

A COMPREHENSIVE STUDY OF SOUTH AFRICAN CONSTRUCTION DATA SOURCES

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Abstract

This paper examines published construction data sources available to researchers, construction professionals, clients and government policy makers in South Africa. The paper explores whether the authenticity of these data sources are reliable and accurate because there are assumptions and processes behind the computation of the data sources which are unknown. The rationale for the examination of these documented construction data sources stems from the argument put forth by scholars that a significant number of these data sources have loopholes and black holes and therefore need to be verified. The paper intends to identify authentic South African construction data sources which can be used in construction data analysis and propose possible methods that should be used in preparing valid construction data sources for publication.

Keywords: Construction Data, Data Sources, Cost Indices, and Industry Performance

INTRODUCTION

According to Ofori (1990) construction is considered to be a sector comprising a number of industries. Sawhney, Walsh and Brown IV (2004), opined that the construction industry consists of a vast array of contractors, sub-contractors and suppliers, resulting in a very complex supply chain. According to Sawhney et al (2004), there are no formalized industry structures that represent all of its stakeholders and its primary output is a series of projects, each resulting in a unique constructed facility. The United Nations (1998) in Ruddock (2002) defines construction activity when used in the compilation of construction statistics as an economic activity directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature and other such engineering constructions as roads, bridges, dams and so forth. Data is regarded as a measurement scale consisting of information, facts and statistics such as cost information used for reference or analysis (Agresti, 2007 and Ofori, 1990). Construction data can therefore be said to mean the information, facts and statistics used in the industry in which fixed assets are erected, renovated, repaired or extended.

The aim of this paper is to explore whether the assumptions and processes behind the development of the published construction data sources available to researchers, construction professionals, clients and government policy makers in South Africa are authentic, reliable

and accurate because according to Patil (2010) and Mc Cabe (2002), there are assumptions and processes behind the computation construction data sources, which are unknown. Furthermore, Ruddock (2002) opined that the ability to provide full conformity with the International Standard Industry Classification (ISIC) is lacking to varying degrees in different countries.

Ofori (1990) noted that owing to the large number of geographically scattered sites from which data needs to be collected, the multiplicity of enterprises involved and their often transient nature, the widespread practice of subcontracting and the risks of omission and double counting that that involves, and the difficulty of defining the boundaries of the industry, statistics on the construction industry are seldom accurate. This view is further corroborated by The World Bank (1984) publication cited in Sawhney et al (2004) which observes that the construction industry is typified by temporary, contract-driven relationships between participants of a given project, and this condition makes characterization and collection of national statistics for cross-country comparison very difficult to satisfactorily achieve. While, Lopes (1998) in Ruddock (2002) referred to the inadequacy and rudimentary nature of data on the construction industry in developing countries pointing out the lack of input-output data in such construction sectors. There is also the added problem of several agencies within a country collecting data on the construction industry in different formats and in relation to different criteria, even where the subjects are similar, leading to unnecessary processing problems (Ofori, 1990 and Ruddock, 2002).

In order to examine the assumptions and processes behind the development of the various data sources available to the construction industry in South Africa and to determine their authenticity, reliability and accuracy, this paper firstly presents the holistic methods used in the compilation of construction data – including definitions and descriptions of the data. Secondly, the paper identifies the published construction data sources and information available to users in South Africa. Thirdly, the paper reviews the assumptions and processes used in compiling the construction data in South Africa and the limitations of the data if any in order to establish the authenticity, reliability and accuracy of the available sources. Finally, the paper proposes possible methods that could be used in preparing valid construction data sources.

HOLISTIC METHODS USED IN THE COMPILATION OF CONSTRUCTION DATA

The construction data to be used in the paper will be mainly related to the resource costs, construction cost indices, all in rates of major items of work, labour cost, national statistics such as GDP, income per capita, construction industry performance indices and so forth. The focus on cost (quoting O'Brien and Al-Soufi (1993)) is due to the fact that it continues to be the dominant dimension in construction with its use of competitive tendering, commodity suppliers and sub-contractors.

According to Ofori (1990) there is a wide range of sources used to gather construction data including direct reporting by contractors, federal government regulatory agencies, and federal, state and local government agencies engaged in construction activity. He further stated that construction data can be obtained in surveys, on a sample basis with estimates made for enterprises not responding to the questionnaire and those not surveyed. In some cases, Ofori (ibid) noted that the data relates only to major conurbations and sometimes only to certain category of projects – location e.g. cities, government construction units, new construction,

value, and method of procurement – e.g. traditional, size of establishment by number of employees, licensed and registered construction establishments, tax inclusion or exclusion.

The accuracy of the compiled data has been a topic for consideration before now. Remer and Buchanan (2000) quoted in Sawhney, Walsh and Brown IV (2004) indicated that as much as 50% variation between estimated and actual construction cost has been found to exist depending on the level of effort expended as measured by the cost of the estimation preparation process. As a result, Sawhney et al (2004) observed that wealthier nations are likely to be willing and/or able to devote the effort required to obtain accurate estimates for a standard project and that less wealthy nations may not be willing or able to do so, and as a result, may develop less accurate estimates.

To improve the quality of international (and national) data provision generally, Lievesley (2001) in Ruddock (2002) in his suggestion noted the fact that, although the term ‘quality’, when applied to official statistics is difficult to define, the following components should apply: (1) validity, (2) reliability, (3) currency, (4) clarity and transparency with respect to known limitations and (5) comparability through adherence to internationally agreed standards.

Construction data according to Sawhney et al (2004) should have the following important characteristics:

- A relatively shortlist of items, in order to minimize the effort required to collect the data
- Incorporation of productivity and the labour/equipment tradeoff into the result
- Items on the list should be representative of construction work performed in each country, meaning that they should be things that actually occur routinely rather than items with artificial pricing due to scarcity of use or lack of demand, and
- Items on the list should be comparable between countries, meaning that they should be as equivalent in objective and perceived value as possible in every country.

Methods used in the compilation of construction data as presented by Sawhney, Walsh and Brown IV (2004) and Mc Cabe, O’Grady and Walker (2002) include: -

- Standard Project Methods which incorporates output indices
- Basket of Goods and Services Approach which incorporates the input indices, and
- Construction component/hybrid based approach

Standards Projects Method (SPM)

According to Sawhney et al (2004), the Standard Projects Method (SPM) was pioneered by Eurostat, and adopted by the United Nations as part of the International Comparison Program (ICP) around 1970. In this method, around 20 standard construction projects are identified for the three basic construction types, i.e. for residential buildings, non-residential buildings and civil engineering works. The projects are documented with a complete set of construction drawings, construction specifications, and bills of quantities for each of the projects. The Bill of Quantities (BoQ) lists basic work items from which the standard project is comprised, and is used in the pricing process (United Nations, 1992 in Sawhney et al, 2004). Pricing of the standard project is done with the help of government and professional quantity surveyors, architects, cost estimators, or civil engineers with some regional modifications. The SPM can be used in gathering output indices. Output indices measure the total cost of construction of a completed structure in each location (Mc Cabe et al, 2002).

The limitations of output indices and the SPM method is that it is a highly complex data collection process and it is extremely difficult to collect the information, usually requiring significant estimating resources (Sawhney et al 2004 and Mc Cabe et al, 2002). Furthermore according to Sawhney et al (2004), it requires specialized knowledge and knowledge of the wide variety of construction tolerances and acceptable quality that exists between nations. The advantage of this approach is that measurement of prices is at the output level and therefore includes productivity differences and the implications of the equipment/labour trade off in its calculation, and the fact that these indices more accurately represent the real costs of construction and reflect local conditions including labour skill, availability and productivity (Mc Cabe et al 2002).

Basket of Goods and Services (BOG) Approach

According to Sawhney et al (2004), the ICP utilizes a basket based on a comprehensive nationwide sample of goods and services on which money is spent in a country. Biru (1998) quoted in Sawhney et al (2004) notes that all expenditure components of GDP including purchases of capital goods and outlays are represented in the basket. The BGS approach is similar in content with the Input method reviewed by Vermande and Van Mulligen (1999), who stated that the input method is based on the weighting of statistical input data (wages, materials and productivity) that is, a factor cost approach. While Mc Cabe et al (2002) viewed the input indices as representative of the construction process inputs such as common materials, equipment and trade labour hours.

The limitations of the BGS method were noted by Sawhney et al (2004) to include its inability to capture productivity very well and that even in cases where the basket includes labour items in most instances, the cost of a fixed number of hours of labour is reported, as it removes the labour/equipment trade-off from the results because no consideration is given to the degree to which some of the trades performed by labour are simplified by equipment use, and also representativity concerns. They opined that existing baskets in common use seem to concentrate on structural elements (concrete and steel principally), which may be appropriate. However, the advantages of input indices as noted by Mc Cabe et al (2002) include the fact that they are the simplest to produce and contain the least error and are useful if labour productivity can be assumed to be similar between the locations or if a general cost of construction comparison is desired.

Construction-Component Based Approach/Hybrid Index

According to Vermande and Van Mulligen (1999), the component method is applied in Germany, Austria, Luxembourg and Canada. They stated that the components, which constitute the basket for the statistical index, specify similar work operations as the building items of the Eurostat bills of quantities. Mc Cabe (2002) notes that the focus of the Hybrid index is on the smaller, more manageable building elements such as foundation walls, insulation or roof membranes to exploit the ease of input index development and the reliability of output indices.

Sawhney et al (2004) opined that it is important to develop a system that can be used to identify component contributions towards final construction output in the nation's GDP in order to establish weightings for the contents of a conceptual model to be called the basket-of-construction components (BOCC). According to them, the proposed model would require pricing of relatively few construction components, and the labour or equipment required to put them in place. As a result, material, labour and equipment costs could be inherently incorporated to whatever degree in a given nation.

PUBLISHED DATA SOURCES AND INFORMATION AVAILABLE IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY

The South African construction data sources and information reviewed below were used only because they were readily available to the authors. Most of the data reviewed are easy to access except for Quantec SA where access may need to be negotiated. While every effort has been made to provide a comprehensive study of the available construction data sources in South Africa, it is inevitable that some sources will have been unintentionally left out.

Statistics South Africa (Stats SA)

Statistics South Africa (Stats SA) is the national statistics agency in South Africa and it is mandated by government to undertake surveys, collect and process data and produce official statistics that will provide the private and public sector with reliable and relevant information. According to Barnes et al (2007), Stats SA's mission is to provide relevant, timely, reliable and accurate body of statistics to inform users on the dynamics in the economy and society through the application of internationally acclaimed practices.

From 1998/99, Stats SA has been developing a set of social statistics. Social and population projects such as the annual October Household Survey and the Population Census have been run to provide Government with critical data for planning and monitoring socio-economic development. According to Stats SA (2010), Stats SA has also emphasized improving the work processes, methodologies and technologies for generating key economic statistics by for example ensuring the compliance of statistical series with the International Monetary Fund and the United Nation's Standards.

Stats SA produces a variety of vital construction data including, GDP on both sectors and inflation, Consumer Price Index (CPI), Producer Price Index is calculated using specific formulas to determine the price escalations for the construction industry. Stats SA also gives a holistic overview of Employment Statistics through its published results of the Labour Force Survey. The Labour Force Survey, which was introduced in year 2000 to track poverty and labour market dynamics, are based on representative probability samples drawn from the South African population. Consequently, all estimates are subject to sampling variability.

South African Reserve Bank (SARB)

Through the South African Reserve Bank's (SARB) Quarterly Bulletin; one can access the National Account's Gross Fixed Capital Formation (GFCF) and the infrastructure spend on private and public sector projects on the Residential, Non-Residential, Machinery, Equipment and Construction Works. The economic data collected by Stats SA and SARB are prepared at various levels of aggregation. This may be illustrated using the CPI which is available at the national level as macrodata.

Industry Insight

Industry Insight offers a wide range of construction business intelligence and customized services these include; Project Database, State of industry reports, Statistics, Forecasts, Newsletters, Provincial Reviews, Preferred Supplier Trade Surveys, Price Indices, Electronic library. In partnership with other willing stakeholders; Industry Insight hosts a series of Focus Forums, in these Focus Forums industry players meet and discuss issues that affect the industry and this also serves as a platform to network and explore other industry opportunities that may be available for the stakeholders.

The Bureau for Economic Research (BER) Building Cost Index

According to Cruywagen (2010), the original BER Index was developed in 1966 by Brook, a quantity surveyor who was at the time responsible for research and development in the quantity surveying division of the Department of Public Works in Pretoria. Segalla (1991) cited in Cruywagen (2010) stated that the original Brook index was based on a variation of the cost items of a single storey, 100m² quasi-house.

Brooke (1974) cited in Cruywagen (2010) explains that the basic logic to the background of the development of the BER index involves the assumption that the total building cost will move in correspondence with the cost of the specific items selected for the purpose. The accuracy of the index will accordingly, depend on the degree to which the items are representative of the most common, and therefore the most widely used, construction and finishing materials. To this end, he stated that the items have been selected in such a manner that the resulting index will be indicative of relative cost levels not only for various types of buildings but also for various regions in the Republic of South Africa and also South West Africa (now Namibia).

Twenty-two cost components including excavation of footings, mass concrete footings, reinforced concrete in slabs and reinforcement were selected and expressed as quantities. These components are then weighted based on the proportions to the role played by each in the total cost, in which consideration had been given to the incorporation of basic design criteria which vary from the simplest one of the fundamental ratio of light or window area to the more complicated criterion of a predetermined floor loading in respect of the ratio of formwork, steel and concrete floor slab component.

By using the quantities (or weights) assigned to the components, an index is calculated for each specific project by multiplying the applicable weights with a rate supplied on a quarterly basis by quantity surveying firms, who submit BER calculation sheets for completed projects. The total amount obtained for each project is then expressed as a percentage of the amount obtained in the base month (Cruywagen, 2010). According to him, these project indices are then used to calculate the overall building cost index.

Davis Langdon Africa Region Property and Construction Handbook

Davis Langdon Africa Region Property and Construction Handbook (2010) highlighted the fact that construction cost estimation is complex and comprehensive exercises based on detailed accurate information are required to achieve reliable levels of comfort, for various undisclosed reasons however, it was revealed that decisions are often based on inclusive rate estimates i.e. rate per m² of construction area or rate per unit in number. It was emphasized that the list of approximate building cost rates for various buildings types in South Africa, which are available in the publication are purely of an indicative nature and should be used with circumspection, as they are dependent on a number of assumptions which were not given. The rates given are said to include the cost of appropriate building services, e.g. air-conditioning, electrical, etc but exclude costs of site infrastructure development, parking, any future escalation, loss of interest, professional fees and VAT. The area of the building expressed in m² is said to be equivalent to the 'construction area'.

Building cost for the purpose of the handbook is deemed to mean the tender price (or negotiated price) submitted by the building contractor. The handbook explains that the words building cost depends on the application thereof in context. A building contractor, for

example, may refer to building cost as the cost of labour, material, plant, fuel and supervision while in contrast, a developer may refer to building cost as either the tender price from the contractor or to the ultimate cost of the project, which could include professional fees, plan approval fees, escalation, loss of interest etc.

The Handbook allowed for regional variations. It explains that construction costs normally vary between different provinces of South Africa and that for example, costs in the Western Cape and KwaZulu-Natal, specifically upper class residential, are generally significantly higher than Gauteng due to the demand for this accommodation.

Support Programme for Accelerated Infrastructure Development (SPAID) Infrastructure Expenditure Tracker

Lockwood (2010) explains that in an effort towards the attainment of the public sector infrastructure programme's objectives, the Business Trust – with the Presidency as a strategic partner – established the Support Programme for Accelerated Infrastructure Development (SPAID). SPAID's goal is stated as being to provide focused support to mobilize an increased private sector contribution to meeting the Accelerated Shared Growth for South Africa (ASGISA) infrastructure targets, while its developmental objective is to ensure that underserved communities have access to infrastructure.

The tracker includes comprehensive data on the level and composition of infrastructure spending in South Africa. Unpublished data was obtained from the South African Reserve Bank that enabled the estimation of the effects of fixed capital spending on the real value of the fixed capital stock, and the quantification of the consumption of fixed capital. Standardized industry data, which was used to assess trends in employment in the construction sector, in terms of both number and skills level was obtained from Quantec (Lockwood, 2010). Multipliers – also obtained from Quantec – were used to estimate the impact of public infrastructure spending on the wider economy in respect of indicators such as value added, remuneration and employment.

Typical information found within the body of the SPAID Infrastructure Expenditure Tracker includes the actual and projected infrastructure spending by the public sector, detailed breakdown of spending on different project types within each province, major projects by types, estimated cost, implementing agent and project completion date, changes in employment in the construction sector among others.

cidb Construction Industry Indicators (CIIs)

Though, the paper will mainly focus on resource costs due to the fact that it continues to be the dominant dimension in construction, mention need to be made about significant construction data being compiled on an annual basis by the cidb.

Construction Industry Indicators (CIIs) were developed by the Department of Public-Works and the cidb with the assistance of the Council for Scientific and Industrial Research (CSIR) in South Africa (Marx, 2009) to play a useful role in developing a sustainable industry and to be adopted as a tool for improving performance in the South African construction industry.

The cidb CIIs has been documented since 2003 and the variables used by the cidb to measure performance of the South African Construction Industry include: client satisfaction with project milestone dates achieved, construction costs versus budget, contractors' performance,

consultants' performance and the quality of materials used in construction. Figure 1 shows the Client Satisfaction results of the Construction Industry Indicators (CIIs) survey for 2009.

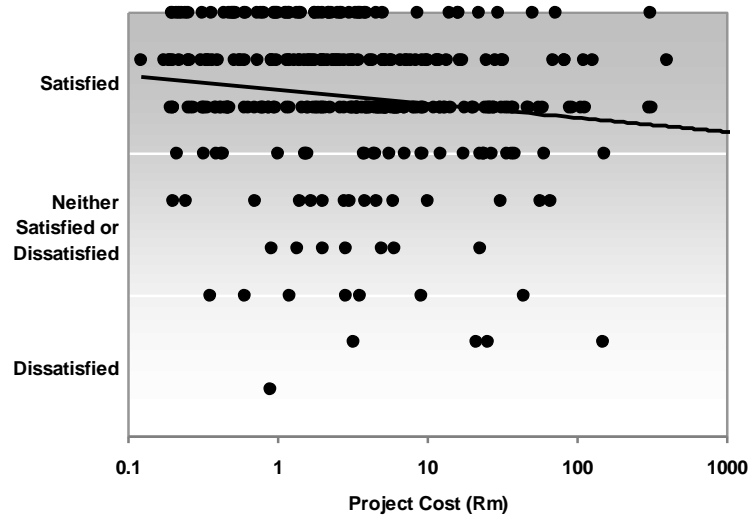


Figure 1: Client Satisfaction (CIIs, 2009)

cidb SME Business Conditions Survey

The SME Business Conditions Survey measures contracting business conditions amongst cidb registered contractors in Grades 3 to 7. The Survey measures, amongst others, the business confidence, and construction activity, tendering competition, employment and labour constraints amongst cidb registered contractors at a provincial level and in various contractor grades. The Bureau for Economic Research (BER) undertakes the SME Business Conditions Survey for the cidb.

The cidb has been undertaking Construction Industry Indicator surveys for the past three (3) years. The trends emerging from these surveys are used to initiate interventions in support of contractor development and the improvement of the overall contracting capacity in the country. Recently, the cidb initiated a quarterly registers monitor to study the registration trends across South Africa.

The cidb SME Business Conditions Survey aims to validate the findings of the internal surveys and provide deeper understanding of the business environment and needs of SMME contractors in order to develop responsive interventions. It must also measure access to work opportunities and the types and value of investments emerging contractors are making in their business across the different provinces. Where possible, the business confidence survey should correlate these to the overall economic climate in the provincial building and construction industry.

Fig 2. Below demonstrates the data that is captured on cidb SME Business Confidence.

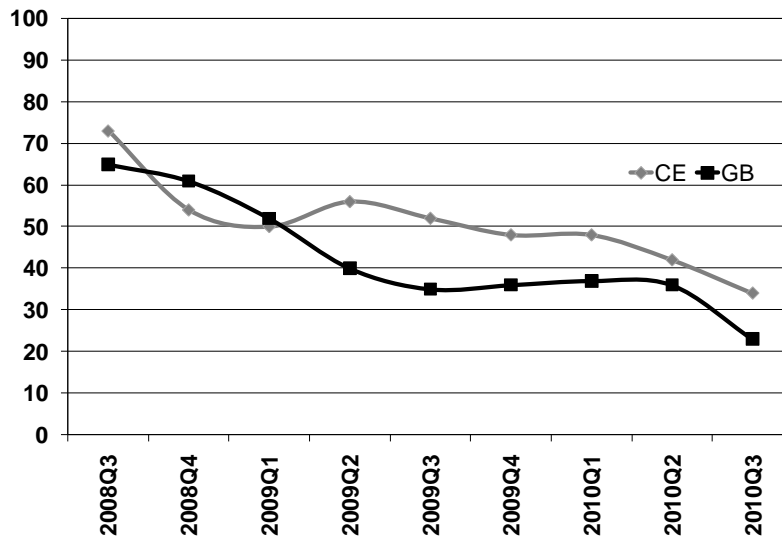


Figure 2: cidb SME Business Conditions Survey (2010)

cidb Quarterly Monitor

The cidb Quarterly Monitor provides an overview of the state of contractor development in South Africa as input to developing targeted development intervention strategies in support of the National Contractor Development Programme (NCDP). The Quarterly Monitor focuses on public sector supply and demand at a provincial level, and deals only with the General Building (GB) and Civil Engineering (CE) cidb Class of Works.

Included in the cidb Quarterly Monitor is the ratio at which the contractors are Upgrading on the cidb Register of Contractors as shown in Table 1 and Figure 2.

Table 1. Contractors Upgrade on cidb Register of Contractors

Upgrades; 201001 to 201004							
From/To	2 to 4	5 & 6	7 & 8	9	Total	Registrations	%
GB							
7 & 8	0	0	11	0	11	280	4%
5 & 6	0	51	51	0	102	1 117	9%
2 to 4	228	193	6	1	428	3 511	12%
1	687	69	4	0	760	59 162	1%
Total	915	313	72	1	1 301	64 070	2%
CE							
7 & 8	0	0	16	10	26	300	9%
5 & 6	0	69	44	0	113	1 248	9%
2 to 4	234	205	9	0	448	2 866	16%
1	484	73	0	0	557	22 225	3%
Total	718	347	69	10	1 144	26 639	4%

Source: cidb Quarterly Monitor (January 2011)

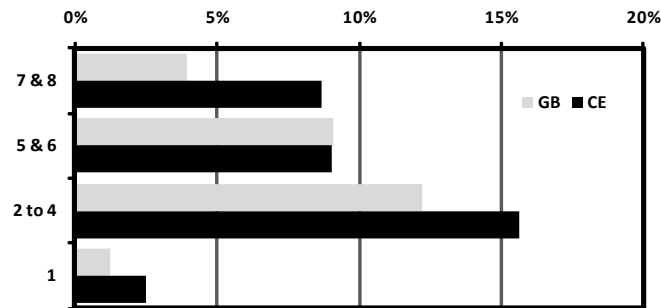


Figure 3: Contractors Upgrade on cidb Register of Contractors
Source: cidb Quarterly Monitor (January 2011)

Quantec SA

Quantec SA discusses the availability of the South African construction industry indicator time-series database that provides disaggregated and consistent long-term view of South Africa's economic structure by industry. The data is compiled by combining a consistent input-output framework spanning three decades with a comprehensive set of industry and national account indicators. The emphasis of the database is on the input and output indices.

SUMMARY OF DATA SOURCES

Table 2 summarizes the characteristics of the available construction data sources in South Africa. It gives an indication if the data types are input, component/hybrid, output or industry performance indices. It also indicates the level of aggregation of the data sources, and if the data provided can be compared along location indices and regions in South Africa. Other variables tabulated are the source of information whether from private or public agencies and the possibility of expressing the data compiled as a time series with a view to facilitating comparisons.

Data Source	Data Type						Location Indices	Availability of Time Series
	Labour (Input)	Materials (Input)	Equipment (Input)	Components (Hybrid)	Projects (Output)	Industry Performance Index		
BER Cost Index (Govt)				√				√
StatsSA (Govt)	√	√					√	√
SARB (Govt)					√		√	√
Davis Langdon					√		√	√
SPAID (Govt)	√				√		√	√
cidb Clls (Govt)					√	√		√
cidb Quarterly Monitor (Govt)					√	√		√
cidb SME Business Confidence Survey (Govt)					√	√		√
Quantec SA	√	√	√		√		√	√
Industry Insight	√	√	√	√	√		√	√

Table 2 shows that only three private data sources - Davis Langdon Africa Property and Construction Handbook, Industry Insight construction management services and Quantec SA

are available to the construction industry in South Africa. Davis Langdon handbook, Stats SA, SARB, SPAID, Quantec SA and Industry Insight provide sources of construction data with location indices, though that of Davis Langdon handbook is not comprehensive in nature. It is important to consider location because South Africa covers a very wide expanse of land and that building costs are likely to differ across the republic due to social factors such as population, demand, income levels among others.

LIMITATIONS, AUTHENTICITY, RELIABILITY AND ACCURACY OF THE PUBLISHED DATA

Certain limitations were revealed in the compilation of the readily available construction data sources. For example, although the BER uses the component based hybrid method advocated by Sawhney et al (2004) in the compilation of data, researchers including Martin (2006) quoted in Cruywagen (2010) has expressed concern about the age of the index and that best practice is not followed any more in compiling the index. An indication that the BER is also worried about the correctness of the index is the fact that it commissioned an independent organization in 2005 to investigate whether the index measures changes in the cost of construction in South Africa correctly (Marx, 2005 cited in Cruywagen, 2010). Other major areas of concern regarding the BER index include the current item descriptions and the fact that the items are not in line with the latest version of the Standard System for Measuring Building Work – 6th edition as published by the Association of South African Quantity Surveyors, some of the materials referred to in the descriptions such as Asbestos roof covering and ceiling are outdated and the relative low number of projects sampled (Cruywagen, 2010).

The degree of accuracy of the rates provided in the Davis Langdon Handbook must be considered to be in direct proportion with the amount of research and study undertaken to establish the rate for the building (Sawhney et al, 2004). Furthermore, the publishers of the Davis Langdon Data Source emphasized the fact that the rates presented are purely of an indicative nature and should therefore be used with circumspection, as they are dependent upon a number of assumptions. This statement in itself has cast a doubt on the accuracy, authenticity and reliability of the Davis Langdon Data Source.

Stats SA and SARB make use of reliable methods in the compilation of the construction data sources published. Stats SA specifically makes use of representative probability samples drawn from the whole South African Population and ensures compliance of the statistical series with the IMF and UN Standards. The data presented is representative of all participants in the economy and for all levels of data aggregation

The construction data published by Industry Insight, Quantec SA and SPAID, rely heavily on the primary data obtained from Stats SA and SARB. The only inputs in these documents are the additional reports and insights provided based on further analysis and interpretation of the data obtained. The extent of reliability of their published data will therefore depend to a large extent on the authenticity of the data obtained from primary sources.

Methods used to obtain the data compiled in the cidb publication tend to be reliable and accurate, and based on information from a representative sample of contractors on the cidb Contractor Register and classes of works. The survey carried out by the cidb relates to

contractors who are mainly involved with government projects and it might not entirely represent unregistered contractors who are only involved in private projects.

Limitations identified on a global scale by Vermande and Van Mulligen (1999) is the difficulty with pricing of building specifications. According to them, building cost experts sometimes are not familiar with particular items, work operations or materials specified in the bills of quantities. Prices given can therefore be completely wrong. The case of the Eurostat surveys is considered to be more serious by Vermande and Van Mulligen (1999), due to the hybrid composition of a 'basket of building types' which has to be representative of all EU-countries, and due to the fact that Eurostat statisticians perhaps have too little construction experience.

CONCLUSION

Ruddock (2002) opined that if the national system cannot provide efficient access to micro-data bases, both business and governments will come to depend increasingly on private proprietary databases, and the advantages of an overall integrated system will be lost. The scenario in South Africa is such that a significant number of the available construction data sources are provided by the government and even the private data source obtains a significant part of its information from the government data sources thereby attempting to integrate the public and private sources of construction data suggested by Ruddock.

Seemingly therefore, there appears to be no visible loopholes and black holes in the computation of the investigated data sources in South Africa and all the data sources can be said to be authentic having made use of standard practices, save only for that of Davis Langdon handbook, wherein the fact was emphasized that the rates presented are purely of an indicative nature and should therefore be used with circumspection and the BER index of which scholars have expressed concern about the practice used in its compilation.

As a guide to construction data compilation in South Africa, it is recommended that samples should be used that will reflect the diversity and size of the country using accepted standards such as input, composite/hybrid and output methods.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the support of the Construction Industry Development Board (cidb) and Dr. Rodney Milford, Programme Manager, Construction Industry Performance, cidb, for his guidance and valued contributions.

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