# An analysis of construction productivity in Malaysia

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# AN ANALYSIS OF CONSTRUCTION PRODUCTIVITY IN MALAYSIA


## Abstract

The construction industry is an industry of major strategic importance. Its level of productivity has a significant effect on national economic growth. Productivity indicators are examined. The indicators consist of labour productivity, capital productivity, labour competitiveness, capital intensity and added value content of data, which are obtained from the published census/biannual surveys of construction industry between year 1999 and 2011 from the Department of Statistics of Malaysia. The results indicated that there is an improvement in the labour productivity, but the value added content is declining. Civil engineering and special trade subsectors are more productive than residential and non-residential subsectors in terms of labour productivity because machine-for-labour substitution is a more important process in the sector. The capital intensive of civil engineering and special trade works enable these subsectors to achieve higher added value per labour cost but not the capital productivity. The added value per labour cost is lower in larger organisation despite higher capital productivity. However, the capital intensity is lower and unit labour cost is higher in the larger organisation.



Keywords: productivity, construction industry, gross output, value added, Malaysia.

## Introduction

A country's growth in productivity is important to maintain or increase its international competitiveness and standard of living. It is the key determinant of long-run growth which leads to higher prosperity. The construction industry is an industry of major strategic importance. Its level of productivity has a significant effect on national economic growth. Gains from higher construction productivity flow across the economy, because all industries are reliant on construction to some extent as part of their business investment. There is a unidirectional causality from annual construction growth to annual GDP growth for the long period of 1970 to 2009 in Malaysia (Chia 2012).

In this paper, the data available from various Census/Survey Reports of the Construction Industry between year 1996 and 2009 published by the Department of Statistics Malaysia from year 1999 to 2011 are analysed at the sectoral and sub-sectoral levels. The productivity indicators are benchmarked to year 1996 in order to establish the grounds for the changes according to the types of construction and size of organisations.

This paper is divided into five sections. The first section examines the issue of productivity measurement. The second section provides a brief account of the productivity indicators considered, sources of data and the method of computation used. The third section presents the result from the analysis of the productivity indicators, while the fourth section provides some theoretical perspectives concerning the productivity indicators. The final section concludes the main findings along with their implications.

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## Productivity measurement

Productivity has been defined generally as a ratio of a measure of output to a measure of some or all of the resources used to produce this output (Grimes 2007). There are many different measures of productivity, the choice of which depends on the purpose of the productivity measurement and availability of data. Broadly, productivity measures can be classified as single factor productivity measures or multi-factor productivity measures (OECD 2001). Labour productivity and capital productivity are the two most common examples of single factor productivity measures.

Labour productivity is a partial productivity measure and reflects the joint influence of a host of factors (OECD 2001). It is typically measured as output per person employed or per hour worked. Capital productivity is usually defined as the output of or return on capital invested. Two basic measures of output are gross output and value added output. The former measure includes intermediate inputs (materials, energy and services used in the process of production) while the latter measure excludes those inputs (Cobbold 2003).

The gross output-based productivity measure provides a more complete picture of the production process by including intermediate inputs as a source of industry growth. It reflects a variety of influences, including changes in efficiency, economies of scale, variations in capacity utilisation and measurement error, as well as disembodied technological change (Schreyer 2001).

Increasing or decreasing labour productivity estimates based on gross output may not reflect a change in technology or efficiency, but rather, substitution between labour and intermediate inputs. The gross output-based productivity measures are more sensitive to substitution between factor inputs and intermediate inputs, particularly through outsourcing. Outsourcing leaves gross output little affected, but reduces labour input (Cobbold, 2003). Furthermore, outsourcing activities previously conducted in-house will cause gross output per unit of labour input to increase even though the amount of labour used to produce the output may not have changed (OECD 2001).

In addition, the inclusion of intra-industry flows of intermediate products would involve double counting on both the input and output side of an industry production function. Double counting as output and intermediate inputs tends to obscure the extent of technological change or changes in efficiency taking place in the industry as a whole (Schreyer 2001).

The measurement of output poses problems in relation to changes of quality, particularly in the construction sector. Identifying and capturing changes in the quality of services is difficult in both conceptual and practice. Although some adjustments for quality are captured in the price data used to deflate current price estimates, the difficulties involved are such that the final measure of industry output may not adequately capture all the changes (Pink 2007).

The value-added measure is more meaningful in the presence of outsourcing and is generally favoured for estimating labour productivity (Cobbold 2003). The value-added-based measure excludes intermediate inputs. This is in effect a total measure of productivity, converted into a partial measure by deducting the value of raw materials, bought-out goods and services from both the numerator and the denominator to give a measure of value-added during the production process (Grimes

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2007). By excluding intermediate inputs, value-added based estimates of productivity growth ignore the effect of productivity improvements gained through the more efficient use of intermediate inputs to capital and labour.

Overall, it would appear that gross output and value-added based productivity measures are useful complements. When technical progress affects all factors of production proportionally, the former is a better measure of technical change. Value-added-based productivity measures are more meaningful in the presence of outsourcing and provide an important indication of the productivity improvement in an industry for the economy as a whole. They indicate how much an industry generates extra delivery to final demand per unit of primary inputs. When it comes to labour productivity, value-added based measures are less sensitive to change in the degree of vertical integration than gross output-based measures (Schreyer 2001).

While productivity refers to the physical relationship between inputs and outputs generally, this is not the way it is measured, especially over longer periods of time. Output and the composition of input mix change over time. It is difficult to establish a rate of conversion between labour and capital in order to compare them on equal terms. The solution is to use the price of outputs and inputs. The level of prices is influenced by a nation's economy, the industry's efficiency and the difficulties in its operating environment as perceived by the entrepreneurs involved. These change over time. A high output may simply be a measure of the level of inefficiency or an indication of high prices in general (Ofori 1990).

This method works well where the value of outputs can be measured independently from the value of different inputs. However, in the building industry, there is no obvious way of measuring output independently from the input. Rather the actual value of output has a close relationship with the cost of input. Hence, in the building industry, productivity increases when times are good and profit is up, and decreases when times are bad and profit is low. In the long run, there are very small changes (Runeson 2000).

The construction sector relies on inputs from the manufacturing sector, which has adopted many management improvement techniques to reduce error rates and sub-standard production rejections, such as just-in-time production, computer-aided design and manufacturing. Such improved efficiencies may be able to increase the quality of output without changing the inputs used in the production process.

Productivity can be measured at the industry, project and task levels. The usefulness of any productivity measurement framework for policy-makers and industry practitioners alike depends crucially on the extent to which it enables the identification of the underlying drivers of productivity (Crawford and Vogi 2006). The industry-level productivity measures can be used to determine whether the productivity of the construction industry as a whole is improving or declining over time. Lagging indicators are needed to track industry trends for several years to help identify the root causes of improvement or declination (The National Academy of Sciences 2009). This information is useful in developing industry-wide strategies for the improvement of policies, procedures, practices and research. For example, to track the impact of greater use of prefabricated components, interpretable technologies, and automated equipment (The National Academy of Sciences 2009). The industry-wide would permit comparison of productivity improvements across the countries, in order to identify the superior methodologies and sharing the knowledge whereby those

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measure could be important for the international comparison of performance (The National Academy of Sciences 2009). The two main reasons for comparing productivity at the sectoral level across countries are: there is a need to understand the determinants of long-term trends in international competitiveness and standards of living, and as a response to the resurgence of growth theory and the need to verify the speed of international convergence in per capita income (Malley, Muscatella and Woitek 2003).

## Research methodology

The productivity indicators were computed from the data obtained from two industry censuses (i.e. year 1996 and 2005) and six industry surveys (i.e. year 1998, 2000, 2002, 2004, 2007 and 2009) published by The Department of Statistics, Malaysia (DOSM) in year 1999 and 2011. The Department of Statistics, Malaysia (DOSM) conducts a biennial Construction Industry Survey and quinquennial Census of Construction Industry. The surveys/censuses cover 25 industries in the Construction Sector (based on the Malaysia Standard Industrial Classification, 2000). The respondents are the establishments primarily engaged in construction activities, with a value of construction work of RM500,000 and above. The surveys collect information pertaining to growth, composition and distribution of output, value added, employment and other variables of the sector. The biennial survey was last carried out in year 2010 for reference year 2009.

The Construction Industry Survey and Census of Construction Industry contain data on value of gross output, cost of input, total number of persons engaged, salaries and wages paid and value of assets owned. The statistics are grouped by work state,

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legal status, ownership, output size group, employment size group, assets size group and type of construction. All the values from the surveys/censuses are deflated to year 2000 prices using the Implicit Price Deflators for construction obtained from the National Accounts (DOS 2008, 2009a).

The construction sector comprises two categories namely, general construction and special trade. The general construction category comprises the sub-sectors of residential construction, non-residential construction and civil engineering construction, while the special trade category involves activities such as metal work, electrical, plumbing, sewerage and sanitary, refrigeration and air-conditioning, painting, carpentry, tiling and flooring, and glass (DOS 2011). The number of organisations by construction sub-sectors and employment size group included in the survey and census reports are provided in Tables 1 and 2 respectively.

*Insert Table 1 here.*

*Insert Table 2 here.*

There is substantial different coverage between the censuses (approximately 10,000 firms) and the surveys (approximately 5,000). The major difference is at the level of smaller firms. Post hoc tests consist of pair-wise comparisons will be used to compare all different combinations of the different size groups in order to validate the significance of the results (Morgan, Leech and Gloeckner 2004).

The definitions of productivity indicators computed for this study follow those adopted by Malaysia Productivity Corporation (NPC 2005) which includes:

1. *Labour productivity.* This comprises two indicators

a. *Added value per employee* (Added Value/Number of Employees), reflecting the amount of wealth created by the organisation relative to its number of employees. A high ratio indicates the favourable effects of the labour factor in the wealth creation process.

b. *Total output per employee* (Total output/Number of Employees), measuring the size of output generated by the organisation.

2. *Labour cost competitiveness*. This measures competitiveness in terms of labour cost and indicates the comparability of the industry in producing products or services at the lowest possible labour cost. This comprises three competitiveness ratios

a. *Added value per labour cost* (Added Value/Labour Cost), indicating how competitive the activity is in terms of labour cost. A low ratio indicates high labour cost which does not match with the creation of added value.

b. *Labour cost per employee* (Labour Cost/Number of Employee), measuring the average remuneration per employee. A high ratio indicates high returns to individual workers and *vice-versa*.

c. *Unit labour cost* (Labour Cost/Total output), measuring the relationship between labour cost and total output. A high ratio indicates high labour cost.

3. *Capital productivity* (Added Value/Fixed assets). This indicates the degree of utilisation of tangible fixed assets. A high ratio indicates an efficient utilisation of assets.

4. *Capital intensity* (Fixed assets/Number of Employees). This is the ratio measuring the amount of fixed assets allocated to each employee and is used to determine whether an industry is relatively capital-intensive or labour-intensive. A high ratio indicates high capital intensity while low ratio means dependence on labour-intensive methods.

5. *Added value content* (Added value/Total output x 100). This ratio is used to gauge the degree of utilisation of bought-in materials and services and changes in the price differentials between products and purchases. A high ratio indicates the efficient usage of purchase or favourable price differentials. A low ratio means high cost of bought-in materials and services, poor products quality and low price competition.

This study looks at the industry-level productivity, therefore only the average productivity is considered. Average productivity can be used to gain a perspective on the systematic issue of the industry. Other productivity such as marginal productivity which measures how much output the company gain with one extra unit of input will not be discussed here.

## Results

The labour productivity measure by total output recorded RM151,111 per employee in year 2009, which is 2.2 times the RM69,013 in year 1996 (Tables 3 and 4). However, the labour productivity measure by value added is RM45,452 in year 2009 which is only 1.7 times the RM26,555 in year 1996. Although the capital intensity in year 2009 (RM20,033) is almost twice the size of the value in year 1996 (RM10,049), capital productivity only increased by 14% for the period (from 2.56 in year 1996 to 2.93 in year 2009). However, the deepening of capital investment had resulted in a reduction of the unit labour cost by 14%. On the other hand, annual labour earning had increased from RM15,642 per employee in year 1996 to RM29,892 per employee in year 2009. Nevertheless, the added value per labour cost was reduced by 10% (from 1.70 in year 1996 to 1.52 in year 2009). The overall effect is added value content contracted from 38.48% in year 1996 to 30.08% in year 2009.

*Insert Table 3 here.*

*Insert Table 4 here*

ANOVA was used to compare the productivity indicators across the different construction subsectors and organisational size groups. The results indicate significant differences in the productivity indicators of the construction sub-sectors except the added value content (Table 5). It means the null hypothesis of no difference in all the productivity indicators (other than added value content) between the different construction sub-sectors can be rejected.

*Insert Table 5 here.*

Follow-up tests were conducted to evaluate pair-wise differences among the means. As the Levene's tests for most of the productivity indicators (except the unit labour cost) are not significant, the population variances of all the productivity indicators (other than the unit labour cost), for each group of the subsectors are approximately equal. Tukey test, a common post hoc test to use when variances are equal, was selected for the follow-up comparisons on all the productivity indicators other than the unit labour cost. Games-Howell test which was used for post hoc comparisons when the Levene test indicates that the variances are unequal was selected for the follow-up comparison on the unit labour cost (Table 6).

*Insert Table 6 here.*

Pair-wise comparisons of significantly different items are presented in Table 7. With respect to the labour productivity measured both in total output and added value, capital productivity, capital intensity and added value per labour cost, significant differences were found between the civil engineering and residential sub-sectors as well as between the civil engineering and non-residential subsectors. In addition, significant differences in capital productivity and capital intensity exist between the special trades and residential sub-sectors and also special trades and non-residential subsectors. The significant difference of unit labour cost occurs between the civil engineering and non-residential subsectors only (Table 7).

*Insert Table 7 here.*

The average labour productivity measured in terms of gross output of the civil engineering subsector (RM97,216) is higher than the residential subsector (RM79,414) and non-residential sub-sector (RM78,500) as shown Table 5. Similarly, the average labour productivity measured in the value added of the civil engineering subsector (RM34,073) is higher than the residential subsector (RM27,582) and non-residential subsector (RM27, 268) (Table 5). However, the capital productivity of both residential (2.94) and non residential (2.84) subsectors is greater than the civil engineering subsector (2.04), despite a much higher level of capital investment (RM16,913) in the civil engineering subsector than in the residential (RM9,409) and non-residential (RM9,721) subsectors. Nevertheless, the civil engineering subsector still achieved a higher added value per labour cost (1.75) than the residential (1.52) and non-residential (1.55) subsectors.

The capital productivity of both residential (2.94) and non residential (2.84) subsectors are higher than the special trades subsector (2.06) despite a much greater level of capital investment (RM15,277) in the special trade subsector than the residential (RM9,409) and non-residential (RM9,721) subsectors (Table 5).

Finally, the unit labour cost of civil engineering (0.20) and non-residential subsectors (0.23) (Table 5) are significantly different.

All the productivity indicators (except added value content) are significantly different between organisation sizes. Table 8 shows that the labour productivity in smaller size organisation is higher than the larger organisation. However, larger organisations are more capital productive than smaller ones. The capital intensity of smaller organisations is higher. Nevertheless, employees still earned more in the larger organisations. The unit labour cost is higher in the larger organisations. As a result, the added value per labour cost is higher in the smaller size organisations.

*Insert Table 8 here.*

Follow-up tests were conducted to evaluate pair-wise differences among the productivity indicators according to the organisation size. As the Levene's tests are significant for all the productivity indicators, equal variances were not assumed among the four groupings (Table 9). Hence, Games-Howell tests were used for post hoc comparisons.

*Insert Table 9 here.*

Pair-wise comparisons of significantly different items are presented in Table 10. The labour productivity and organisation size were not significantly different. However, capital productivity, capital intensity, added value per labour cost, labour cost per employee and unit labour cost were significantly different between the large and medium, large and small, large and micro, and medium and small organisations. The added value per labour cost and unit labour cost between medium and micro, as well as small and micro size organisations were significantly different. The labour cost per employee between medium and micro size establishment were also significantly different (Table 10).

*Insert Table 10 here.*

## Discussion

From the end of the 1980s to the end of the 1990s, the Malaysian economy was driven by the implementation of mega building and infrastructure expansion projects, such as the RM3.42 billion, 494 kilometres North-South Highway, the RM9 billion, Kuala Lumpur International Airport, the RM740 million, 13.5 kilometres Penang Bridge, the RM20.1 billion, Putrajaya administrative capital and the RM6 billion, Petronas Twin Tower. Most of the large infrastructure projects were already completed by the turn of the millennium.

The Construction Industry Surveys/Census over the period of 1996 to 2009 shows that construction labour productivity first peaked in year 2004. It subsequently declined in year 2005 and 2007 before it gained recovery in year 2009. This is partly attributed to the reduction of construction employment as a result of the measures to control the influx of illegal foreign workers under the Amnesty Programme in 2004 (BNM 2006). By the end of year 2009, capital intensity doubled the value in year 1996 (Tables 3 and 4). However, there is a declining trend of added value content; the added value content in year 2009 being only 78% of what had been achieved in year 1996, reflecting the high cost of bought-in services or materials. The price of steel bars increased three times in year 2006 by a total of 45% and the price of cement was revised at end-2006.

The civil engineering sub-sector is more productive in terms of labour productivity and is also more capital intensive than the residential and non-residential sub-sectors. Machine-for-labour substitution has been a more important process in civil engineering. However, it is less competitive in capital productivity than the residential and non-residential construction sub-sectors. The rise of capital intensity (60.3%) of the civil engineering sub-sector between year 1996 and 2009 was faster than the growth of capital productivity (27.2%), which implies that there is room for better utilisation of capital assets in the civil engineering sub-sector. In addition, the labour productivity of civil engineering recorded a 93% improvement when measured as gross output compared with 53% when measured as value added (Appendix 1). This is a typical example explained by Runeson (2000) where "most of process-changes are not considered productivity improvements in the building industry but are classified as part of the manufacturing industries". It is due to the peculiarities of the standard industrial classification (SIC) as the substitution of labour with capital causes a substantial increase in unaccounted labour requirement on-site.

The residential sub-sector had the greatest improvement in labour productivity (Tables 3 and 4). The labour saving Industrialised Building System (IBS), which encourages greater automation and mechanisation, was introduced into the residential sub-sector, with the government pledging to use it to construct 100,000 units of affordable houses in its 2005 Budget and all new government building projects were required to have at least 50% of IBS content (CIDB 2007). The exemption of construction levy on contractors using IBS is 50% of the building components was announced in year 2007. Consequently, capital investment intensified by 143.5% from year 1996 to 2009, unit labour cost substantially reduced by 23.9% and capital productivity increased by 10.5%. However, the added value per labour cost only improves marginally by 0.1% (Tables 3 and 4). Similarly, of the four sub-sectors, the added value content of this sub-sector encountered the most severe contraction of 25.8%. This is mainly due to the high cost of bought-in off-site manufactured components.

The special trades subsector is the second most capital intense subsector after civil engineering. The capital intensity of the special trades subsector was approximately 1.6 times that of the residential or non-residential subsector, but with capital productivity of only 0.7 times the two sub-sectors. The capital intensity has been grown by 188.5% from year 1996 to 2009, but its capital productivity declined by 13.5%. This subsector consists of a large variety of trades ranging from labour intensive activities, such as painting and decorating, to capital intensive activities such as renting of construction equipment. In addition, it also includes such trades as 'heating, ventilation, air-conditioning and refrigeration work', which form the bulk of the contract sum. The increased technical sophistication demands of construction products and the construction processes will continuously drive the demand for the highly specialised nature of much of the work. The sector recorded the second highest output per employee (RM91,864) among the sub-sectors and 123.1% improvement from year 1996 to 2009, but the added value content showed a relatively slower growth of 87.77%. With 188.5% and 110.8% respectively, the capital intensity and labour cost per employee of the special trades sub-sector shows the greatest improvement (Table 4).

The results of pair-wise comparisons of labour productivity according to the organisation sizes are not statistically significant. The capital productivity of the larger size organisations, however, was higher than that of smaller size organisations. This reflects a more efficient utilisation of capital by the larger organisations. Larger firms are likely to be more technological advanced, systematically managed, gain the advantages of specialisation and of risk-spreading by diversification to obtain technical and managerial economies of scale in a number of markets (such as residential and civil engineering) at the same time (Hillebrandt 2000). The labour cost per employee of the larger size organisations was higher than that of the smaller size organisations. This is consistent with Gruneberg and Ive’s (2000) notion of an implied bargain that workers in larger firms will work with above average intensity in return for above average wages. The larger firms are able to achieve higher work intensity, or greater non-capital-embodied efficiency and appear to enjoy much higher levels of productivity (Gruneberg and Ive 2000).

The argument of Gruneberg and Ive implies that higher productivity is expected in the larger organisation. In addition, the finding of unit labour cost in the larger size organisations did not decrease, contradicts the common belief that large companies move on a decreasing cost curve over time and through different technologies. It is because the firm may face a rising long-run average cost curve in that some inputs cannot be increased except at a higher price. If the firm has a large share of the market, the ability to purchase supplies of materials in bulk might offset any increases due to other factors such as purchases from the sources further a field or from more expensive operations when demand is large. When a firm becomes big, it tends to be less flexible due to its increased bureaucracy, encouraging inertia and resistance to change (Chau *et al.* 2005). A firm operating in a limited geographical area may well find out that, to substantially increase its turnover involves extending its catchments' area, and hence its costs of transport and supervision as travelling time increases. Similarly, the geographical spread of demand for projects may not coincide with the availability of manpower, either because of increased transport costs or because of the bargaining power of the operatives (Hillebrandt 2000). Company politics and the indivisible nature of 'entrepreneurial ability' – that the decision-making process gets clogged (Hillebrandt 2000) are often counterproductive - are likely to be proportionate to the size of the firm (Chau *et al.* 2005). In addition, the construction industry is very management intensive compared to manufacturing industry. There are many layers of management involved even on a fairly small residential project which may only be noticed in large factories where there are routines for most of the process. As a result, diseconomies of scale are more likely to happen in the construction industry.

Additionally, the free-enterprise spirit and no-nonsense approach to do business is inherent in small firms. Small businesses have a natural tendency towards diversity and flexibility (Beck and Demirguc-Kunt 2004). Consequently, smaller size organisations are able to achieve higher added value with the same unit of labour cost.

## Conclusion

The survey/census data between year 1996 and 2009 points to a trend of continuous declination in the value added content of the Malaysian construction sector, although there was an improvement in capital investment - mainly from the civil engineering and special trade sub-sectors, and smaller size organisations. Machine-for-labour substitution has been a more important process in civil engineering. The adoption of IBS encourages greater automation and mechanisation, and significant reduction in the unit labour cost. There is an increase in the earnings of construction workers. The increasing utilisation of intermediate inputs prefabricated off-site is evidenced with lower labour productivity measured in added value compare with those measured in gross output. The situation of declination in added value per labour cost could be reversed if there is an improvement of capital productivity, which requires further enhancement of capital utilisation and management of capital asset.

The special trades subsector and smaller size organisations that operate as subcontractors most of the time have significant higher capital intensity in comparison with other subsectors. Large organisations generally resort to a greater use of subcontractors to reduce the overhead burden. The need for firms to be flexible in terms of volume of trade has also resulted in work practices that rely on a major part of their work being done through subcontracting. The increased technical sophistication demands of construction industry will continuously drive the demand for the highly specialised works. The special trade subsector is expected to expand,

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however, there is a need~~s~~ to enhance the capital productivity. The very nature of small firms and the employment of flexible workforce enable them to achieve higher added value per labour cost.

Malaysia has since launched its Economic Transformation Programme (ETP) in year 2010 which is expected to provide a boost of 30% to 50% towards the volume of construction work over the next decade. This will provide an opportunity for the construction sector to adopt productivity enhancing technologies and methods of construction to improve its competitiveness in the future by optimising resource utilisation, adopting good practices along with advanced construction techniques.

The industry-level statistics and measures are lagging indicators that are not very much time sensitive, therefore the value of this study to individual project owners and contractors is limited. However, the findings would serve as a good reference to the policy makers, government agencies and researchers in understanding the success or failure of the industries, improvements and inefficiencies of the past policies.

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Table 1 Number of organisations by construction sub-sectors

| **Establishment** | **1996** | **1998** | **2000** | **2002** | **2004** | **2005** | **2007** | **2009** |
|---|---|---|---|---|---|---|---|---|
| Civil Engineering | 3,538 | 1,511 | 1,487 | 1,238 | 1,374 | 3,613 | 1,738 | 1,474 |
| Non-residential | 1,897 | 972 | 1,073 | 978 | 814 | 1,624 | 874 | 1,218 |
| Residential | 2,246 | 1,024 | 975 | 853 | 904 | 1,725 | 1,091 | 1,088 |
| Special Trade | 3,074 | 1,661 | 1,533 | 1,259 | 1,358 | 3,385 | 1,840 | 1,984 |
| Total | 10,755 | 5,168 | 5,068 | 4,328 | 4,450 | 10,347 | 5,543 | 5,764 |

Source: Various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 2 Number of organisations by employment size group

<table>
<tr><th>Establishment</th><th>1996</th><th>1998</th><th>2000</th><th>2002</th><th>2004</th><th>2005</th><th>2007</th><th>2009</th></tr>
<tr><td>Less than 5</td><td>2,084</td><td>100</td><td>73</td><td>42</td><td>102</td><td>1,559</td><td>154</td><td>158</td></tr>
<tr><td>5-9</td><td>2,222</td><td>417</td><td>426</td><td>256</td><td>343</td><td>2,395</td><td>598</td><td>535</td></tr>
<tr><td>10-19</td><td>1,952</td><td>977</td><td>1,023</td><td>704</td><td>778</td><td>2,238</td><td>1,138</td><td>1,150</td></tr>
<tr><td>20-29</td><td>950</td><td>669</td><td>647</td><td>577</td><td>566</td><td>965</td><td>719</td><td rowspan="2">1,708</td></tr>
<tr><td>30-49</td><td>1,038</td><td>830</td><td>867</td><td>749</td><td>715</td><td>1,047</td><td>869</td></tr>
<tr><td>50-99</td><td>1,138</td><td>886</td><td>928</td><td>865</td><td>853</td><td>968</td><td>877</td><td rowspan="3">1,581</td></tr>
<tr><td>100-149</td><td rowspan="2">704</td><td rowspan="2">655</td><td>422</td><td>392</td><td>392</td><td>388</td><td>359</td></tr>
<tr><td>150-199</td><td>204</td><td>214</td><td>195</td><td>233</td><td>203</td></tr>
<tr><td>200-499</td><td>473</td><td>448</td><td>361</td><td>399</td><td>371</td><td>392</td><td>414</td><td>410</td></tr>
<tr><td>500-999</td><td>126</td><td>121</td><td>81</td><td>89</td><td>102</td><td>116</td><td>140</td><td rowspan="2">222</td></tr>
<tr><td>More than 1,000</td><td>68</td><td>65</td><td>36</td><td>41</td><td>33</td><td>46</td><td>72</td></tr>
<tr><td>Total</td><td>10,755</td><td>5,168</td><td>5,068</td><td>4,328</td><td>4,450</td><td>10,347</td><td>5,543</td><td>5,764</td></tr>
</table>

Source: Various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 3 Productivity indicators of the Malaysian construction sector 1996-2009 at constant 2000 prices

| **Productivity Indicators** | **1996** | **1998** | **2000** | **2002** | **2004** | **2005** | **2007** | **2009** |
|---|---|---|---|---|---|---|---|---|
| Total output per employee | 69,013 | 73,338 | 86,947 | 90,764 | 105,805 | 104,643 | 117,322 | 151,111 |
| Added value per employee | 26,555 | 28,318 | 31,820 | 32,089 | 36,372 | 36,840 | 34,972 | 45,452 |
| Added value per labour cost | 1.70 | 1.61 | 1.67 | 1.62 | 1.69 | 1.75 | 1.40 | 1.52 |
| Labour cost per employee | 15,642 | 17,642 | 19,020 | 19,789 | 21,461 | 21,075 | 25,037 | 29,895 |
| Unit labour cost | 0.227 | 0.241 | 0.219 | 0.218 | 0.203 | 0.201 | 0.213 | 0.198 |
| Capital productivity | 2.56 | 2.19 | 2.18 | 2.38 | 2.47 | 2.72 | 2.48 | 2.93 |
| Capital intensity | 10,049 | 12,982 | 14,585 | 13,367 | 15,310 | 14,518 | 16,222 | 20,033 |
| Added value content | 38.48 | 38.61 | 36.60 | 35.35 | 34.38 | 35.21 | 29.81 | 30.08 |

Source: Computed from various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 4 Productivity indicators of the Malaysian construction sector 1996-2009 at constant 2000 prices

| Productivity Indicators | 1996 | 1998 | 2000 | 2002 | 2004 | 2005 | 2007 | 2009 |
|---|---|---|---|---|---|---|---|---|
| Total output per employee | 100.0 | 106.3 | 126.0 | 131.5 | 153.3 | 151.6 | 170.0 | 219.0 |
| Added value per employee | 100.0 | 106.6 | 119.8 | 120.8 | 137.0 | 138.7 | 131.7 | 171.2 |
| Added value per labour cost | 100.0 | 94.5 | 98.5 | 95.5 | 99.8 | 103.0 | 82.3 | 89.6 |
| Labour cost per employee | 100.0 | 112.8 | 121.6 | 126.5 | 137.2 | 134.7 | 160.1 | 191.1 |
| Unit labour cost | 100.0 | 106.1 | 96.5 | 96.2 | 89.5 | 88.9 | 94.2 | 87.3 |
| Capital productivity | 100.0 | 85.5 | 85.1 | 92.7 | 96.4 | 105.9 | 96.7 | 114.2 |
| Capital intensity | 100.0 | 129.2 | 145.1 | 133.0 | 152.4 | 144.5 | 161.4 | 199.4 |
| Added value content | 100.0 | 100.3 | 95.1 | 91.9 | 89.3 | 91.5 | 77.5 | 78.2 |

Source: Computed from various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 5 Mean and One-way ANOVA F Test Statistic (F Ratio) of productivity indicators of construction sub-sectors by types of work, 1996-2009 at 2000 prices

| **Productivity Indicators** | **Civil engineering works** | **Non-residential works** | **Residential works** | **Special trades works** | **F** | **Sig.** |
|---|---|---|---|---|---|---|
| Added value per employee | 34,073 | 27,268 | 27,582 | 30,946 | 7.34 | 0.001 |
| Total output per employee | 97,216 | 78,501 | 79,415 | 91,864 | 6.10 | 0.003 |
| Added value per labour cost | 1.75 | 1.55 | 1.52 | 1.61 | 5.23 | 0.005 |
| Labour cost per employee | 19,462 | 17,591 | 18,100 | 19,236 | 3.12 | 0.042 |
| Unit labour cost | 0.20 | 0.23 | 0.23 | 0.21 | 4.85 | 0.008 |
| Capital productivity | 2.04 | 2.84 | 2.94 | 2.06 | 22.35 | 0.000 |
| Capital intensity | 16,914 | 9,721 | 9,409 | 15,277 | 29.51 | 0.000 |
| Added value content | 35.09 | 35.00 | 35.23 | 33.78 | 0.29 | 0.830 |

Source: Computed from various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 6 Tests of homogeneity of variance of the productivity indicators of construction sub-sectors by types of work, 1996-2009 in 2000 price

| **Productivity Indicators** | **Levene Statistic** | **df1** | **df2** | **Sig.** |
|---|---|---|---|---|
| Added value per employee | 2.621 | 3 | 28 | .070 |
| Total output per employee | 0.953 | 3 | 28 | .429 |
| Capital productivity | 0.595 | 3 | 28 | .623 |
| Capital intensity | 2.064 | 3 | 28 | .128 |
| Added value per labour cost | 0.133 | 3 | 28 | .940 |
| Wages per employee | 1.453 | 3 | 28 | .249 |
| Unit labour cost | 4.589 | 3 | 28 | .010 |
| Added value content | 0.567 | 3 | 28 | .641 |

Table 7 Selected results of multiple comparisons of productivity indicators of construction sub-sectors by types of work, 1996-2009 at 2000 prices

| Dependent Variable | (I) Types of works | (J) Types of works | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|---|
| Added value per employee | Civil engineering works | Non-Residential works | 6805* | 1672 | .002 |
| Added value per employee | Civil engineering works | Residential works | 6491* | 1672 | .003 |
| Total output per employee | Civil engineering works | Non-Residential works | 18715* | 5307 | .008 |
| Total output per employee | Civil engineering works | Residential works | 17801* | 5307 | .012 |
| Capital productivity | Non-Residential works | Civil engineering works | .81* | .15 | .000 |
| Capital productivity | Residential works | Civil engineering works | .91* | .15 | .000 |
| Capital productivity | Non-Residential works | Special trades works | .79* | .15 | .000 |
| Capital productivity | Residential works | Special trades works | .88* | .15 | .000 |
| Capital intensity | Civil engineering works | Non-Residential works | 7193* | 997 | .000 |
| Capital intensity | Civil engineering works | Residential works | 7505* | 997 | .000 |
| Capital intensity | Special trades works | Non-Residential works | 5556* | 997 | .000 |
| Capital intensity | Special trades works | Residential works | 5868* | 997 | .000 |
| Added value per labour cost | Civil engineering works | Non-residential works | .20* | .06 | .017 |
| Added value per labour cost | Civil engineering works | Residential works | .23* | .07 | .006 |
| Unit labour cost | Civil engineering works | Non-Residential works | -.02# | .01 | .012 |

* The mean difference is significant at the .05 level using Tukey's HSD test.
# The mean difference is significant at the .05 level using the Games-Howell test.

Table 8 Mean and One-way ANOVA F Test Statistic (F Ratio) of productivity indicators of construction sub-sectors by size of organisation, 1996-2009 at 2000 prices

| Productivity Indicators | Micro | Small | Medium | Large | F | Sig. |
|---|---|---|---|---|---|---|
| Added value per employee | 36,020 | 29,624 | 29,694 | 31,116 | 2.828 | .044 |
| Total output per employee | 122,692 | 94,961 | 85,467 | 88,767 | 4.472 | .006 |
| Added value per labour cost | 2.93 | 2.01 | 1.73 | 1.56 | 53.046 | .000 |
| Labour cost per employee | 12,337 | 14,756 | 17,165 | 19,960 | 30.023 | .000 |
| Unit labour cost | 0.12 | 0.16 | 0.20 | 0.23 | 57.099 | .000 |
| Capital productivity | 0.95 | 1.28 | 1.83 | 3.06 | 33.558 | .000 |
| Capital intensity | 54,575 | 23,971 | 16,227 | 10,377 | 31.643 | .000 |
| Added value content | 33.04 | 32.44 | 35.09 | 35.22 | 1.727 | .168 |

Source: Computed from various issues of Census/Survey of Construction Industry (DOS 1999, 2000, 2002, 2004, 2006, 2007, 2009b, 2011)

Table 9 Tests of homogeneity of variance of productivity indicators of construction sub-sectors by size of organisation, 1996-2009 at 2000 prices

| Productivity Indicators | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|
| Added value per employee | 10.854 | 3 | 78 | .000 |
| Total output per employee | 17.169 | 3 | 78 | .000 |
| Capital productivity | 5.821 | 3 | 78 | .001 |
| Capital intensity | 87.221 | 3 | 78 | .000 |
| Added value per labour cost | 29.385 | 3 | 78 | .000 |
| Wages per employee | 5.005 | 3 | 78 | .003 |
| Unit labour cost | 4.893 | 3 | 78 | .004 |
| Added value content | 8.763 | 3 | 78 | .000 |

Table 10 Selected results of multiple comparisons of productivity indicators of construction sub-sectors by size of organisation 1996-2009 at 2000 prices

| Dependent Variable | (I) Size of organization | (J) Size of organization | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|---|
| Capital productivity | Medium | Small | .55# | .12 | .000 |
| Capital productivity | Large | Micro | 2.11# | .35 | .000 |
| Capital productivity | Large | Small | 1.79# | .23 | .000 |
| Capital productivity | Large | Medium | 1.24# | .22 | .000 |
| Capital intensity | Micro | Large | 44,197.40# | 12,133.71 | .033 |
| Capital intensity | Small | Medium | 7,744.23# | 2,417.15 | .024 |
| Capital intensity | Small | Large | 13,594.03# | 2,386.16 | .000 |
| Capital intensity | Medium | Large | 5,849.80# | 877.02 | .000 |
| Added value per labour cost | Micro | Small | .92# | .21 | .012 |
| Added value per labour cost | Micro | Medium | 1.20# | .21 | .003 |
| Added value per labour cost | Micro | Large | 1.37# | .21 | .001 |
| Added value per labour cost | Small | Medium | .28# | .04 | .000 |
| Added value per labour cost | Small | Large | .45# | .05 | .000 |
| Added value per labour cost | Medium | Large | .17# | .04 | .000 |
| Labour cost per employee | Medium | Micro | 4,828.11# | 1,216.19 | .018 |
| Labour cost per employee | Medium | Small | 2,408.42# | 839.61 | .044 |
| Labour cost per employee | Large | Micro | 7,623.51# | 1,228.92 | .001 |
| Labour cost per employee | Large | Small | 5,203.82# | 857.95 | .000 |
| Labour cost per employee | Large | Medium | 2,795.40# | 462.58 | .000 |
| Unit labour cost | Small | Micro | .05# | .01 | .025 |
| Unit labour cost | Medium | Micro | .09# | .01 | .000 |
| Unit labour cost | Medium | Small | .04# | .01 | .000 |
| Unit labour cost | Large | Micro | .11# | .01 | .000 |
| Unit labour cost | Large | Small | .06# | .01 | .000 |
| Unit labour cost | Large | Medium | .02# | .01 | .000 |

* The mean difference is significant at the .05 level using Tukey's HSD test.
#The mean difference is significant at the .05 level using the Games-Howell test.

Appendix1 Productivity indicators and productivity index (1996=100) according to construction subsectors of 1996-2009 at constant 2000 prices

| | 1996 | 1998 | 2000 | 2002 | 2004 | 2005 | 2007 | 2009 |
|---|---|---|---|---|---|---|---|---|
| **Civil Engineering** | | | | | | | | |
| Total output per employee | 82,054 | 86,199 | 103,409 | 107,529 | 118,013 | 106,957 | 122,171 | 156,924 |
| Added value per employee | 31,873 | 33,129 | 38,944 | 37,512 | 40,166 | 37,817 | 37,105 | 48,849 |
| Added value per labour cost | 1.86 | 1.75 | 1.90 | 1.74 | 1.81 | 1.81 | 1.45 | 1.65 |
| Labour cost per employee | 17,138 | 18,968 | 20,478 | 21,527 | 22,158 | 20,931 | 25,507 | 29,609 |
| Unit labour cost | 0.2089 | 0.2200 | 0.1980 | 0.2002 | 0.1878 | 0.1957 | 0.2088 | 0.1887 |
| Capital productivity | 2.23 | 1.80 | 1.78 | 2.27 | 2.12 | 2.29 | 1.99 | 2.84 |
| Capital intensity | 13,852 | 18,447 | 21,940 | 16,335 | 19,667 | 17,704 | 21,494 | 22,206 |
| Added value content | 38.84 | 38.43 | 37.66 | 34.89 | 34.04 | 35.36 | 30.37 | 31.13 |
| **Non-residential** | | | | | | | | |
| Total output per employee | 64,059 | 67,119 | 76,613 | 73,466 | 93,689 | 95,462 | 108,232 | 147,637 |
| Added value per employee | 24,612 | 26,214 | 28,034 | 26,982 | 31,928 | 34,938 | 32,113 | 42,662 |
| Added value per labour cost | 1.62 | 1.56 | 1.63 | 1.55 | 1.59 | 1.66 | 1.35 | 1.43 |
| Labour cost per employee | 15,158 | 16,795 | 17,217 | 17,402 | 20,137 | 21,051 | 23,718 | 29,735 |
| Unit labour cost | 0.2366 | 0.2502 | 0.2247 | 0.2369 | 0.2149 | 0.2205 | 0.2191 | 0.2014 |
| Capital productivity | 2.87 | 2.81 | 2.96 | 2.37 | 2.61 | 3.43 | 3.87 | 3.30 |
| Capital intensity | 8,329 | 9,373 | 9,480 | 11,250 | 12,720 | 10,901 | 9,539 | 16,658 |
| Added value content | 38.42 | 39.06 | 36.59 | 36.73 | 34.08 | 36.60 | 29.67 | 28.90 |
| **Residential** | | | | | | | | |
| Total output per employee | 54,060 | 60,263 | 75,397 | 81,715 | 98,420 | 104,258 | 115,243 | 147,424 |
| Added value per employee | 21,943 | 24,394 | 27,019 | 29,132 | 35,042 | 35,572 | 33,739 | 44,396 |
| Added value per labour cost | 1.51 | 1.46 | 1.46 | 1.52 | 1.66 | 1.69 | 1.34 | 1.52 |
| Labour cost per employee | 14,488 | 16,745 | 18,547 | 19,140 | 21,131 | 21,030 | 25,098 | 29,293 |
| Unit labour cost | 0.2680 | 0.2779 | 0.2460 | 0.2342 | 0.2147 | 0.2017 | 0.2178 | 0.1987 |
| Capital productivity | 3.19 | 2.62 | 2.71 | 3.00 | 3.36 | 3.45 | 3.08 | 3.52 |
| Capital intensity | 6,676 | 9,364 | 9,979 | 9,608 | 10,832 | 11,040 | 12,591 | 16,260 |
| Added value content | 40.59 | 40.48 | 35.84 | 35.65 | 35.60 | 34.12 | 29.28 | 30.11 |
| **Special Trade** | | | | | | | | |
| Total output per employee | 68,485 | 76,689 | 91,949 | 102,975 | 112,025 | 112,350 | 123,287 | 152,774 |
| Added value per employee | 24,562 | 27,992 | 32,471 | 35,133 | 37,727 | 39,337 | 36,515 | 46,091 |
| Added value per labour cost | 1.66 | 1.58 | 1.61 | 1.62 | 1.66 | 1.83 | 1.41 | 1.47 |
| Labour cost per employee | 14,826 | 17,718 | 20,165 | 21,677 | 22,677 | 21,451 | 25,835 | 31,254 |
| Unit labour cost | 0.2165 | 0.2310 | 0.2193 | 0.2105 | 0.2024 | 0.1909 | 0.2095 | 0.2046 |
| Capital productivity | 2.59 | 2.11 | 1.93 | 1.96 | 2.19 | 2.29 | 2.06 | 2.24 |
| Capital intensity | 9,196 | 13,357 | 16,809 | 17,777 | 17,918 | 18,395 | 20,343 | 26,535 |
| Added value content | 35.86 | 36.50 | 35.31 | 34.12 | 33.68 | 35.01 | 29.62 | 30.17 |
| **Indices of Productivity Indicators (1996=100)** | | | | | | | | |
| **Civil Engineering** | | | | | | | | |
| Total output per employee | *100.0* | *105.1* | *126.0* | *131.0* | *143.8* | *130.3* | *148.9* | *191.2* |
| Added value per employee | *100.0* | *103.9* | *122.2* | *117.7* | *126.0* | *118.6* | *116.4* | *153.3* |
| Added value per labour cost | *100.0* | *93.9* | *102.3* | *93.7* | *97.5* | *97.1* | *78.2* | *88.7* |
| Labour cost per employee | *100.0* | *110.7* | *119.5* | *125.6* | *129.3* | *122.1* | *148.8* | *172.8* |
| Unit labour cost | *100.0* | *105.4* | *94.8* | *95.8* | *89.9* | *93.7* | *100.0* | *90.3* |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Capital productivity | *100.0* | *80.9* | *79.5* | *101.9* | *95.2* | *102.4* | *89.0* | *127.2* |
| Capital intensity | *100.0* | *133.2* | *158.4* | *117.9* | *142.0* | *127.8* | *155.2* | *160.3* |
| Added value content | *100.0* | *98.9* | *97.0* | *89.8* | *87.6* | *91.0* | *78.2* | *80.1* |
| **Non-residential** | | | | | | | | |
| Total output per employee | *100.0* | *104.8* | *119.6* | *114.7* | *146.3* | *149.0* | *169.0* | *230.5* |
| Added value per employee | *100.0* | *106.5* | *113.9* | *109.6* | *129.7* | *142.0* | *130.5* | *173.3* |
| Added value per labour cost | *100.0* | *96.1* | *100.3* | *95.5* | *97.7* | *102.2* | *83.4* | *88.4* |
| Labour cost per employee | *100.0* | *110.8* | *113.6* | *114.8* | *132.8* | *138.9* | *156.5* | *196.2* |
| Unit labour cost | *100.0* | *105.7* | *95.0* | *100.1* | *90.8* | *93.2* | *92.6* | *85.1* |
| Capital productivity | *100.0* | *98.1* | *103.2* | *82.9* | *91.1* | *119.7* | *135.1* | *115.3* |
| Capital intensity | *100.0* | *112.5* | *113.8* | *135.1* | *152.7* | *130.9* | *114.5* | *200.0* |
| Added value content | *100.0* | *101.7* | *95.2* | *95.6* | *88.7* | *95.3* | *77.2* | *75.2* |
| **Residential** | | | | | | | | |
| Total output per employee | *100.0* | *111.5* | *139.5* | *151.2* | *182.1* | *192.9* | *213.2* | *272.7* |
| Added value per employee | *100.0* | *111.2* | *123.1* | *132.8* | *159.7* | *162.1* | *153.8* | *202.3* |
| Added value per labour cost | *100.0* | *96.2* | *96.2* | *100.5* | *109.5* | *111.7* | *88.8* | *100.1* |
| Labour cost per employee | *100.0* | *115.6* | *128.0* | *132.1* | *145.8* | *145.2* | *173.2* | *202.2* |
| Unit labour cost | *100.0* | *103.7* | *91.8* | *87.4* | *80.1* | *75.3* | *81.3* | *74.1* |
| Capital productivity | *100.0* | *82.1* | *84.9* | *94.2* | *105.5* | *108.2* | *96.7* | *110.5* |
| Capital intensity | *100.0* | *140.3* | *149.5* | *143.9* | *162.2* | *165.4* | *188.6* | *243.5* |
| Added value content | *100.0* | *99.7* | *88.3* | *87.8* | *87.7* | *84.1* | *72.1* | *74.2* |
| **Special Trade** | | | | | | | | |
| Total output per employee | *100.0* | *112.0* | *134.3* | *150.4* | *163.6* | *164.1* | *180.0* | *223.1* |
| Added value per employee | *100.0* | *114.0* | *132.2* | *143.0* | *153.6* | *160.2* | *148.7* | *187.7* |
| Added value per labour cost | *100.0* | *95.4* | *97.2* | *97.8* | *100.4* | *110.7* | *85.3* | *89.0* |
| Labour cost per employee | *100.0* | *119.5* | *136.0* | *146.2* | *152.9* | *144.7* | *174.2* | *210.8* |
| Unit labour cost | *100.0* | *106.7* | *101.3* | *97.2* | *93.5* | *88.2* | *96.8* | *94.5* |
| Capital productivity | *100.0* | *81.3* | *74.6* | *75.5* | *84.5* | *88.3* | *79.7* | *86.5* |
| Capital intensity | *100.0* | *145.2* | *182.8* | *193.3* | *194.8* | *200.0* | *221.2* | *288.5* |
| Added value content | *100.0* | *101.8* | *98.5* | *95.1* | *93.9* | *97.6* | *82.6* | *84.1* |

Source: Computed from Malaysia Construction Industry Census 1996 and 2005 and Malaysia Construction Industry Survey 1998, 2000, 2002, 2007 and 2009.

Appendix 2 Productivity indicators and productivity index (1996=100) according to establishment sizes of 1996-2009 at constant 2000 prices

| | 1996 | 1998 | 2000 | 2002 | 2004 | 2005 | 2007 | 2009 |
|---|---|---|---|---|---|---|---|---|
| **Micro** | | | | | | | | |
| Total output per employee | 49,048 | 78,454, | 137,394 | 152,411 | 249,632 | 50,227 | 112,890 | 151,482 |
| Added value per employee | 26,680 | 28,480 | 38,749 | 41,622 | 59,146 | 19,539 | 29,784 | 44,160 |
| Added value per labour cost | 3.65 | 2.65 | 2.68 | 3.20 | 3.55 | 2.41 | 1.98 | 3.30 |
| Labour cost per employee | 7,305 | 10,749 | 14,470 | 13,010 | 16,642 | 8,100 | 15,037 | 13,381 |
| Unit labour cost | 0.15 | 0.14 | 0.11 | 0.09 | 0.07 | 0.16 | 0.13 | 0.09 |
| Capital productivity | 2.86 | 0.64 | 0.48 | 0.52 | 0.60 | 1.17 | 0.96 | 0.41 |
| Capital intensity | 9,631 | 44,373 | 81,542 | 80,278 | 94,984 | 15,669 | 27,057 | 83,064 |
| Added value content | 54.40 | 36.30 | 28.20 | 27.31 | 23.69 | 38.90 | 26.38 | 29.15 |
| **Small** | | | | | | | | |
| Total output per employee | 94,264 | 134,517 | 192,910 | 226,118 | 285,147 | 145,242 | 221,901 | 219,998 |
| Added value per employee | 37,260 | 49,209 | 64,324 | 72,338 | 79,135 | 50,784 | 61,730 | 59,202 |
| Added value per labour cost | 4.05 | 3.92 | 4.10 | 3.98 | 4.46 | 4.11 | 3.70 | 3.83 |
| Labour cost per employee | 18,505 | 25,202 | 31,530 | 36,366 | 35,464 | 24,834 | 33,315 | 30,886 |
| Unit labour cost | 0.39 | 0.37 | 0.33 | 0.32 | 0.25 | 0.34 | 0.31 | 0.28 |
| Capital productivity | 4.28 | 2.28 | 2.38 | 2.27 | 2.25 | 2.66 | 2.17 | 2.11 |
| Capital intensity | 17,968 | 44,680 | 54,280 | 65,529 | 71,159 | 35,666 | 50,130 | 44,131 |
| Added value content | 79.26 | 83.18 | 66.96 | 64.01 | 55.72 | 70.00 | 56.07 | 53.84 |
| **Medium** | | | | | | | | |
| Total output per employee | 245,143 | 266,579 | 407,753 | 451,149 | 518,879 | 460,068 | 435,032 | 206,738 |
| Added value per employee | 94,312 | 102,857 | 150,991 | 161,177 | 174,280 | 160,035 | 135,322 | 60,318 |
| Added value per labour cost | 6.73 | 6.69 | 8.70 | 8.62 | 9.27 | 9.14 | 7.78 | 3.58 |
| Labour cost per employee | 56,101 | 61,434 | 86,826 | 93703 | 93,990 | 87,731 | 87,208 | 33,776 |
| Unit labour cost | 0.91 | 0.92 | 1.07 | 1.05 | 0.91 | 0.96 | 1.01 | 0.33 |
| Capital productivity | 9.11 | 6.61 | 8.72 | 8.94 | 9.65 | 9.93 | 8.14 | 2.78 |
| Capital intensity | 42,664 | 61,941 | 88,118 | 96,313 | 91,181 | 78,783 | 74,806 | 34,142 |
| Added value content | 153.71 | 154.15 | 185.27 | 178.71 | 168.22 | 174.05 | 155.70 | 58.42 |
| **Large** | | | | | | | | |
| Total output per employee | 254,129 | 228,645 | 277,203 | 286,721 | 271,749 | 279,721 | 269.911 | 173,562 |
| Added value per employee | 96,064 | 86,971 | 101,041 | 101,581 | 97,540 | 99,876 | 79,610 | 52,984 |
| Added value per labour cost | 5.05 | 4.68 | 4.86 | 4.69 | 4.69 | 5.01 | 4.03 | 2.87 |
| Labour cost per employee | 57,252 | 56,107 | 62,328 | 65,000 | 62,338 | 59,891 | 59,230 | 36,941 |
| Unit labour cost | 0.68 | 0.74 | 0.67 | 0.68 | 0.70 | 0.64 | 0.66 | 0.43 |
| Capital productivity | 9.44 | 8.25 | 9.60 | 11.57 | 10.14 | 10.71 | 6.56 | 4.22 |
| Capital intensity | 31,827 | 31,714 | 32,993 | 29,741 | 33,541 | 26,530 | 32,625 | 19,708 |
| Added value content | 114.88 | 114.81 | 109.26 | 106.16 | 108.28 | 107.12 | 88.53 | 61.12 |
| **Indices of Productivity Indicators (1996=100)** | | | | | | | | |
| **Micro** | | | | | | | | |
| Total output per employee | *100.0* | *160.0* | *280.1* | *310.7* | *509.0* | *102.4* | *230.2* | *308.8* |
| Added value per employee | *100.0* | *106.7* | *145.2* | *156.0* | *221.7* | *73.2* | *111.5* | *165.5* |
| Added value per labour cost | *100.0* | *72.5* | *73.3* | *87.6* | *97.3* | *66.0* | *54.2* | *90.4* |
| Labour cost per employee | *100.0* | *147.2* | *198.1* | *178.1* | *227.8* | *110.9* | *205.8* | *183.2* |
| Unit labour cost | *100.0* | *92.0* | *70.7* | *57.3* | *44.8* | *108.3* | *89.4* | *59.3* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Capital productivity | *100.0* | *22.4* | *16.6* | *18.3* | *21.0* | *40.8* | *33.5* | *14.4* |
| Capital intensity | *100.0* | *460.7* | *846.7* | *833.5* | *986.2* | *162.7* | *280.9* | *862.5* |
| Added value content | *100.0* | *66.7* | *51.8* | *50.2* | *43.6* | *71.5* | *48.5* | *53.6* |
| **Small** | | | | | | | | |
| Total output per employee | *100.0* | *142.7* | *203.9* | *239.9* | *302.5* | *154.1* | *235.4* | *233.4* |
| Added value per employee | *100.0* | *132.1* | *172.6* | *194.1* | *212.4* | *136.3* | *165.7* | *158.9* |
| Added value per labour cost | *100.0* | *96.8* | *101.1* | *98.4* | *110.4* | *101.6* | *91.5* | *94.8* |
| Labour cost per employee | *100.0* | *136.2* | *170.4* | *196.5* | *191.6* | *134.2* | *180.0* | *166.9* |
| Unit labour cost | *100.0* | *95.6* | *83.8* | *82.0* | *64.0* | *86.9* | *78.0* | *71.7* |
| Capital productivity | *100.0* | *53.2* | *55.5* | *53.0* | *52.6* | *62.0* | *50.7* | *49.2* |
| Capital intensity | *100.0* | *248.7* | *302.1* | *364.7* | *396.0* | *198.5* | *279.0* | *245.6* |
| Added value content | *100.0* | *92.3* | *84.5* | *80.8* | *70.3* | *88.3* | *70.7* | *67.9* |
| **Medium** | | | | | | | | |
| Total output per employee | *100.0* | *108.7* | *166.3* | *184.0* | *211.7* | *187.7* | *177.5* | *84.3* |
| Added value per employee | *100.0* | *109.1* | *160.1* | *170.9* | *184.8* | *169.7* | *143.5* | *64.0* |
| Added value per labour cost | *100.0* | *99.4* | *129.4* | *128.1* | *137.8* | *135.8* | *115.6* | *53.2* |
| Labour cost per employee | *100.0* | *109.5* | *154.8* | *167.0* | *167.5* | *156.4* | *155.4* | *60.2* |
| Unit labour cost | *100.0* | *100.8* | *116.6* | *114.4* | *99.2* | *104.6* | *110.0* | *35.9* |
| Capital productivity | *100.0* | *72.6* | *95.8* | *98.2* | *106.0* | *109.1* | *89.4* | *30.6* |
| Capital intensity | *100.0* | *145.2* | *206.5* | *225.7* | *213.7* | *184.7* | *175.3* | *80.0* |
| Added value content | *100.0* | *100.3* | *120.5* | *116.3* | *109.4* | *113.2* | *101.3* | *38.0* |
| **Large** | | | | | | | | |
| Total output per employee | *100.0* | *90.0* | *109.1* | *112.8* | *106.9* | *110.1* | *106.2* | *68.3* |
| Added value per employee | *100.0* | *90.5* | *105.2* | *105.7* | *101.5* | *104.0* | *82.9* | *55.2* |
| Added value per labour cost | *100.0* | *92.6* | *96.2* | *92.8* | *92.9* | *99.2* | *79.8* | *56.9* |
| Labour cost per employee | *100.0* | *98.0* | *108.9* | *113.5* | *108.9* | *104.6* | *103.5* | *64.5* |
| Unit labour cost | *100.0* | *108.1* | *99.0* | *99.7* | *102.1* | *94.4* | *97.0* | *77.1* |
| Capital productivity | *100.0* | *87.4* | *101.7* | *122.6* | *107.5* | *113.4* | *69.4* | *44.7* |
| Capital intensity | *100.0* | *99.6* | *103.7* | *93.4* | *105.4* | *83.4* | *102.5* | *61.9* |
| Added value content | *100.0* | *99.9* | *95.1* | *92.4* | *94.3* | *93.2* | *77.1* | *53.2* |

Source: Computed from Malaysia Construction Industry Census 1996 and 2005 and Malaysia Construction Industry Survey 1998, 2000, 2002, 2007 and 2009.