

COMPREHENSIVE MACRO-INFORMATION SYSTEMS FOR THE CONSTRUCTION INDUSTRY: AN INTERNATIONAL PERSPECTIVE

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In order to fully understand the functioning of the construction industry, it is necessary to place the industry in perspective vis-a-vis the overall economy of a country. A necessary requirement is that a comprehensive information system exists. In many countries, a critical review of currently available data, their sources, processes and accessibility shows significant deficiency.

This paper reports on the proposed work of the CIB (International Council for Building Research Studies and Documentation) Task Group on 'Macroeconomic Data Related to the Construction Sector', which is undertaking a study of the process of development of macroeconomic information systems in a selected group of countries world wide. In this paper, the need for a comprehensive information system is determined, as well as the current relevance of such a system and its appropriateness in the current stage of development of different countries. Additionally, the extent to which the construction industry, professions and client organisations utilise the available data is assessed.

Keywords: Construction sector, information systems, macro-economy.

INTRODUCTION

Perhaps more than for any other industry, data on construction activity is, in many countries, particularly poor and erratic. The construction and property industries play a vital role in any country's economy and a prime requirement to fully understand the functioning of the construction industry, is the necessity of placing the industry in perspective vis-a-vis the overall economy of a country. A necessary requirement is that a comprehensive information system exists.

Any researcher wishing to make international comparisons of the construction sector will often find that the paucity or unreliability of official, published statistics is a real stumbling block. The variety of statistical definitions and accounting procedures used for this sector has been well-documented in a recent study (Ruddock.1997). This report came to the conclusion that there has been little change in recent years in the quality and availability of macroeconomic data for many countries.

For much research work, dealing with only a small number of countries, recourse to an individual country's national accounts, supported by groundwork in that country, may be appropriate. Yet this would be impossible for wider international comparisons. Good opinion surveys, such as those of Bon's (1996), certainly provide important and interesting information, to complement 'official' information sources but 'improved' official data is essential. The most disappointing features of data availability are still the lack of a regular, complete set of UN statistics on the industry and the inevitable

degree of under-reporting in many countries, which still leads to the questionable reliability of data.

THE LIMITED NATURE OF CURRENT DATA DEFINITIONS OF CONSTRUCTION ACTIVITY

The United Nations in its Annual Yearbook of National Accounts draws concepts and definitions from the International Recommendations for Construction Statistics. Unfortunately, there are sometimes differences in underlying concepts and definitions for different countries.

Generally, the whole of construction activity consists of the following:

- Construction industry proper: contract construction by general builders, civil engineers and special trade contractors;
- Contract construction carried out for others by establishments or organisations classified to industries other than construction;
- Own-account construction carried out by independent units of enterprises or other organisations not classified to the construction industry proper;
- Own-account construction carried out by establishments or other organisations not classified to the construction industry, with no independent construction unit;
- Own-account construction carried out by individuals.

Data on construction authorised and completed cover, in principle, all construction activities in urban and rural areas and are derived from information collected by municipalities or other local authorities during the exercise of regulatory or controlling functions. In some cases, coverage is restricted to urban areas or major cities; in other instances, only to construction by private sector. Construction of a temporary nature is excluded from all series.

United Nations statistics

A major revision of the United Nations System of National Accounts (SNA) in 1993 had taken almost two decades, beginning in 1975 as an updating, clarification and harmonisation of the 1968 SNA with other international statistical systems. There were quite major changes in some areas but some of the inadequacies of the previous SNA were perpetuated. On the positive side, the question of consistency with the data collected by other international agencies was actively accepted.

With respect to the question of whether the SNA is now starting to provide an adequate framework for analytic uses for data about the economy, it should be recognised that the SNA is both conceptually and statistically a set of aggregate accounts designed to be presented as tabulations. In a sense, the SNA is a prisoner of the printed page and punch card mentality; it reflects both data needs and data technology characteristic of the past 50 years. The revision has not been designed to take advantage of the recent development and anticipated future changes in both data needs and data technology.

Considering the present analytical needs for detailed information about the economic system and the capabilities of modern computers, the national accounts should be constructed in a manner capable of integrating and accessing microdata bases derived from administrative sources and large samples. If the national accounts cannot provide efficient access to such detailed data, both business and governments will

increasingly come to depend on private proprietary data bases, and the advantages of an overall integrated system will be lost.

However, if a set of core accounts are used to record the transactions of enterprises, governments and households in the national accounts, they could be directly related to a wide variety of microdata bases referring to such entities and their transactions. Harmonisation of concepts used for the national accounts and microdata sources would be required, and the familiar problems of data reconciliation would need to be resolved. The SNA should be built around the task of integrating macro aggregates with the underlying microdata. From an analytical point of view, such integration is essential if computational techniques such as microsimulation modeling utilising longitudinal data are to be related to macroeconomic analysis.

Published construction statistics

As the last publication of the *U.N. Construction Statistics Yearbook* was in 1989 (showing 1985 data) and the 1997 published *National Accounts: Main Aggregates and Detailed Tables* deals with data up to 1993, it is necessary to investigate other sources in order to examine more current state of the industry across countries, in order to gauge the general pattern.

It is certainly the case that the 'best', in the sense of most complete sets of construction statistics, are available for the developed economies of North America and Europe. The Organisation for Economic Cooperation and Development (OECD) publication *Economic Outlook* compiles various macroeconomic statistical measures for member countries and provides a periodic assessment of economic trends that includes short-term projections of GDP (Gross Domestic Product) and GFCF (Gross Fixed Capital Formation). The *Annual Bulletin of Housing and Building Statistics for Europe and North America* published by the United Nations aims to provide basic annual data in the field of housing and building in European countries, Canada and the U.S.A.. The statistics are provided for fifty-five countries and use commonly agreed definitions worked out under the auspices of the Confederation of European Statisticians.

The data compiled, covers:

- Dwelling stock.
- Number of buildings constructed.
- Value of construction (completed construction work by category).
- Building firms (number of firms, output, employment).
- Building materials (including production and *apparent use* of cement).
- Prices, costs and rents (wholesale price indices of materials, input and output price indices for housing construction).

(One complication with trying to make comparisons is the fact that many countries, particularly those in Eastern Europe, have, until relatively recently, been producing national accounts under the MPS system and this has complicated comparisons between these countries and those using the SNA system, particularly in the area of capital formation. This has been especially important for the construction sector.)

Yet it is still difficult to obtain series from these publications in order to make inter-country comparisons and even a simple analysis of these data sometimes produces some interesting results. By way of example, one illustration is shown here.

Use of the data on GDP, GFCF and GFCFC (Gross Domestic Fixed Capital Formation in Construction) from the 1993-1997 *Annual Bulletins* enables the calculation of GFCFC as a %age of GDP for 1990-94. For the twenty-two countries, for which these data are available, it is interesting to consider the variation in this %age. Table 1 shows a *league table* of countries, indicating that at the extremes, whilst GFCFC has a value of over 15% of GDP in Switzerland, the Finnish economy shows a comparable figure of only 6.5%.

Table 1: GFCFC as a % of GDP

	1990-94
Switzerland	15.3
Cyprus	14.8
Austria	14.3
Germany	14.3
Spain	13.6
Canada	12.2
France	10.4
Belgium	10.2
Hungary	10.0
Kyrgyzstan	9.2
Greece	9.0
Romania	8.9
Slovenia	8.8
Italy	8.7
Ireland	8.6
Malta	8.1
Iceland	7.8
Netherlands	7.7
Denmark	7.6
U.K.	7.0
U.S.A.	6.8
Finland	6.5

This massive variation is worthy of more in-depth study. Important questions arising from these results must be:

1. How is it possible that such massive variation exists?
2. What is the significance for the construction sector and its relationship with investment and national income levels?
3. Most importantly here - **Is the degree of data validity adequate?** The variation is, itself, the subject of a current research project but the scope of this paper is merely to investigate the availability **and reliability** of data.

THE CIB TASK GROUP

In early 1998, the CIB set up a Task Group to provide an international focal point for the development of macroeconomic information on the construction sector and to develop appropriate macroeconomic models and methodologies for the study of the sector. The scope of interest also includes consideration of sector policy and state

support issues, viewing construction industry development in the context of the national economy of the country.

One specific area of work of the Task Group involves looking at the problems of proposing a methodology and programme to develop appropriate macro-information systems in those countries with the most poorly developed systems.

Two groups of countries in particular fall into this category:

a. Newly industrialised countries (NICs) and less developed countries (LDCs).

In many NICs and LDCs, the availability and validity of data on construction is very variable. Two recent studies, firstly of the construction industry of India (Connaughton and Potter 1997) and secondly of the construction sectors in Sub-Saharan Africa (Lopes and Ruddock 1996) both found the deficiency of reliable data to be a major problem.

The research on India found that, whilst government departments are great enthusiasts for statistics, particularly with respect to public activities, the information is inconsistent between different sources and this makes analysis and comparison difficult. Further, because construction is not formally championed by any central government department, there is a significant lack of useful data on workload and output.

Information about private sector construction activity is even harder to find, especially as much of it is undertaken by the 'informal' sector. The professional institutions and trade associations represent only a small proportion of the total number of those involved in construction and, not surprisingly, they too are very much in the dark when it comes to assessing the total value of construction work in India. The researchers conclude that 'we have, in many cases, had to make our own estimates, which are derived from data on other industries'.

b. Central European Countries (CECs)

In many CECs, in which construction and property markets are still evolving, a critical lack of economic information exists. This is recognised by both researchers and practitioners in the industry. For instance, Euroconstruct (1997), in a recent study of the construction industry in CECs, indicated that, whilst official statistics estimate the shadow economy in this sector to account for 15% of GDP, local experts estimate the actual share to be approximately 30%. Additionally, the extent to which the construction industry, emerging professions and client organisations utilise the available data needs to be assessed.

This paper concentrates specifically on the problems of the latter (CEC) group of countries.

Whilst the recommendations of the UN System of National Accounts (SNA 93) and the European System of National Accounts (ESA 95) are being incorporated into the national accounts of many CECs, these countries have been using, until relatively recently, the MPS system. This has specific implications as the area of capital formation is particularly important for the construction sector.

The difficulties in harmonising statistical data on construction at European level is well recognised. Eurostat recognises that statistics from countries wishing to join the European Union (EU) must be treated with caution, that national sources (especially with regard to construction) do not yet fully conform to EU standards and

organisations such as FIEC (European Construction Industry Federation) have sought to improve the methodology for statistical collection.

A major feature of the structural change is the proliferation of a 'dual' economy. On the one hand, a 'formal' sector operates within the framework of legislation, while, on the other hand, an 'informal' sector flourishes in which all manner of enterprises operate, mostly disregarding applicable legislation. The informal sector provides little or no statistical and other information and contributes minimally to the state coffers. It does, though, serve the purpose of developing entrepreneurial skills to some extent and providing employment and a livelihood to many.

The public sector in CECs is a major contributor to the GNP, through its own service and other enterprises, as well as through its policies, which may encourage, inhibit or inflate economic activity. The state, therefore, plays a role in stimulating or inhibiting construction activity and often invests in construction simultaneously with private sector demand. The amplitude of the construction cycle is thus increased, creating capacity and other problems in the industry.

Regular and timeous availability of economic and construction market statistics, also from the informal industry, will assist central government and other agencies to improve decision making about construction needs, thus eliminating market imbalances and other inefficiencies.

THE DEVELOPMENT OF COMPREHENSIVE INFORMATION SYSTEMS

The UK has a construction sector with a particularly advanced construction market, with well-evolved provision of information systems. For example, the Royal Institution of Chartered Surveyors produce a comprehensive Building Cost Information Service. The Royal Institute of British Architects, the Chartered Institute of Builders etc. provide market information for their members. Complete databases of construction activity and pricing, especially the 'National Planning and Development Database', are provided by building information specialists.

UK experience can be used to provide a model for the development of such systems in CECs. The specific market need requirements of each country's construction sector must be analysed. The initial stage of the research, therefore, requires a statistical analysis of the structure of the construction industry in the various countries to be carried out.

Policies affecting the construction sector will be examined with particular reference to the construction market and a comparison with EU policies will be made. Policy recommendations about the harmonisation of construction industry policies in all three countries will also be considered. The countries analysed have many common features. Review of the construction sector is severely hampered by the inefficient supply industries and a most urgent requirement is to improve information systems in the industry.

The evaluation of data availability in the CECs

In order to consider a suitable framework for the development of a system for these transitional economies of the CECs, a comparison can be made with the situation in another transitional economy. In their work on the development of information systems in the South African construction sector, Eksteen and Langenhoven (1997) propose a workflow method of data categorisation. This is shown below in Figure 1,

starting with clients, progressing to professionals, contractors, suppliers and ending with the property market which represents the assets created by the groups higher up in the workflow chart.

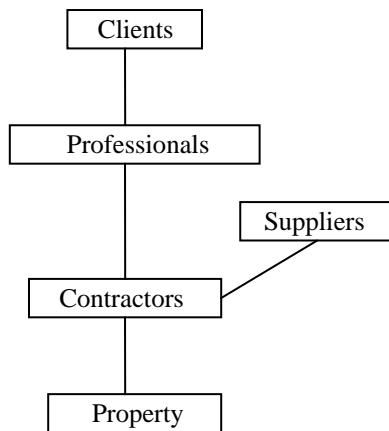


Figure 1: Workflow chart

Such a system is particularly appropriate for CECs, where the data available lacks completeness. There may be different reasons for this. It may be due to an underestimation of the importance of comprehensive data availability or it may be caused by lack of perception regarding the composition of the overall system. The industry may be seen as important in gross fixed investment but only as a derivative of investment taking place in the rest of the economy.

It is vital for actors in the construction sector to have a comprehension of the way in which the market place operates simply to survive. The opening up of the CECs' economies in the 1990s has posed a challenge for superior market intelligence. The overwhelming share of data is inevitably collected and collated by government institutions and, in many cases, government institutions are the primary sources of that very information. Private sector institutions gathering and producing data are almost unheard of. They are simply not economically viable. Yet there is a dire need for some institution to fill the void in data in the market economy.

The general problems apply basically to all the different sources of information, which are available. More specifically, pertinent to the different sectors in the *workflow*:

- *Professionals:* There is very little understanding of market sizes, trends in employment and training needs. In some cases, institutions have been set up based on their Western European counterparts and progress is being made in this area.
- *Suppliers:* The opening of barriers to outside competition has greatly complicated the problem.
- *Construction companies:* One glaring omission is the lack of industry benchmarks.

Lack of data on standard labour rates, for instance, makes it difficult for individual firms to compare their own performance.

PROPOSALS TO IMPROVE THE SYSTEM

At the present stage in the development of the market economies of the CECs, the establishment of priorities and the allocation of resources both present difficult problems. A commitment to establish a system is needed from government departments, from the organised construction industry and from the construction professions.

There is, therefore, a need to identify all present sources of construction data and a network of collaborators within these sources also needs to be established. The initial purpose being to coordinate and categorise the present data according to source and user. Thereafter, a procedure for regular updating and distributing data needs to be established.

The thorny issue concerns the costs of establishing and running the system. Funding can come from levies raised on members of contractors groups and professional organisations or from subscriptions from system users, though initial setting up costs should be government assisted.

CONCLUSION

It is apparent that improvements in data availability for anyone concerned with the macroeconomics of the construction sector are being made, but at a relatively slow pace. For construction economics researchers, improved data availability enables us to better understand the role of the industry in the economy but the benefits to construction contractors and all other actors in the industry of more reliable data are also obvious. The need for data and its interpretation in any enterprise is essential for planning and strategic management and indeed may be vital in the assessment of its own competitiveness.

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