known to BlueOptima. Once this industry level estimate is arrived at, constituents of the Global 2000 are evaluated and their developer populations estimated. The relative proportions of developers in Economic Sectors are then applied on a pro rata basis to the global software developer population.

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Learn More

BlueOptima's industry benchmarking capability is available to BlueOptima's Developer Analytics subscribers.

BlueOptima Global Benchmark Pro

Leverage BlueOptima's Global Benchmark to see how your organisation's software development performance compares to peers in the same industry.

Contact BlueOptima today to arrange a demo of the Benchmark Pro.

BlueOptima Data Science

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