Which Index Series?

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SUMMARY

This paper looks at the building cost index series available in New Zealand and the relevance of those series, primarily to cost control during the design period and, to a lesser extent, to their relevance as a reasonable basis for the recovery of costs arising from inflation.

INTRODUCTION

Estimating and cost planning

Control of cost during the design process has for long been influenced by the absence of any satisfactory building cost (or price) index series and with inflation currently running in the 10 to 17% range (dependent upon which series you use) an additional measure of uncertainty has been introduced for those attempting to realise their client's objectives.

The control of building costs in the design stage is well understood by most large development organisations. Public clients have for many years employed their own professional staff to brief and to supervise either their own professional departments or outside consultants. More recently the larger institutional clients in the form of insurance companies, banks, state trading corporations, religious orders, etc, have employed their own professional staff to brief and to supervise consultant designers.

Budgets are mostly set from prepared sketch plans (cost tending to follow design, rather than the reverse) and clients usually have some rule-of-thumb method of assessing the reasonable or the acceptable level of cost that they have in mind for a project. That assessment is normally based upon their own past experience or upon published information.

Unless clients have a considerable building programme, difficulties arise in relating the source of their budget assessment with the time period and the location of their present project.

While designers are expected to have more skill in the assessment of costs and while they will normally have access to a wider field of cost data than their client, differences between client and consultant frequently arise from an inability of each to satisfy the other of the reasonableness or even the relevance of their own budget evaluation.

When agreement has been reached upon an overall budget figure, there remains opportunity for considerable misunderstanding about the real relationship between cost statements arising from cost checks of individual elements and the pre-dated or post-dated budget figure. With the larger project and the longer design period the problem is increased. Given the potential lack of accuracy inherent in any design estimating process, an additional inaccuracy is introduced by an inability to relate element work categories to the time base of the overall cost plan.

Most quantity surveyors would recognise the condition of temporary relief that can be offered by this grey period in the design cost control process and the opportunity offered to mitigate previous discrepancies from whatever cause. Equally many clients would recognise a period of uncertainty when they are aware of the potentially different movement that may be occurring between the inflationary level of the element under consideration and the project as a whole.

Calculation of fluctuations in cost

In recent years, due both to the influence of a high level of inflation and to an increase in the incidence of a number of very large projects, contractors, and others, have become more acutely aware of the considerable costs involved in recovering cost fluctuations by conventional means.

As far back as June 1975, the New Zealand Institute of Architects amended their published form of contract by introducing a revised Appendix III. A revision that would offer the parties an alternative to the conventional method of inflationary cost reimbursement; a method of recovery based upon the application of a formula. Unfortunately the alternative offered preceded the availability of a suitable index series against which a formula could be applied. Many factors have in the meantime combined to prevent a formula method of cost recovery being widely used.

CONSTRUCTION PRICE AND COST INDEX SERIES

Published series readily available

The construction industry in New Zealand has been slow to recognise the need for a specialist index series reflecting its own distinctive needs, particularly in terms of (net) cost and (market) price.

Of the three widely published series available (Table 1) two are based wholly upon a combination of three series published by the Department of Statistics[1] and the third is based upon a structure and a

TABLE 1

Published price and cost indices

Index	*Index Provides*	*Purpose of Index*	*Basis of Index*	*Frequency of Publication*	*Lapse Time**	*Prices Derived From*
BIAC Building Cost Index	Composite series covering commercial and residential	Economic planning	Resource	Quarterly	2 to 3 months	Official indices
MWD Construction Cost Index	Composite series covering civil engineering work	Measure movement of CE costs	Resource	Quarterly	2 to 3 months	Official indices
NZIV Modal Modal House Cost Index	Composite series covering housing in 25 locations	Measure movement of housing tender prices	Market	Monthly	1 to 2 months	Pricing of standard Bills of Quantities

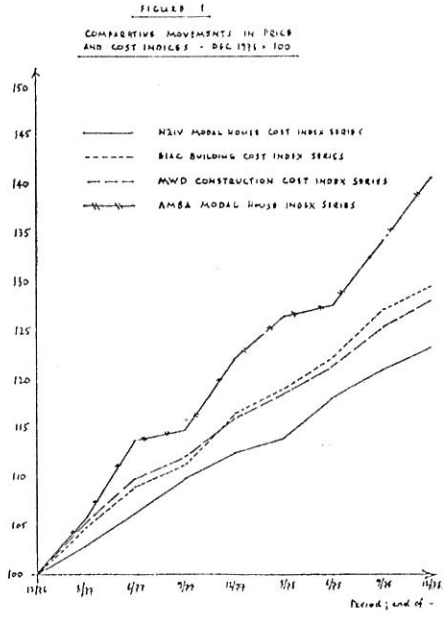
*Lapse time: between gathering of raw price data and the publication of the index.

collection process that is quite independent of official statistics.[2]

The construction and the stated purpose of each of the tabled series is provided by each of the index constructors and also they are summarised on pages 30-35 of *A building cost index appropriate to New Zealand conditions*.[3]

What other series are available?

For many years the Auckland Master Builders' Association (AMBA) have calculated an index series relevant to the needs of their members in the housing sector. This series was dramatically amended and republished early in 1972 with a base of December 1971. The process was extended to other Associations and in June 1973 was published by the New Zealand Master Builders' Federation (NZMBF)[4] as a set of four independent locational series reflecting changes in resource costs of a Modal House. Some details are available of the method of construction of the series and regular information is available upon subscription.



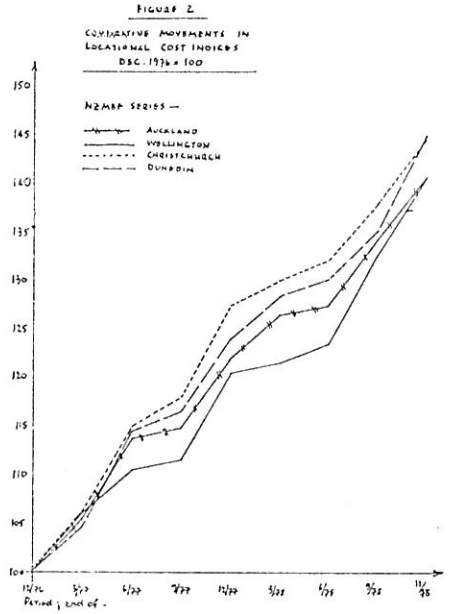
The comparative movements of the three widely published series together with the movement of the AMBA series is indicated in Figure 1.

Figure 2 shows the movement of the NZMBF series in each of the four locations.

Figure 3 shows the separate movement of the labour and the material components of the Auckland section of the NZMBF series, together with the combined movement of those two components.

What are the needs?

It is apparent from the limited material at present available that each series will only, at best, measure movement in cost or in price within the context of its own design. If a series is designed primarily "to estimate real volume changes in demand as measured by building permits issued, and supply as measured by quarterly values of work put in place" (BIAC), it will only coincidentally be useful for some aspect of practical use



in design estimating, etc. Similarly a series constructed primarily for valuation purposes (NZIV), is likely to be a very loose fit when applied to the construction industry.

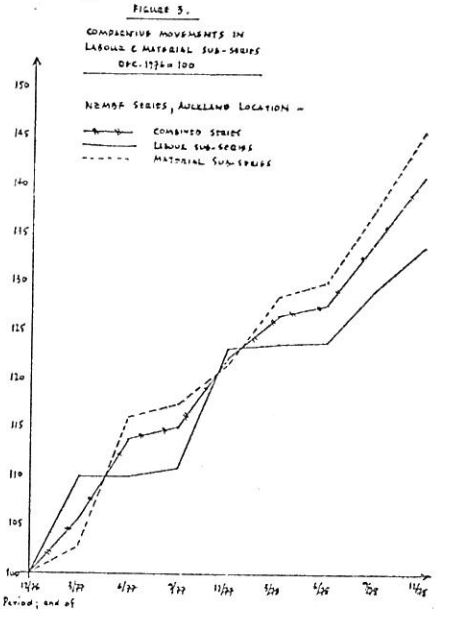
It is suggested that for a series to satisfy the needs of the industry, it would need to record in either cost or price terms—

(i) Influence of time on cost
(ii) Influence of location on cost
(iii) Influence of differing building types on cost
(iv) Cost structure during the design process
(v) Cost structure during the construction process.

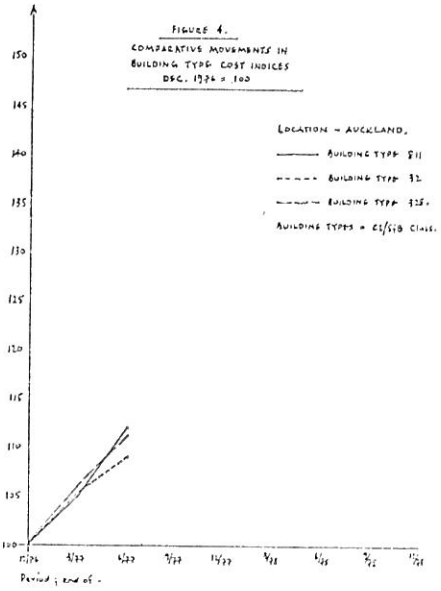
It is further suggested that since there is no datum against which any series may be judged as being more accurate than another, each series should be judged against three practical tests, namely:

(i) That there is a reasonable theoretical basis to the series
(ii) That the series appears to represent the cost (or price) movement of the stated model
(iii) That the series correlates with other relevant data.

Test (i) implies that the method of construction, the regimen and the weighting of the component parts should be accessible to the user (so that he may judge the relevance of the series to his needs). For perfectly understandable reasons the official series which combine to produce both the BIAC and the MWD series are not available to the public. The relevance of either series to any particular use in design estimating or for escalation recovery is therefore uncertain.



The NZIV series has been designed primarily for valuation purposes but has for many years been widely used for other purposes including the interpretation of building costs in different locations throughout the country. The precise method of price determination is not clear and the introduction of a three-month moving average method of "smoothing" price changes has cast doubts about the short term reliability of the series (to the construction industry).



Research carried out as part of a project report[4] attempts to review in detail building cost and price series available in New Zealand (and elsewhere) and to propose a method of construction of a family of series that would satisfy the criteria outlined above.

The application of the proposals outlined in that report are at present being processed and Figures 4 and 5 indicate the principle that most would intuitively acknowledge, namely that different building types and different elements will reflect differing cost trends.

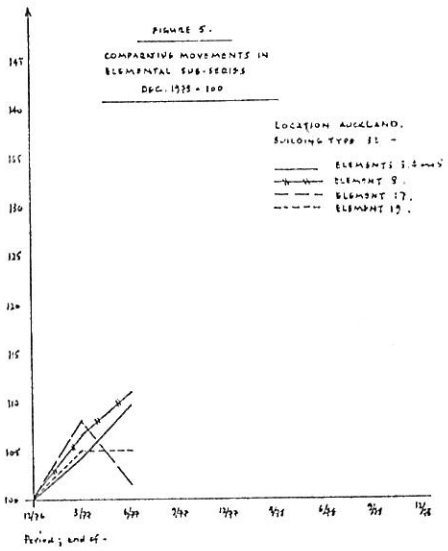
Conclusions

To construct a series (or a family of series) that will satisfy the practical needs of the industry is largely a matter of the need being sufficient to provide the stimulus to act.

To provide some stimulus by suggesting that we know far too little about the movement of "recognisable packages" of cost has been demonstrated by the varying comparative movements indicated in Figures 1 to 5. While the time span of some series is

short, the trends are apparent that:

(i) Different locations do produce different trends
(ii) Different building types do produce different trends
(iii) Different elements do produce different trends, and
(iv) Different trades will produce different trends.



While one needs to look no further than any current BIAC Newsletter[5] to learn of the wide authority available on price movement, the question to be answered is how relevant to the needs of the industry are any of the existing available series.

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The Timber Roofs of the Thames Barrier

Anyone taking a casual glance at the enormous helmet shaped metal roofs on seven of the concrete piers which form the Greater London Council's Thames Floor Barrier in Woolwich Reach could be forgiven for thinking that they were cunningly shaped in steel. In fact the stainless steel is only skin deep and beneath it lies a complex double curvature timber construction of three layers of European redwood softwood on laminated West African iroko hardwood frames.

The helmet shapes of the roofs, which some liken to the upturned hull of a boat, were determined by the outline plan of the piers and when the project was in the design stage in 1973 architects and engineers of the Greater London Council, together with representatives of Rendel, Palmer and Tritton, the consulting engineers for the Thames Barrier, met at the headquarters of the Timber Research and Development Association (TRADA) at Hughenden Valley near High Wycombe, to discuss the feasibility of using timber for the roof construction. The initial conversations revolved around the durability and fire resistance of a timber structure in which TRADA was able to point to the natural durability of certain species of hardwood on the one hand and to the predictable performance with known charring rates of timber in fire conditions.

The design brief given to TRADA, specialist consultants for the timber roofs, was that the shape of the roofs devised and specified by the architects of the GLC, should be achieved with a high level of accuracy and should be capable of prefabrication off-site to reduce site work to a practical minimum. Should the lower parts of the roofs be damaged in use by ships colliding with the piers, the structure must lend itself to easy and effective repair.

Five of the seven roofs involved are 19 metres high and so the length of the arch members required ruled out the use of pressure impregnation of preservative for arch members as no treatment cylinders are available for such lengths. Having settled for laminated arch members, the preservative treatment of laminates before assembly into glulam members was considered but rejected on the grounds that some surface preparation of the timber laminae would have to take place after treatment but before gluing, and the possibility existed of some of the treated timber being planed away to expose untreated wood. This led to the consideration of three hardwood species which were classified as "very durable" and which could be reliably glued. Tysons (Contractors) Ltd, the sub-contractor for the construction and erection of the roofs, who had been appointed by the main civil works contractor, C. T. H. (Costain, Tarmac, HBM Joint Venture) chose iroko, as they had previous experience with this species in glulam work.

The roof membrane beneath the stainless steel skin was designed to be made up of three layers of European redwood softwood boarding. The first layer, 22m thick, was applied at an angle of 45° to the arches; the second layer, 32mm thick, was applied horizontally, and the third layer on the outside, again 22mm thick, was applied at 45° in the opposite direction to the first layer. The first layer was fixed to the arch ribs with glue and ring shanked nails and the following two layers were fixed mechanically and glued together. The crossply construction of the roof membranes gives a multi-directional strength to the shell membrane and ensures that the double curved shape is maintained.

Tysons (Contractors) Ltd—made a one-fifth scale model and sent it to TRADA for load testing. This was carried out in TRADA's mechanical testing hall where it successfully sustained three times the severest design load combination of dead, vertically imposed and wind load.

The production order was for five roofs 19m high × 11m wide and 24m long and for two roofs 15.5m high × 8m wide × 18m long. Tysons have made the roofs in 12 sections for assembly on the piers. The 28 gauge stainless steel sheet cladding is factory applied. The prefabricated sections are erected on site and the cladding seamed and capped. The sections were taken from the Liverpool factory to the site by lorry and transported out to the piers on twin pontoons with a specially constructed deck. Tysons also had to design and build a curved scaffolding from which the ridge could be capped and a cradle to travel down the face of the roof for sealing the vertical joints in the stainless steel between the prefabricated sections.

Table 8
Respondents' attitude to increased mortgage repayments on present income

Respondents	declined to give necessary information	prepared to increase mortgage repayment	not prepared to increase mortgage repayment
No. in sample	3	20	61
Percentage	4	24	72
Av. % of net income spent on actual mortgage repayments	—	20.1%	22.2%

'housing career', in which they start with the cheaper kind of houses or flats and then move later to better houses" (8).

Thus a clear picture emerges of an almost static proportion of net income being expended on housing but with the purchasers moving up the housing market with each entry on to the market. It is difficult to compare the average figure with national figures, since the tables produced from the General Household Survey 1973 include mortgages from both new and older property with new and long-standing mortgage arrangements (9).

The respondents were asked if they were prepared to increase the mortgage repayments on their present level of income in order to buy a better house. Table 8 shows about 24% are prepared to increase their repayments now and many other respondents indicated that future rises in income would allow them to consider increased repayments at a later date.

Conclusions

In choosing the location of the house the respondents exhibited a relative independence due to the ownership of a motor-car. Some respondents had been caused problems by their inability to understand drawings supplied by the builder. To avoid misunderstandings it is suggested that the purchaser should be entitled to view a show house and a part of the estate layout before any agreement becomes legally binding.

The aspirations of most respondents were towards trading-up the housing market on subsequent houses after the initial purchase. In respect of the financial arrangements many respondents would welcome impartial expert advice for this most important decision.

An analysis of the respondents' replies revealed the existence of thresholds of satisfaction with room sizes. It is quite feasible to use such thresholds as the basis for realistic design guides.

It is interesting that the respondents' assessment of quality did not always agree with that of the experts. The key areas were central heating and the estate layout. The building societies tend to remain aloof from the mortgagors and it is suggested that they ought to play a more positive role in protecting the buyers' interests.

The respondents displayed a realistic approach towards higher standards and were prepared to spend money in order to gain improvements. A recurring theme was the attitude towards moving house. The respondents who had only recently moved into their houses were quite prepared to consider moving again, should the opportunity arise, whereby they could "trade-up" to a better house. This mobile approach was plainly linked with the advantage that could be gained in moving up the housing market.

The overall impression given was that the respondents displayed a commendable drive in seeking to improve their housing standards by their own efforts but at the same time they displayed a realistic approach to the consequent economic restraints.

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