

Is construction productivity being measured meaningfully? Looking at value added per worker has limitations. It's better to look at site productivity by floor area per man-hour in a project.

By **LOW SUI PHENG**

EYE ON THE ECONOMY

The myth of low construction productivity

THE focus on productivity is not likely to go away any time soon, following the Government's announcement of the economic restructuring programme in 2010 that aims to achieve an annual productivity growth rate of 2 to 3 per cent in 10 years.

At the current halfway mark in 2015, labour productivity fell into negative territory, contracting 0.8 per cent last year.

In numerous past reports on labour productivity, the construction industry was often singled out as lagging behind other industries. However, measuring construction productivity is not a straightforward task, as I discovered during my recent study of productivity indicators, conducted for the Building and Construction Authority (BCA).

The problem with measuring productivity

THE complexities associated with measuring construction productivity are, however, not new.

In 1965, studies from Northern Ireland highlighted difficulties in measuring construction outputs. This is because the work done in any one year is a mixture of a wide range of all types of new building and civil engineering projects as well as repair, maintenance and refurbishment jobs.

Within each category of work, jobs vary in size, form, location and complexity. The measurement problem is aggravated further with different composition of construction outputs from year to year.

Traditionally, labour productivity is expressed as Value Added (VA) per Worker (\$). How do we judge whether construction productivity is satisfactory? This is often done by comparing construction VA per Worker with that of other countries and other industries domestically.

Construction labour productivity in Singapore has often been compared with that of other advanced countries, with an outcome that is often not in our favour. VA per Worker remains one of the most commonly used indicators for international comparisons. Most advanced countries, however, do not publish such information because these statistics have been acknowledged to be unreliable.

Some limitations of such international comparisons include the fact that industry structure, compositions and practices are different in different countries. Also, comparison for a single point in time does not reflect the construction boom and bust cycles in different countries. Finally, international comparisons based on a common currency (typically US\$) do not account for currency fluctuations and differences in construction price levels among countries. The Singapore dollar was pegged at S\$2.11 against US\$1 in 1981. Today, it's about S\$1.38 to US\$1.

Between 2006 and 2011, there was a -20.8 per cent change in the S\$ as it weakened against the US\$. In that same period, the changes were -31.3 per cent, 14.9 per cent and -26.9 per cent for Ja-



pan, Britain and Australia respectively against the US\$.

Another limitation in international comparisons is in the treatment of remuneration. This forms part of the income approach to estimating VA. However, the World Bank acknowledged that wages are generally higher in high-income countries. An international cost consultancy firm suggested that in 2012, the hourly costs of a general labourer and a site foreman, including overheads, were US\$12 and US\$24 respectively in Singapore. These contrasted sharply with US\$53 and US\$77 respectively in the US.

Finally, building methods and standards are interpreted differently when cost comparisons are made. Hospitals, for example, are functionally similar but are not entirely built to the exact same standards in different countries. Likewise, wooden houses have tra-

ditionally been built as dwellings in Japan but not so in Singapore.

Hence, international comparisons of construction VA per Worker are not straightforward.

Domestic comparisons

DOMESTIC comparisons of construction VA per Worker with that of other industries (e.g. manufacturing) should also consider the complexities and practices of the construction industry.

Unlike manufacturing, construction firms cannot relocate low VA work outside Singapore. The nature of construction is that expressways and skyscrapers must of necessity be built in Singapore. Many different trades are also involved in construction. To avoid redundancy, larger construction firms do not employ all the different specialist trades. Subcontracting is therefore rampant in

construction. A BCA survey shows that all construction firms subcontracted 41.7 per cent of their construction turnover. In construction, different teams come together for a short period of time to complete a job and disband upon project completion. The transient nature of construction projects can adversely affect the learning curve.

Construction also extensively uses structural steel, claddings and drywall partitions produced in the manufacturing industry. Up to 30 per cent of total construction outputs are sourced from manufacturing. This can go beyond 50 per cent for building projects with a high manufactured content, such as hospitals.

Hence, while off-site production activities shift from construction to manufacturing, the reduction in labour required on the building site is not captured as

productivity gains in construction insofar as these manufactured products are concerned.

Site productivity: floor area per man-hour

THE limitations in using construction VA per Worker have been recognised in the US, Canada and Northern Ireland. These places advocate measuring physical site productivity.

Studies in Japan and Australia also suggest that no one single productivity indicator fits all situations. The choice of different productivity measures was also acknowledged by the Organisation for Economic Cooperation and Development.

Singapore's BCA has adopted a multi-pronged approach to measuring construction productivity, emphasising an industry-wide measurement of physical site pro-

ductivity. This starts at the trade level (e.g. painting) before aggregating across all trades to yield a project-level productivity indicator. All project-level productivity indicators for a specific year are then weighted according to different project types and aggregated to yield the Industry Overall Productivity Indicator (IOPI), which looks at construction in terms of square metres per man-day (m²/man-day).

Unlike VA per Worker, construction trade productivity indicators are easier for data capture because the scope of work is clearer and more definitive. Studies in Australia, Canada, Ireland, Japan, New Zealand, Britain and the US have indicated that on-site productivity measurements are more reliable for construction.

But while on-site productivity measurements have been recognised by developed countries to be more relevant, they do not have a platform to facilitate systematic data capture.

In Singapore, the BCA has since 2011 implemented industry-wide measurement of physical site productivity through the Electronic Productivity Submission System (ePSS). The ePSS facilitates firms to seamlessly furnish monthly site productivity data to the BCA as provided for in the Building Control (Buildability and Productivity) Regulations, 2011, for building projects with gross floor areas equal to or greater than 5,000 m². The BCA also encourages firms to adopt the Biometric Authentication System to automatically record the number of workers accessing a project site daily. The ePSS computes site productivity indicators for different categories of private residential (landed and non-landed), public housing, commercial, industrial and institutional buildings.

The ePSS provides greater certainty, stability and representation in the data-collection process. The IOPI in a particular year is obtained by weighting the total gross floor area and certified progress payments for each of the different building types. Last year, the proportion of building projects covered by ePSS represented 90.6 per cent of the total floor areas of projects that obtained temporary occupation permits.

The data shows that site productivity as measured by IOPI has been improving at 1.4 per cent per annum since 2010. Data furnished by the BCA shows that the IOPI grew by 2 per cent last year to 0.403 m²/man-day.

Measuring construction site productivity circumvents limitations of the VA indicator. It is in line with recommendations from Australia, Canada, Japan, New Zealand and Britain where activity-based measures have been encouraged.

There is certainly always room for our construction industry to improve. But it is also timely to review if we have been measuring construction productivity meaningfully and if there is indeed a better alternative.

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