

# 12

## **A New Construction Price Comparison Methodology for The International Comparison Program: Concept Note**

*Paper for Session 3*

**Global Office**



**Technical Advisory Group Meeting  
October 1-2, 2009  
Washington DC**

## Table of Content

1. Background.....	3
2. Objectives .....	3
3. Review of alternative approaches .....	3
4. Outline of proposed approach.....	4
5. Issues to be addressed.....	5
6. Proposed programme of work .....	5
7. Annexes .....	6
Annex 1. Summary comparison of approaches to international construction price comparisons	6
Annex 2. Outline conceptual approach.....	8
Annex 3. Program of the work.....	9

## 1. Background

---

International construction price comparisons are notoriously problematic. The challenge is to identify an approach that provides an appropriate combination of reliable results, simplicity and reasonable cost in implementation, as well as compatibility with other national data sets. The consultants' view is that there is no single perfect universal solution; and that the approach adopted will to some extent be a compromise and may involve more than one method. Elements that are often not addressed adequately are linkages with national accounts, dialogue between data providers and data collectors and collection and use of other price data for triangulation. The work described in this concept note will endeavour to address all of these points.

## 2. Objectives

---

The overall purpose of the proposed work is to provide support to the World Bank International Comparison Program (ICP) team on construction prices as a contribution to the Bank's work on Purchasing Power Parities. It will include testing the feasibility of using ISIC industry categories as a framework for input prices in order to provide close links to national accounts. This concept note sets out proposals for research and testing activities up to June 2010 with a view to introducing a new method in the ICP 2011 pricing round.

## 3. Review of alternative approaches

---

A variety of approaches have been used over the years to collect price data for international construction price comparisons. These have been based on:

- **Input prices** to construction (the prices paid by construction contractors for the inputs to construction work – primarily construction materials and labour)
- **Output prices** of construction (the prices of completed construction projects charged by contractors to their customers)
- **Intermediate prices** (prices used, for example, by contractors for parts of construction work, either in their own estimates or in tenders to customers)
- Some **combination** of the above.

Annex 1 reviews the advantages and disadvantages of the generic approaches to international construction price comparisons. The bill of quantities approach attempts to get to output prices; the construction components approach is based on intermediate prices; the basket of goods approach uses input prices; the single project estimate approach uses output prices.

Comparable input prices are the most straightforward to collect. They are for standard units of measurement (tonnes, m<sup>2</sup>, m<sup>3</sup>, days, etc) of readily available items (concrete, timber, steel, skilled labour, etc). Input prices (and, indeed, all construction prices) are context dependent, that is they are, at least to some extent, dependent on the quantity used, the scale of the project, how and where it is used, who is doing the work, and who is the customer for the work. A particular problem with this approach is that input prices are not purchaser prices, they are the prices paid by contractors to their suppliers, not the prices charged to their customers.

It is difficult to obtain directly comparable construction output prices. It is most unusual for identical projects to be constructed in different countries at the same time in exactly the same circumstances. The output prices that are typically used are either consultant's or contractor's estimates, that is, they are not 'real' prices; they are, however, based on experience and represent an expert view on a range of projects and thus contain an element of subjectivity. Even though it is usually possible to obtain normalised average real prices (eg. per m<sup>2</sup>) for broadly similar project types (mass market housing, industrial buildings, office buildings, sections of highway, etc), these are not identical and may vary in quality and functional performance. Again, they are expert views and based on a range of projects.

Intermediate prices are available – from price books, successful tenders, for example – but the ways they are used depend on the pricing approach of particular contractors and the circumstances of particular projects. They need to be used consistently, if prices from successful tenders are used, all prices need to come from the same tender. Price book prices cannot reflect the specific context of projects or the methods use by different contractors.

The work outlined below will review the main international construction price comparison methodologies, including the Eurostat and OECD methods, the BOCC method used in the last ICP round and the method developed in the CIS states. It will also look at other methods, including the BLOC method developed by Dr Best and a variety of more or less comparable construction cost and price data from both public and private sources. The consultants' general feeling is that either input or output prices are preferable to intermediate input prices. They can be observed and, unlike intermediate prices are not artefacts of a contractor's pricing policy. An advantage of using input prices would be its simplicity.

#### 4. Outline of proposed approach

---

The attached diagram (Annex 2) outlines the proposed approach. It is based on input prices weighted to represent national construction output, the weighting based on input-output tables. The top part of the diagram sets out construction and its relationship to the economy. There is a direct progression from GDP through investment (GFCF) to gross construction output. That is then broken down into residential building, non-residential building and civil engineering. Normally value data will be available for all of the above from national statistics.

The bottom of the diagram sets out the main inputs to construction. Input-output tables provide a breakdown of intermediate consumption (purchases from other industries) and value added by the construction industry (mainly surplus or profit and compensation of employees, the cost of labour). The construction column for a range of countries and years suggests the following broad breakdown of inputs:

- Materials, products and energy: 40 – 50%
- Construction purchases from construction: 0 – 20% \*
- Transport and distribution: 5 – 10%
- Finance, insurance and services: 5 – 10%
- Operating surplus: 10 – 20%
- Compensation of employees: 20 – 25%

\* this is sub-contracting; examination of the construction row in the input-output table may allow for further analysis

It is also possible, to break down the first group into industrial inputs that can be characterised by one, or a few, materials or products. Data is usually available on numbers of construction labour and sometimes on

labour productivity. The cost of materials and labour typically represents 60 – 75% of total construction output.

There is, however, a disconnect in the diagram. While, from the top down, it is possible to get directly to the three basic headings from national statistics, from the bottom up the resources can be aggregated to total construction output via input-output tables but not to the three basic headings. Work is needed on the distribution of resources across the basic headings. It may be that there will be less confidence in price levels at basic headings than at all construction. At this stage the diagram is illustrative only; it represents a theoretical model but it has some practical problems, some of which are discussed below.

In addition to the work outlined in the diagram, the consultants envisage collecting other construction (input and output) price data to help triangulation of the main data. This additional data will also help to explain international price level differences.

## **5. Issues to be addressed**

---

Issues to be addressed during methodology development include:

- Transition to purchasers' prices [Basic data is input costs not output prices]
- Development of input construction shares by basic heading for individual countries or groups of similar countries [Availability, reliability and compatibility of input-output tables internationally needs to be assessed]
- Selection of inputs [A relatively compact number of materials and products will represent entire industries]

## **6. Proposed programme of work**

---

The proposed work on methodology development is split into two parts. Annex 3 puts the main activities into a time frame. It does not indicate formal meetings with World Bank and ICP regional representatives but these are both necessary and desirable.

## 7. Annexes

### Annex 1. Summary comparison of approaches to international construction price comparisons

#### The bill of quantities approach

<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>○ familiarity and, despite recognized shortcomings, a commonly accepted methodology</li> <li>○ aims to provide output prices/prices paid by end users</li> </ul>	<ul style="list-style-type: none"> <li>○ based on estimated bid prices, not actual market prices</li> <li>○ bid prices do not provide current price levels; they are forecasts of likely future output prices</li> <li>○ bid prices may not be reliable indicators of outturn prices</li> <li>○ difficult to establish average annual and national price levels</li> <li>○ difficult to provide representative and comparable projects across countries</li> <li>○ difficult to accommodate very large projects</li> <li>○ difficult to accommodate work to existing buildings (repair, maintenance and improvement)</li> <li>○ difficult to aggregate projects to sectoral or national totals</li> </ul>
<b>Opportunities</b>	<b>Barriers</b>
	<ul style="list-style-type: none"> <li>○ needs pricing experts with access to price data and <u>common</u> methods of working</li> <li>○ labor intensive and expensive</li> <li>○ requires complex and extensive pricing documents and instructions</li> </ul>

#### The construction components approach

<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>○ similar to, but less complicated than, the bill of quantities approach</li> <li>○ easier to provide representative and comparable components than whole projects</li> <li>○ aims to provide output prices/prices paid by end users</li> </ul>	<ul style="list-style-type: none"> <li>○ based on estimated bid prices, not actual market prices</li> <li>○ may not fully account for contractors' margins</li> <li>○ bid prices do not provide current price levels; they are forecasts of likely future output prices</li> <li>○ difficult to establish average annual and national price levels</li> <li>○ does not take account of project size or complexity</li> <li>○ may not accommodate the full range of types of construction work</li> <li>○ does not accommodate work to existing buildings (repair, maintenance and improvement)</li> <li>○ difficult to aggregate components to sectoral or national totals</li> </ul>
<b>Opportunities</b>	<b>Barriers</b>
<ul style="list-style-type: none"> <li>○ reduced effort [as compared to BoQ approach] offers possibility of multiple observations</li> </ul>	<ul style="list-style-type: none"> <li>○ needs pricing experts with access to price data and <u>common</u> methods of working</li> <li>○ requires comprehensive pricing documents and instructions</li> </ul>

#### The basket of inputs approach

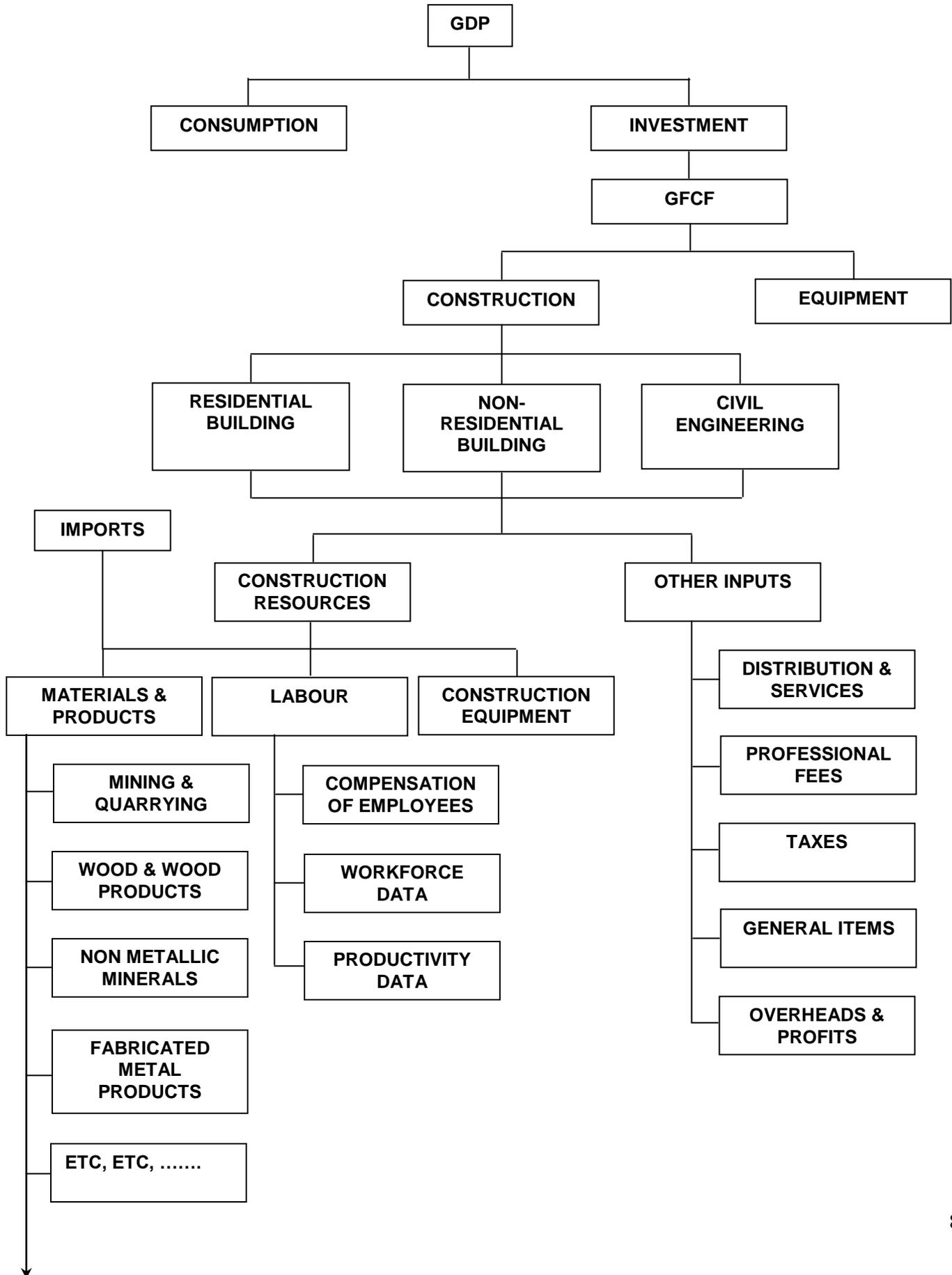
<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>○ short and easy to complete</li> <li>○ data collection does not require experts</li> <li>○ in line with many other price index and price comparison methodologies</li> <li>○ using national weightings from input output tables, provides a single national average value</li> </ul>	<ul style="list-style-type: none"> <li>○ does not account for contractors' margins (provides input costs rather than output prices)</li> <li>○ does not easily provide sectoral price level indicators</li> </ul>

<ul style="list-style-type: none"> <li>○ possible to disaggregate price differences (to separate price level and resource mix differences)</li> <li>○ possible to account for labour productivity differences</li> <li>○ provides current price levels, not forecasts</li> </ul>	
<b>Opportunities</b>	<b>Barriers</b>
<ul style="list-style-type: none"> <li>○ reduced effort offers possibility of multiple observations and/or annual price surveys</li> <li>○ reduced complexity offers possibility of widespread use</li> </ul>	<ul style="list-style-type: none"> <li>○ considered to be simplistic (although simplicity can be considered a virtue);</li> <li>○ it has been dismissed lots of times previously</li> <li>○ input output tables are not always available/up to date (the consultants will attempt to derive/construct generic input weights appropriate to different regions/ sub-regions)</li> </ul>

**The single project estimate approach**

<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>○ relatively simple to complete</li> <li>○ provides output prices/prices paid by end users</li> </ul>	<ul style="list-style-type: none"> <li>○ probably only works for a relatively small number of more or less standard projects</li> <li>○ difficult to accommodate non-standard/very large/specialist projects</li> <li>○ difficult to accommodate work to existing buildings (repair, maintenance and improvement)</li> <li>○ difficult to aggregate projects to sectoral or national totals</li> </ul>
<b>Opportunities</b>	<b>Barriers</b>
<ul style="list-style-type: none"> <li>○ reduced effort offers possibility of multiple observations and/or annual price surveys</li> </ul>	<ul style="list-style-type: none"> <li>○ needs pricing experts with access to price data and common methods of working</li> <li>○ requires clear pricing documents and instructions</li> </ul>

## Annex 2. Outline conceptual approach



### Annex 3. Program of the work

#### STAGE 1: METHODOLOGY DEVELOPMENT

	Activities	October to December 2009												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.1	Clarify purpose and scope of exercise	■	■											
1.2	Review previous approaches and results		■	■	■	■								
1.3	Prepare outline of methodology			■	■	■								
1.4	Collect and review input-output data				■	■	■	■						
1.5	Select resources and match to ISIC categories					■	■	■						
1.6	Compile resource mixes for basic headings						■	■	■	■				
1.7	Compile aggregate (regional) weightings								■	■				
1.8	Test sensitivity to different weightings and mixes									■	■	■		
1.9	Review adjustments to input prices									■	■	■		
1.10	Prepare and present interim report												■	■
1.11	Liaise with World Bank and others	■	■	■	■	■	■	■	■	■	■	■	■	■

**STAGE 2: TESTING AND VALIDATION**

	Activities	January to June 2010																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
	Compile questionnaire for NSIs	█	█																									
	Collect and review national statistical data			█	█	█	█																					
	Identify types and sources of benchmark data			█	█	█	█																					
	Compile survey instruments					█	█	█	█																			
	Identify potential survey respondents					█	█	█	█																			
	Carry out test exercises in UK and Australia									█	█	█	█															
	Visit selected countries as pilot exercises									█	█	█	█															
	Analyse initial survey results													█	█	█	█											
	Develop validation techniques													█	█	█	█											
	Analyse and validate pilot results																	█	█	█	█							
	Prepare draft report and review with Bank and others																					█	█	█	█			
	Prepare and present final report																										█	█
	Liaise with World Bank and others	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█