

RICS

Predicting construction duration of building project

FIG Congress
Munich
October 2006

Theresa Burrows, Ian Pegg and Joe Martin,
BCIS.

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‘Significant Contract overruns are almost invariably traced to weaknesses on the part of the client as opposed to the professional consultants and contractors engaged to deliver the project. The most common deficiencies are weak client briefing and frequent client changes during the design and construction phases’

NHS Executive Capital Investment Manual

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Data availability

- Plenty of data on costs
- BCIS database of over 15000 projects
 - £/m²
 - £/functional unit
 - Elemental cost analyses
- No such data on time
 - BCIS record contract period not outturn

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Key Performance Indicators

- Introduced in 1999
- Included KPIs for Time and Cost predictability
- BCIS carried out the data collection and analysis on behalf of the Government (DTI)
- Provided data on actual durations

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Key Project Stages

Key Project Stages

A Commit to Invest
Client Sanction → Design

B Commit to Construct
Start on Site → Construction

C Available for Use
Construction Completion

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Key Performance Indicators

Cost and Time Predictability Unadjusted- Construction Period B to C

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Causes of unpredictability of time

- The impact of increases in time, unlike costs, cannot be shared and therefore always affect predictability
- Lack of information on actual time taken on projects

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Factors that affect time to build

- Phasing
- Design
- Site access
- Site conditions
- Market constraints
- Complexity
- Availability of resources
- Availability of finance

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Factors that affect time to build

But we do not know these things at the inception of a project

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Construction Duration Calculator

Input screen

Building Construction Duration Calculator version 1.0.1

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Procurement route:
 Traditional Design management and construct Construction management
 Design and build Management contracting Other

Building function:

Region:

Value (anticipated contract sum): Date of project:

Contractor Selection:
 One stage Two stage Negotiated Partnered

Client:
 Private sector (non housing) Local government Housing association
 Private sector (housing) Other public sector

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Calculate Exit

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Feed back from users

- Functional groupings too broad
- Need to use individual building types
- Deflation adjustment is restrictive
- Need to predict whole project duration not just construction period

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Internal Feedback

- Look at A-C as well as B-C
- Try other transformations in the model

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New Study

- Update using expanded data base
- Look at data on project time as well as contract time
- Use building types in the model
- More flexible way of standardising costs

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Data used in study

Based on analysis of known variables for:

- Over 2,700 building projects carried out in the UK
- Projects completed between 1998-2006
- New build building projects only
- Based on **actual** construction duration period (from construction stage B to stage C completion)

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Data used in study

- Projects for which some of the project variables were unknown have not been included
- Refurbishment schemes excluded
- Infrastructure projects excluded

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Known project variables

- ✓ Project Sector (4)
- ✓ Client Type (5)
- ✓ Procurement Route (6)
- ✓ Building Function (29)
- ✓ Contractor Selection Method (5)
- ✓ Region (11)

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Projects by function

Function	Percentage
Residential facilities	34%
Administrative, commercial and protective facilities	15%
Educational, scientific and information facilities	14%
Utilities and civil engineering facilities	12%
Recreational facilities	8%
Health and welfare facilities	6%
Industrial Facilities	7%
Common facilities and other facilities	3%
Religious facilities	1%

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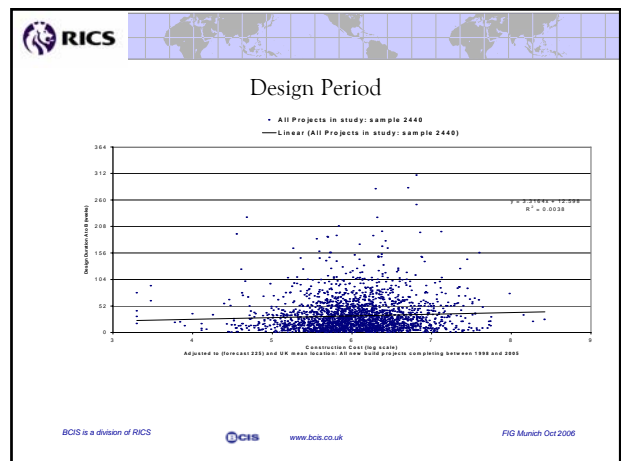
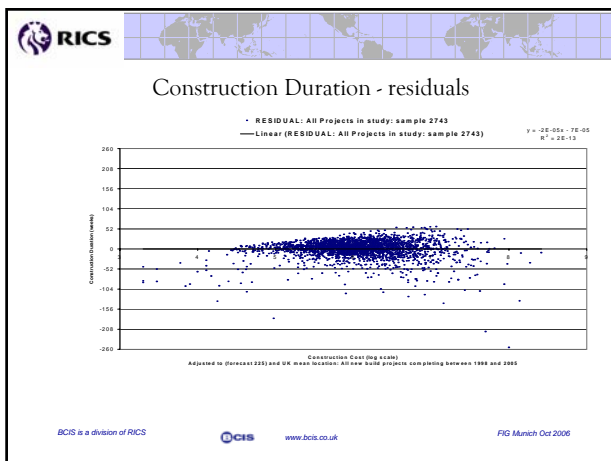
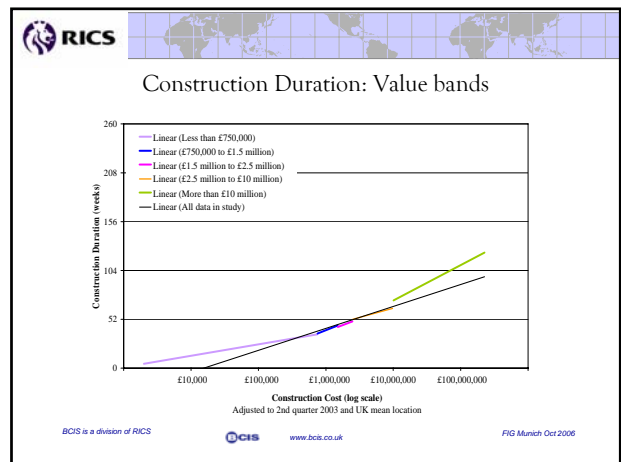
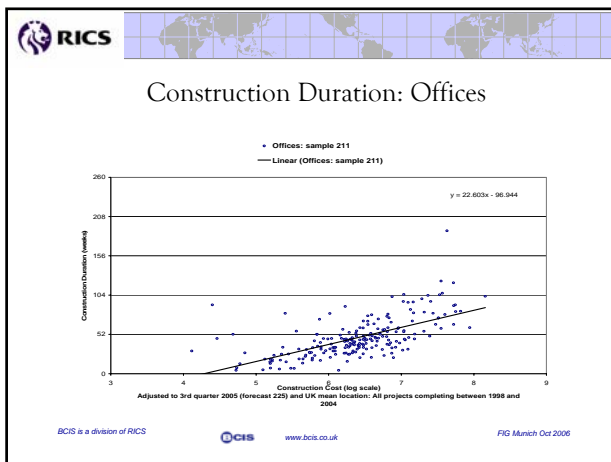
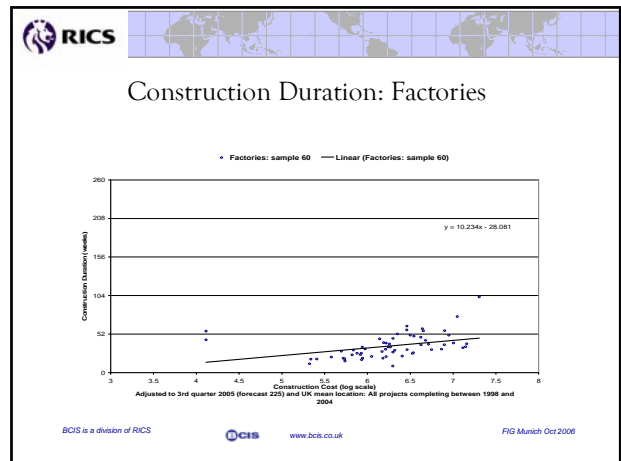
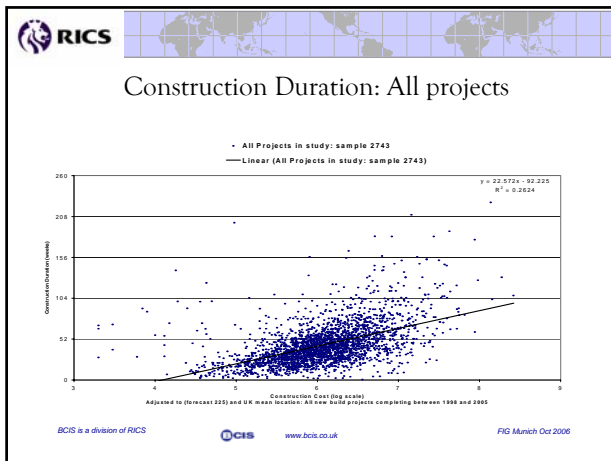
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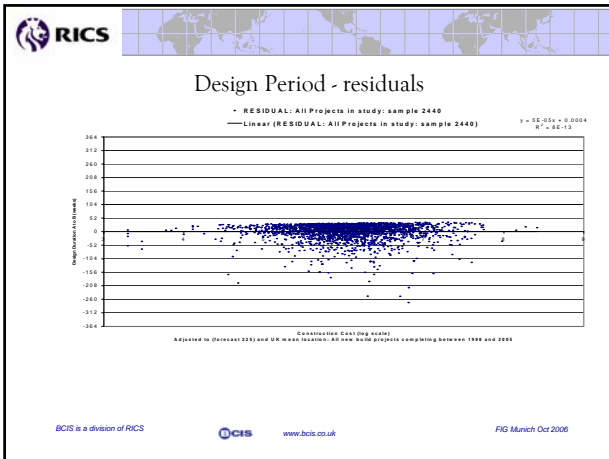
Data Analysis

Various relationships between the construction duration and the cost were tested including:

- spend rate per week
- total construction cost
- log of total construction cost

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Construction Duration Calculator
 Input screen

Building Construction Duration Calculator version 1.0.1

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Procurement route:
 Traditional Design manage and construct Construction management
 Design and build Management contracting Other

Building function: 200 Industrial facilities

Region: North West

Value anticipated (contract sum): £ 1,000,000 Date of project: 01/2004 (2007 Forecast)

Contractor Selection:
 One stage Two stage Regulated Framework

Client:
 Private sector (non-housing) Local government Housing association
 Private sector (housing) Other public sector

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Construction Duration Calculator
 Output screen

Estimated contract duration is 20 weeks

This is an average for the building specified and the 90% confidence interval for this estimate is 17 to 24 weeks.

Individual projects will take more or less time than the average: an approximate 90% prediction interval for individual projects is 6 to 43 weeks.

The parameters used were:
 Contract sum: £1,000,000 (£1,007,000 at 20/2003 UK mean price level)
 Building function: 200 Industrial facilities
 North West
 Design and build
 One stage contract
 Private non-housing client

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