CONFERENCE ON THE INTERNATIONAL COMPARISON PROGRAMME
MARCH 11 - 15 2002

CONSTRUCTION INDUSTRY PURCHASING POWER PARITIES - OBTAINING COMPARABLE PRICES

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May 2002

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OVERVIEW

1. This paper is an investigation of some alternative methods for the collection of comparable prices for construction PPPs. Part 1 will give a brief description of the method currently used by the OECD and outline some areas of concern in relation to this method and its use in the wider scope of the International Comparison Programme (ICP). Part 2 will explore alternative approaches or possible changes to the current method. It will look at some of the methods used to produce temporal construction price indexes and assess their suitability in a spatial context. Part 3 will assess the relative merits of alternative approaches against the criteria of cost, availability of data, and ability to deliver comparable prices.

1. CURRENT OECD METHOD

2. The basic requirements of the data supplied by countries for calculating PPPs are that the prices must be for items that are representative of expenditure on final GDP and comparable between countries, while the prices should be consistent with the valuation of the GDP (OECD, 1999a).

3. Achieving both representativeness and comparability in the items selected for construction pricing is difficult due to the great variety of construction outputs produced. Outputs of the same functional category of construction can differ according to design, size, materials and construction method. These differences may be pronounced between countries and even within countries due to such factors as culture, socioeconomic conditions, geography and climate.

4. Consequently, while it may be possible to select representative projects in one country, it is generally difficult to match a representative project in one country with a comparable and representative project in other countries.

5. To overcome this, the current OECD method selects a set of hypothetical standard projects designed to be broadly representative of construction in participating countries, and requests these to be priced using a bills-of-quantity approach. This method results in an emphasis on comparability rather than representativeness (OECD, 1999a).

6. Consistent interpretation of the bills is essential to ensure that prices provided are comparable. To encourage this the OECD provides the following information:

- A brief preamble to each bill which describes such things as design features, materials, size, and function.

- Some fairly detailed diagrams and measurements for each bill. Total area (defined as habitable area) is provided for the houses, while for other bills area is not provided but could possibly be calculated from the measurements information provided on the diagrams.

- A set of guidelines covering: flexibility of interpretation; the definition of the pricing basis (purchasers' prices and national annual prices); the scope of items

included under general and preliminary expenses; the application of architects' and engineers' fees and the scope of services they include; the application of value added tax and other sales tax; and the source of unit prices.

7. The 1999 OECD PPP round selected the detached house; apartment; factory building, office block; agricultural shed; road; sewer main; and bridge as products to represent construction within the categories of dwellings, non-residential buildings, and civil engineering works.

8. For most types of product a single standard bill was selected. However to further achieve representativeness specific bills were produced for the detached house, the road and the factory to reflect major differences between countries. For the detached house there were 6 bills (detached house, Portuguese house, Nordic house, North American House, Japanese house and Australasian house), for the road there were 2 bills (asphalt road and macadam road), and for the factory there were 2 bills (factory building and Japanese factory).

Pricing basis

9. The pricing basis is purchasers' prices, "that is those that would actually be paid by purchasers of the standard construction projects" (OECD, 1999b). Purchasers' prices are defined as including producers' costs (materials, labour, equipment hire, sub-contractors' fees), plus profits (or loss) of the prime contractor, general expenses (including a share of head office overheads), preliminary expenses, architects' and engineers' fees and value added tax. Price of land is excluded.

10. In addition, the conceptually preferred pricing is at national annual prices, that is annual average prices and national average prices. Mid year prices are used as a convenient approximation of annual average prices. The use of mid year prices as annual averages assumes that price movements are uniformly spread over the year.

Source of prices

11. The PPP guidelines suggest that unit prices can be obtained either from existing bills of quantity from successful (or realistic) tenders made by construction companies, or preferably from a computerised system of unit costs and tender price information for the construction industry kept by major consultancy firms and research institutes. The use of this information to price the bills of quantity requires the services of an expert such as a quantity surveyor, estimator or cost consultant, and for most participating national statistics offices it is usually necessary to contract these services.

Areas of concern in relation to the current method

12. The broad areas of concern in regards to the current method and its use in the extended scope of the ICP are as follows:

- Cost and resource consumption. The current method is quite resource demanding as it requires the provision and editing of around 1000 unit prices for each country. In addition, since this data can mostly be provided only by outsourced experts, the process can also be costly.

- Availability of data. Will the data needed to price bills of quantity of the type currently used be available in all of the proposed 118 countries in the ICP?

- Comparability of prices. The current method seems to require considerable latitude in interpretation of the specifications for the (relatively homogeneous) group of countries involved. Will the expansion of scope bring further difficulties in obtaining comparable prices?

- National annual prices. The use of mid year prices as annual averages assumes that price movements are uniformly spread over the year, and the guidelines concede that this assumption is unlikely to be valid for countries with high levels of inflation. Also, the collection of national average prices is currently fairly difficult and may prove even more so with the ICP.

13. This paper will not attempt to delve too deeply into the performance of the current method as this subject is being addressed in other research papers. However, in Part 3 this method will be confronted with the alternative approaches suggested in Part 2.

2. POSSIBLE ALTERNATIVE APPROACHES

14. There are several methods which can be used to measure the price movement over time of construction output. This section looks at whether these methods are applicable to the production of spatial indexes for construction, with particular emphasis on the requirements of the ICP.

Factor costs

15. A factor cost index is generally compiled as a weighted index of the costs of factor inputs, usually labour, materials and plant. The weights and regimen items are determined from an analysis of representative projects. Broad weights are calculated for each factor, and within each factor detailed weights are usually calculated for each regimen item. A set of items are chosen for periodic pricing. These items are selected to be representative of the regimen items, and they can be specified so they are applicable to a broad range of output types.

16. The factor cost method could be used for the calculation of spatial indexes. The basic factors would be the same for all countries, and it may be possible also to select common standard regimen items. Also, by making some allowances for regional preferences and standards, it may be possible to select representative items for pricing which are comparable between countries. This method could be used for individual product types (such as detached houses) or product groups (such as residential or non-residential building) or possibly even total construction. As in the calculation of PPPs for other commodities, you would produce cross country relatives for each input item, and then average these relatives to get higher level PPPs.

17. Due to the differing relative importance of input items in the cost of construction it would be advisable to use a weighed average in deriving higher level relatives. The calculation of these weights would require analysis by an expert of actual construction projects. This would be a fairly resource intensive activity for one country, so to do it for every country in the ICP could be prohibitive in terms of cost, and also in terms of the availability of project data and the people with the necessary expertise to undertake the analysis. A simpler alternative would be to undertake the weighting in one country and assume that these weights were universally applicable. This method would not be satisfactory due to the very wide differences that exist between countries in terms of factor productivity: for example in some countries where labour is cheaper, labour would be used in preference to plant. This would be particularly pronounced in civil works such as road construction, and would limit the comparability of the weights. A compromise could be reached in calculating weights to represent groups of countries with broadly comparable methods of construction. There is some anecdotal evidence that broad level data for weighting the relative contributions of plant, labour and material may exist and be readily accessible in many countries (Kamil K. Al-Adhadh, 2002). If this is the case, then this data could be used to improve the group weightings described above.

18. A factor cost method has been successfully applied in recent CIS and Mongolia comparisons. The application of this method is described in some detail in papers by Goskomstat of Russia (2002) and Kuznetsov (2002).

Component costs

19. The component cost method treats construction output as a set of standardised homogenous components representing sub-contracted work-in-place (OECD, 1997). This method is usually applied to building construction, however it can also be applied to civil engineering works.

20. In a time series context, a set of construction output types is chosen to cover as well as possible the variety of output commonly constructed. Output can be selected on the basis of criteria such as function, complexity, construction practices, materials used and design features. Base period weights or values are produced from an analysis of documentation relating to recently constructed projects representative of the selected output types. Each project is broken down into a set of standard well defined components, with each component consisting of a quantity, a unit rate, and a value (quantity multiplied by rate).

21. Projects are priced each period by updating the unit rate of each component while holding the quantity constant. The resultant component values are aggregated to produce a current period project value using the base year structure. A Laspeyres price index for each project can be obtained by dividing the total current period value by the base period value. Project indexes are weighted together to produce price index numbers for strata, such as building function, region and total industry.

22. At this point the component cost method is similar to the bills-of-quantity approach used in the calculation of construction PPPs. However, because of the standardisation of components, it is possible to greatly simplify the price collection process.

23. Rather than collect a distinct set of prices for every component of each project, it is possible to greatly reduce the number of prices collected by arriving at a group of representative items. Firstly, pricing can focus on a subset of components which contribute to the bulk of the building cost. Secondly, it may be possible to use one item to represent several components which fall under the same building trade, or which exhibit similar price behaviour. The price collected, for example, for one specification of the formwork to a suspended slab could represent several formwork components (say formwork to slabs, columns and beams). Finally, because the components are standardised it will be possible for one specification to be applicable to several output types. For example, an office building, a shopping centre, a hospital, a hotel and an apartment building will share a set of common components (the components will have different quantities and values for each project, but share the same definition). For some of these common components just one price may suffice for all the projects. It may be possible to arrive at a set of items, perhaps as few as 60, which are the main cost drivers for all building projects. Theoretically, the cost drivers would correspond either directly or by proxy to all the components of each project.

24. The component cost method links the representative items back to the projects so that the unit rates in each project can be updated with price movements of the representative items, allowing a current period project value to be calculated.[1] Rather than produce a price index with the project values, as described above, it is also possible to use the same set of value and linkage information to produce a set of weights so that a price index can be produced simply by weighting together price movements of each of the cost drivers.

25. In a spatial index application of the component cost method, you would use the above process to arrive at a set of representative items, and you would then need to collect comparable prices for each item in all the participating countries. As in the calculation of PPPs for other commodities, you would produce cross country relatives for each item, and then average these relatives to get higher level PPPs. The production of a set of weights for the representative items would enable you to produce a weighted average, and so reflect the different contribution of components to the value of completed output.

26. It would not be feasible to produce a set of weights for each country due to the complexity of the processes involved and the resources and information which would be required for such an undertaking. Furthermore, as with the factor cost method described above, the simpler alternative of assuming that the weighting in one country could apply to all countries would not be satisfactory due to the very wide differences that exist between countries in terms of factor productivity, and how these differences would impact on the relative share of components in total project cost. A compromise could be reached in calculating weights to represent groups of countries with comparable productivity. Projects could be selected from one country to represent all countries in that grouping. Alternatively, if a different project were analysed from each country the eventual consolidation and weighting would reflect all countries in that group. The grouping of countries could also facilitate the collection of comparable prices, if the grouping also encompassed similar construction methods, materials, culture and taste (John Milliken, 2002).

Schedule of prices

27. A representative sample of projects either completed or taking place over a period of time is selected. A Paasche price index is produced by pricing the components in each sampled project using a schedule of base period rates, and then calculating the ratio of the current actual price of the sampled project to the recalculated price at the base reference period (OECD, 1997).

28. Translated into to the context of a spatial index, a price relative between countries B and A would be produced by the ratio of the actual price of a project in country B to the recalculated price using country A rates.

29. Unlike the bills-of-quantity approach used in the calculation of construction PPPs, this method uses real projects for each country, rather than standard and hypothetical models. This method would seem to favour representativeness over comparability, however comparability would be improved if the process was inverted as well (by taking the ratio of the actual price of a comparable project in country A to the recalculated price using country B rates). If undertaken for a range of construction outputs, this method would require a lot of current project information and be very resource intensive. Therefore it is not regarded as a realistic option for the ICP.

Quoted prices

30. Respondents, ideally construction companies, quote competitive prices for a hypothetical output whose specifications are kept constant from one period to the next. The model, which is usually based on a carefully selected actual project, is updated periodically to ensure that it is typical of current construction practices and materials. It may be necessary to use several models in order to adequately cover a wide range of outputs. This method is rarely used in construction price indexes as it involves a great deal of work to place a competitive quote for what is a hypothetical project, and is unlikely to be taken seriously by respondents (OECD, 1997).

31. The quoted prices method corresponds to the bills of quantity approach currently used in the calculation of construction PPPs, with the exceptions that the respondent is usually a quantity surveyor or cost consultant, and only one quote is produced for each model project.

32. As there are so many items, the bills of quantities approach is fairly resource intensive and costly both in the pricing of the bills and the editing and compilation of the data. Most of the bills used in the 1999 round of the OECD PPP appear to be schedules of quantities or cost plans and are already in a more reduced form than full bills of quantity. Nevertheless, a possible alternative which could be considered involves a further reduction in the number of items on the bills. Experts in building cost analysis have suggested that around one hundred items would provide an accurate measure of building cost (Craig Langston, 2002).

33. Another approach which could be considered would be to structure the bills in an elemental format. For example in Australia there are 46 standard elements covering 14 elemental groups, including preliminaries, substructure, superstructure, finishes and fittings (National Public Works Council Inc, 1980). The elements refer to actual parts of buildings and include all the work that would be required in its production. So for example the sub-element ground slabs is defined as including concrete, formwork, reinforcement, damp proofing etc. Using an elemental cost

plan, with detailed specifications, quantity information, and supporting guidelines on quality (such as high standard of finishing), prices could be provided without the need to consider the comparability of materials and methods.

34. One point which would need to be considered in relation to this approach is that the definition of elements does not accord to an international standard. Research by Davis Langdon Australia compared standard elements used in the United Kingdom, Singapore, China, Australia, the United States, South Africa and Malaysia. Davis Langdon found that while there were many similarities between countries, there were also many differences, and across all the countries in the study, elements could be sorted into only six common groupings (Alan Jenkins, Davis Langdon Australia, 2002).

Matched models

35. Although the matched model method can be used to measure price movement over time in construction outputs such as standard project homes, its applicability to the calculation of construction PPPs appears to be limited due to the great variety in most kinds of construction outputs between different countries.

36. The matched model approach may be plausible for use in PPPs if the primary criteria for comparability is function. In this context, the approach could be extended beyond houses to all kinds of buildings. Building price could be compared on a square metre basis for a broadly specified type of building, for example a light duty factory. With this approach local variations in factors such as design, construction method and materials would not have to be considered. Square metre prices of building types in a range of countries is compiled by a number of companies[2].

3. EVALUATION OF THE ALTERNATIVE METHODS

37. This section discusses the relative merits of alternative approaches against the criteria of ability to deliver comparable prices, availability of data, and cost.

Comparability of prices

Interpretation of the specifications

38. Consistent interpretation of the product or item specifications is a key factor to enable comparable pricing. Consistency of interpretation is affected by the simplicity of the product to be priced, the precision of the specification and the representativity of the specification within a country. Difficulty in the interpretation of specifications can lead to errors and require follow up editing. One would think that simpler items with precise specifications are easier to interpret. However, it can be argued that specifications must allow some latitude in their interpretation to ensure that a comparable but representative local product is selected. A literal interpretation of a specification may lead to the selection of an unrepresentative product.

39. Methods which break down the building cost all seem to aim for a simplicity

of item which will make clear interpretation easier and lead to a greater likelihood of comparability. The bills of quantities approach facilitates comparable pricing as each project is broken down into many self contained construction work activities which are specified and quantified such that they could theoretically be priced in a consistent manner in different countries. Of all the breakdown methods, factor costs would seem to offer the simplest and least ambiguous products and the greatest chance of consistent interpretation.

40. Selection of items which are comparable between countries is naturally one of the keys to comparable pricing. Similarity or differences in taste and institutions affects the inter-country comparability of the goods and services they produce (Ryten, 1999). Countries will have different types and styles of construction output, particularly buildings. Methods which break building output into a set of components have a greater chance of collecting comparable prices. The bills of quantities approach draws up items to allow a compromise in cases where there is a wide variety of standards between the participating countries. The component cost method and particularly the elemental cost plan approach assumes all buildings are made up of the same set of basic components. However, with these methods you are not pricing a whole unrepresentative building, but you are pricing components which may be common to buildings arising from different tastes etc.

41. The pricing of whole projects in the bills of quantity method places the prices for individual items within the bills in a context. This could be beneficial in the editing processes undertaken by the data provider (and also those eventually compiling the PPPs) and increase the chances of more reliable (and comparable) prices being provided.

42. The use of broad items, such as in the elemental cost plan approach, on the surface appears to allow too much latitude in interpretation. However, given the different elemental classification frameworks employed around the world, if it were possible to identify items commonly understood in each framework, and if these items were precisely defined in terms of dimensions, standard and quantity, countries should be able to provide a comparable price. In addition, whilst the items making up that price, such as materials, methods, regulatory standards[3], will differ between countries, the elemental component will be comparable in terms of function.

43. The extent to which the concept of function (and its possible relationship to utility) should be a major criteria in determining comparability would be a worthwhile subject for further discussion.

Adjustment for quality differences

44. Where temporal price indexes aim to hold quality constant over time, spatial price indexes similarly must aim to measure price difference of items for which the quality is held constant over regions.

45. Supposing a method for construction pricing is chosen to limit as much as possible the difficulties of inter-country comparability caused by variable types and styles of construction outputs, there can still be qualitative differences between countries due to differences in materials, methods, workmanship, supervision and

standards.

46. The issue of quality difference has been approached in a number of ways in past comparisons. In instances where different materials and methods are used, pricing schedules have made allowance for the pricing of several variants to enable the selection of the most appropriate component or the calculation of adjustment coefficients. A more recent type of adjustment has been developed for the ECP to account for differences in standards and workmanship. This approach involved the assessment and grading of a set of building characteristics against a base country, to produce a factor with which the total building price could be adjusted. A more detailed description of these adjustment methods can be found in papers by Sergueev (1997) and Rittenau (2002).

47. The quality adjustment methods described by Sergueev and Rittenau were applied in comparisons which used the bills of quantity pricing method. The gradings approach could be adapted for use in all the alternative methods. The use of variants would have limited applicability in the schedule of rates method due to the potentially large volume of data required, and would have no applicability in the matched model method, but could be used for all other methods.

48. Whether or not these adjustments for quality differences could be practically applied on the scale of the ICP is debatable. The application of the variants approach could be plausible, the grading approach maybe less so as it involves the inspection of building work in a number of countries. Quality adjustment needs to be the subject of a further investigation taking into account the countries in the ICP and the final method chosen.

Productivity

49. There will be some difference in productivity between countries, and this difference will be greater between some countries than others. Labour productivity, measured as output per work hour, will be effected by the skill and experience of the labour force, the degree of automisation, the quality of plant and equipment, the efficiency of materials procurement, time lost due to bad weather and industrial disputation and the use of off-site fabrication (DISR, 1999b). Low labour productivity, however, may still result in moderate or high project productivity (defined as square metres built per month) if there are more workers on site or 24 hour construction cycles (Langston & Best, 2001).

50. The aim of construction pricing should be to collect prices for comparable **output.** The ratios of factor inputs, the price of these inputs, and the productivity of labour will natuarally vary between countries even in the production of comparable items. Difference in productivity should be regarded as a legitimate factor contributing to differences in construction prices. It is not a qualitative factor to be removed or held constant. However, if differences in inputs effect the quality of the output, then these differences should be eliminated if possible.

51. The bills of quantity method used in past comparisons, and all the alternative methods except the factor cost method, measure output prices. These outputs may be either work-in-place components of structures or entire structures (in the matched model method). The price of these outputs should implicitly reflect the productivity

of the country supplying the output. On the other hand, the factor cost method will require an explicit (and generally broad) estimate of productivity (reflected in the weights of labour, materials and plant) in order to combine the input prices to produce an output price.

52. As discussed in Section 2 above, the calculation of weights for each country in the factor cost and component cost methods could be prohibitively costly. Furthermore, it was argued that the use of a set of weights for one country to represent all countries would be unsatisfactory due to the wide differences in factor productivity. A compromise was suggested in which a common set of weights were used for a group of countries with comparable productivity.

53 The use of a common set of weights for a group of countries in the factor costs and component cost methods assumes that countries in the group share comparability in: a) the proportional contribution of components or input to total project price, hence comparable productivity and relative input prices; and b) comparable construction activity in regards to the different building types. As the differences in these areas of comparability become greater, then naturally the veracity of the cross country relatives would reduce. The current bills of quantity method may be superior at the product level in the accurate reflection of productivity differences between countries. However, in calculation of the higher level cross country relatives detailed products have been given equal weights. This assumption of comparable and equal levels of activity may also lead to distortions. For example : would factories have an equal weight to offices and would sewers have equal weights to roads in construction activity?

Inflation

54. The use of mid year prices as annual averages assumes that price movements are uniformly spread over the year. This assumption is unlikely to be valid for countries with high levels of inflation. In addition, factors such as contractual method, procurement systems, off site fabrication, site operation strategies and productivity can lead to variation in building times between countries (DISR, 1999b). Point in time pricing would understate the effect on prices of a combination of inflation and longer construction time. While inflation would be an issue regardless of the pricing method used, a simple and cheap method may allow the collection of more prices to allow the estimation of an annual average. Being the simplest and cheapest method, factor costs would best lend itself to the collection of prices over a year, however the more expensive component cost method would also be suitable.

Availability of data

Price and specification information

55. Information will be required for the selection and specification of items to be priced, and also for the eventual pricing of these items. In the past this kind of information has generally been obtained from major consultancy firms with access to a range of existing bills of quantity for actual projects and up to date unit cost and tender pricing information[4]. The unit cost information is usually accessed from a comprehensive computerised database.

56. Obviously, the wide international scope of the ICP raises questions about the availability of such information. If up to date unit cost and tender pricing information were not available, to be able to determine prices for a country at the very least you would need access to information on similar jobs that have been done recently which can be used as benchmarks. You would also need people with expertise in construction measurement, costing and procurement (such as estimators and quantity surveyors), and experience in that particular country (John Milliken, 2002).

57. Not all countries have quantity surveying firms or the like, nor readily available information on construction costs. However there are some firms with international operations or alliances and a very wide scope who may have had some experience in such countries.[5] Also, even in countries where there are no local quantity surveying services, there will still be contractors who are determining the costs for real projects. Anecdotal evidence suggests that in many low income countries data is collected on the total costs in the construction industry by labour, plant and materials (Al-Adhadh, 2002). This broad level information could be useful for deriving the weights used in the factor cost method.

58. The fact that it may be necessary in some countries to use the services of non-local consultants and possibly local contractors is a very good reason to use as simple and brief a pricing method as is possible. The bills of quantity approach would seem too complex, and too prone to misinterpretation and misreporting. Simpler methods such as component cost, factor cost, the truncated bills approach and the elemental cost plan approach would seem to reduce the chance of error. In addition, as the prices required for the factor cost method are so simple, their provision may not require the services of an expert.

National annual prices

59. The conceptually preferred pricing is at national annual prices, that is annual average prices and national average prices. Mid year prices are used as a convenient approximation of annual average prices. Should mid year prices be adjusted to a full year basis, the necessary price series would need to be available to undertake this. Countries with National Accounts may be able to use a deflator which relates closely to construction, if they did not have access to a more specific price series. In the absence of either of these options a broad measure such as the CPI may have to be considered.

60. National average prices should be derived as weighted averages of regional prices. The collection of regional prices can add greatly to the resources required. These difficulties may even more pronounced in countries with decentralised or widely distributed populations. Simpler and briefer pricing methods, such as factor inputs, component costs, truncated bills and elemental cost plans would be more conducive to compiling national average prices than would the lengthier bills of quantity approach.

Pricing basis

61. Purchasers' prices would reflect market prices for most construction (subsidised construction would be one exception). As purchasers' prices include

prime contractors' profit margin, they will also theoretically reflect the bidding strategy of companies and the point in time of a country in the building cycle (Craig Langston, 2002). It needs to be considered whether these factors would hinder the comparability of prices.

62. Factor costs do not reflect the whole range of factors which impact on market prices. Profits of the prime contractor are not included, nor are general expenses (which includes a share of head office overheads), preliminary expenses, architects' and engineers' fees and value added tax. The regimen of inputs for this method could be expanded to cover general expenses, preliminary expenses, architects' and engineers' fees and representative prices for all of these items may be readily available. Subcontractors and prime contractors' margins' and profit on the other hand would not be readily available and would need to be estimated, possibly from a small survey of construction companies.

63. Similarly, the component cost method does not include prime contractors' profits, although the prices for work in place would include subcontractors' margins. A realistic figure for prime contractors' profit will be difficult to obtain and would most probably have to be estimated. It should be noted that in the bills of quantities approach, although prime contractors' profit is included as a general expense in all the items of the bill, the actual rate of profit used will have been estimated.

64. If it were decided that the coverage of prime contractors' profit were in fact a hindrance to the comparability of prices, then the factor cost method and component cost methods would be quite suitable.

65. Another issue worth noting is "own account" construction. In the national accounts, in principle, own account construction is valued at estimated basic price, which is different from purchasers' price. The incidence of own account construction is likely to vary significantly between countries.

Linking

66. Linking of countries is an issue to be addressed regardless of method chosen. However the factor cost and component cost methods may require more and graduated linking if grouping is done at a sub-regional level. While it appears that linking could be done by item or by country, it is an issue which requires close examination.

Cost

67. Cost is a significant factor in the pricing of construction outputs because the services of expert consultants is usually required. Cost will naturally be dependent on the number of countries in the programme and the number of items to be priced.

68. There are persuasive arguments for adopting methods which require the collection of fewer prices. The organisation of price collection through one international consultant may have some benefits in regards to the quality of data, however whether or not it would lead to cost savings is a matter requiring further analysis.

69. There could be significant advantages in the use of the component cost method. Providing that the weighting was undertaken for a subset of countries, the substantial reduction in the number of items to be priced (from over 1000 to under 100) could achieve significant resource savings, given the number of countries participating in the ICP. Attachment 1 gives a fairly crude comparison of the costs of a traditional bills of quantity method against the possible costs of a component cost method.

70. The initial set up of the factor cost, the component cost and the truncated bills of quantity approach would be fairly resource intensive, compared to the set up of the traditional bills of quantity approach and the elemental cost plans approach. The component cost method, which is fairly convoluted, would be particularly resource intensive. The collection of prices, on the other hand would be more resource intensive for the traditional bills of quantity approach than all other approaches. Also, the simpler methods would require less editing and follow up.

Conclusion

71. The following table summarises the methods discussed in Section 2 against the criteria of: ability to deliver comparable prices; availability of data; and cost. The point of reference for the cost criteria is the traditional bills of quantity method used by the OECD.

	Ability to deliver comparable prices	Availability of data	Cost (point of reference is the traditional bills of quantity method)
Factor inputs	Weighting method assumes comparable productivity between grouped countries. Simple specifications give more chance of consistent interpretation.	Pricing data should be readily available in all countries. Broad level weighting data may be available in some countries. Factor inputs do not accurately represent market prices of output. Margins and profit would need to be estimated, but this may be possible with a small survey. Simple and inexpensive method more suitable for collection of national annual prices.	Higher set up costs, lower pricing costs. Lower processing costs. Possibly lower overall cost.
Component cost	Weighting method assumes comparable productivity between grouped countries. Low number of specifications means editing will be easier and errors fewer.	Data should be available in all countries, but in some countries will require greater degree of estimation. Prime contractors' profit would need to be estimated. Fewer items to be priced may lessen the impact of estimation on data quality. Simple and inexpensive method more suitable for collection of national	Higher set up costs, lower pricing costs. Lower processing costs. Possibly lower overall cost.

		annual prices.	
Quoted Prices a) traditional bills of quantity method used by the OECD	Superior in the accurate reflection of productivity differences between countries. The pricing of whole projects puts individual items into context and improves the chance of correct interpretation. Method which is probably most capable of delivering comparable prices. However this does largely depend on the interpretation of the specifications and with 118 countries consistency of interpretation may be a problem. Higher number of specifications to be priced could increase the chances of error.	Data available in all countries, but in some countries will require greater degree of estimation. High number of specifications to be priced makes it more difficult to provide national annual prices.	
Quoted Prices b) truncated bills method	As above, but reduced number of specifications lower the chances of error.	As above, but reduced number of specifications marginally lower the difficulties in providing national annual prices	Higher set up costs, lower pricing costs. Possibly lower processing costs. Possibly lower overall cost.
Quoted Prices c) elemental cost plan method	Very broad item may give too much latitude in interpretation and lead to problems in comparability.	Data available in all countries, but in some countries will require greater degree of estimation.	Similar or lower set up costs, possibly lower pricing cost. Possibly lower processing costs. Possibly lower overall cost.
Matched models	As above	Up to date data not likely to be available for all countries	Lower set up costs, lower pricing costs. Lower processing costs. Lower overall cost.

72. The traditional bills of quantities approach seems to be the best method of delivering comparable prices at the required pricing basis for a small group of countries. However, as the number of countries in the exercise increases then this method becomes less suitable. The number of prices to be provided and the likelihood of experts and up to date pricing information not being available conspire to increase the chance of misinterpretation, misreporting and poor quality data. The likely volume of editing required would be quite burdensome. A truncated bills of quantity approach retains some of the benefits of the traditional approach while reducing costs and complexity.

73. Simpler methods may have certain limitations in terms of their ability to provide comparable data on the desired pricing basis. However for the factor costs method and the component cost method these limitations may not necessarily be greater than those associated with the existing method. In addition, it seems that these simpler methods could be less resource intensive.

Mark Dubner
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May 2002

Notes

1. A successful application of the component cost method with reference to non-house building outputs was developed by the Australian Bureau of Statistics and Rider Hunt Canberra Pty Ltd.

2. Rider Hunt, Rawlinsons, Davis Langdon.

3. Regulatory standards differ between countries. It is expected that the impact of regulatory standards could contribute to variation in costs by between 5-20% (DISR, 1999b).

4. In some countries, for example Malaysia and Singapore, government agencies are now compiling comprehensive databases of unit cost information on the construction industry.

5. Two such alliances are: Rider Hunt, Levett & Bailey and Gardiner Theobald; and Davis Langdon Seah. These alliances have offices and associated offices in Africa, the Middle East, Australasia, the United States, Asia and Europe.

ATTACHMENT 1

The following analysis compares the costs of the traditional bills of quantity method and the component cost method based on prices paid in 1999 by the Australian Bureau of Statistics for these services.

1. Calculation of unit cost per item priced.
Unit cost for pricing OECD PPP bills: $8.62 per item (9 bills totalling 1102 items priced at a cost of $9500)
Unit cost of pricing components for ABS building price index: $9.89 (59 items in 9 regions priced at a cost of $5250)

2. Cost of set up.
Set up analysis of 8 buildings to determine representative components to be priced and their weights: $15,000

3. Cost of traditional bills of quantity method for pricing 9 bills in 118 countries based on above unit cost.
Total cost of $1,120,910 (1102 items in 118 countries at $8.62 per item)

4. Cost of component cost method assuming 100 items collected in 118 countries in 6 regional groupings.
Total cost of $206,702 ($15,000 start up in 6 regions plus 100 items in 118 countries at $9.89 per item)

5. Cost of component cost method assuming 100 items collected in 118 countries in 12 regional groupings.
Total cost of $296,702 ($15,000 start up in 12 regions plus 100 items in 118 countries at $9.89 per item)

Notwithstanding the very crude nature of this analysis and the fact that it has not taken into account factors such as the likely economies of scale from pricing a greater number of items, the results show that a component cost approach should be significantly cheaper.

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ACKNOWLEDGMENTS

The authors would like to thank the following people and organisations for the valuable information and insights they provided on the construction industry: Mark Chappé of Rider Hunt Canberra Pty Ltd; John Milliken (FAIQS); Alan Jenkins of Davis Langdon Australia; Assoc. Professor Craig Langston of the University of Technology, Sydney; Trent Bourne of the Department of Industry Science and Resources; Rob Pollard and Per Ekehov of Baulderstone Hornibrook; and Peter Young of Leighton Contractors. The authors would also like to thank Kamil K. Al-Adhadh (UN-ESCWA) and Serguei Sergueev (Austrian Statistical Office) for their comments on the paper. Finally, the authors would like to acknowledge the research services provided by Anne Freer of the ABS library.