CHAPTER 12 - THE COMBINATION OF THE HISTORIC TIME SERIES WITH PRIMARY DATA AND FUTURE SURVEY DATA TO CREATE A STRATEGIC MANAGEMENT INFORMATION SYSTEM FOR THE SOUTH AFRICAN CONSULTING ENGINEERING INDUSTRY

12.1 Introduction

The previous chapters included a literature survey, a description of the available quantitative secondary industry data and the primary data collection process through ten surveys of the South African consulting engineering industry. Chapter 11 in particular dealt with the evolution of survey questionnaires and reporting formats in these industry surveys. This chapter illustrates how secondary and primary data was used to create a SMIS for the South African consulting engineering industry. This was done by presenting relevant time series for a number of representative indicators of key business areas in consulting engineering and discussing the process by which the various time series were developed from primary survey data that was calibrated using available secondary data. In Chapter 13 the developed SMIS was evaluated against the criteria for a suitable SMIS as stated in Chapter 6.

The section headings used in the survey forms and the State of the Industry reports are often mentioned or even used as section headings in this chapter for ease of reference.

12.2 Statistics in the strategic management information system

The survey reports, called the State of the consulting engineering industry reports, included a statistics section that provided an overview of survey results by presenting summarised statistics and trends on the key indicators of the health of the South African consulting engineering industry. This included forecasts for each of the indicators for the six-month period following every survey. The following paragraphs deal with statistics on the individual indicators.

12.2.1 Employment in the South African consulting engineering industry

The total number of people employed by firms represents an important indicator of the level of activity in the local consulting engineering industry and of the reaction of the industry to its external business environment. Changes in employment levels can furthermore be interpreted with other data to monitor increases or decreases in productivity in the industry. The more detailed breakdown of employment by category will be discussed under 12.11, the human resources management section of this chapter.

Table 12.1 presents statistics on the actual total employment levels within the South African consulting engineering industry on various dates during the study period as determined from the quantitative survey questions on employment. The table furthermore presents the various forecasts for changes in total employment as determined from the qualitative questions in the human resources section of each of the questionnaires. Forecasting only commenced from the fifth survey onwards as it could not be done with confidence using only the few primary data points. The construction of the historic time series from secondary data took place in the period up to March 1998 and forecasting

commenced in December 1998 after calibrating primary data using of the historic time series. The simple short-term forecasting technique used is described in Annexure 5.

TABLE 12.1

Total employment in the South African consulting engineering industry

Date/ Survey no.	Actual employment (1)	Forecast employment	% deviation of actual from forecast	Comment on forecasts
Jun-96 Pilot	11 938			No forecast information available prior to this study
Jun-97 No. 1	12 185			Forecast not possible from pilot survey
Jan-98 No. 2	12 618			Meaningful forecast not possible prior to construction of historic time series
Jun-98 No. 3	12 379			Meaningful forecast not possible prior to construction of historic time series
Dec-98 No. 4	11 512			No forecast done; testing historic time series
Jun-99 No. 5	11 035	10 476	+5,336%	Forecast from December 1998 survey
Dec-99 No. 6	10 382	10 372	+0,096%	Forecast from June 1999 survey
Jun-00 No. 7	10 634	10 414	+2,113%	Forecast from December 1999 survey
Dec-00 No. 8	11 006	9 971	+10,38%	Forecast from June 2000 survey
Jun-01 No. 9	10 236	10 682	-4,175%	Forecast from December 2000 survey
Dec-01		10 799		Forecast from June 2001 survey

Note: (1) Survey information adjusted using the historical time series for total employment constructed from secondary data (Table10.6) and applying the benchmarking or calibration techniques described in Chapter 8 (8.2) to primary (survey) data as shown in Table 12.2.

Table 12.2 illustrates how secondary data was used to calibrate the primary data obtained from initial surveys carried out prior to the establishment of the historic time series.

TABLE 12.2

Calibration of survey information on employment using historic time series constructed from secondary data

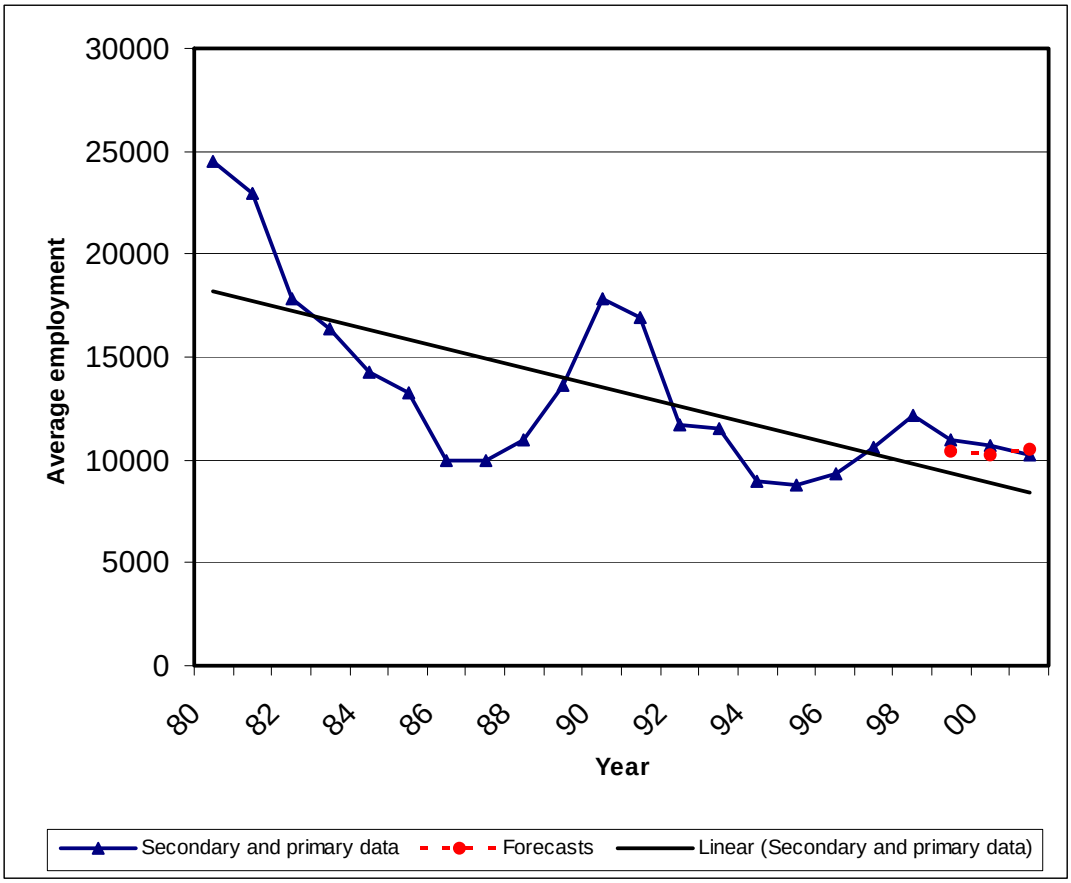
Date	Survey information on total employment (1)	Adjusted primary data
Jun-96	12 988	11 938
Jun-97	14 716	12 185
Jan-98	15 246	12 618

Note: (1) Survey information as included in the report for the period July 1997 to December 1997. This information was obtained by inflating the data from respondents to a level considered to be representative of the South African consulting engineering industry without the benefit of secondary (benchmarking) data, i.e. prior to the construction of the historical time series for total employment (Table 10.6) from secondary data.

Figure 12.1 illustrates the total employment figures for the South African consulting engineering industry. The linear trendline applied to the historic and survey data (constructed using Microsoft Excel ™) shows the continuing trend of reducing total employment. The forecast values shown illustrate the figures contained in Table 12.1.

FIGURE 12.1

Employment in the South African consulting engineering industry (historic secondary data and adjusted primary survey data)



The question arises whether the decreasing level of employment resulted only from the reduced activity in the sector or whether the figures also reflect an increase in productivity. The secondary data in Chapter 10 (Table 10.6) did show an increase in productivity, measured as the ratio of people employed per inflation adjusted fee income earned, for the years 1980 to 1997.

The number of people employed to earn R1 million in fees reduced from 6,754 in the 1987 census to 5,817 in the 1993 census [198, 199]. This represents an increase in productivity of 13,873%, which can probably be ascribed to an increase in the application of information technology and the automation of design office functions during this period. In spite of the improved productivity the total expenditure on salaries, as a percentage of fee turnover, declined from 50,3% in 1987 to 43,7% in 1993, while profitability declined from 10,9% in 1987 to 9,9% in 1993, indicating that operating costs, other than staff-related costs, e.g. the cost of increased use of information technology and office automation and the cost of operating capital, increased substantially over the period.

The measurement of productivity during the study period rendered the data shown in Table 12.3, which do not represent a steady increase in productivity, but a more erratic variation in the number of people employed per R1 million fees earned. This variation can probably be ascribed to:

- Changing industry confidence levels (refer to 12.7), i.e. the expected future activity levels in the industry at the time,

- and the time lag between changes in activity levels and corresponding increases or decreases in employment levels.

This is also illustrated in Figure 12.2, which can be read in conjunction with the confidence level graph in Figure 12.13.

TABLE 12.3

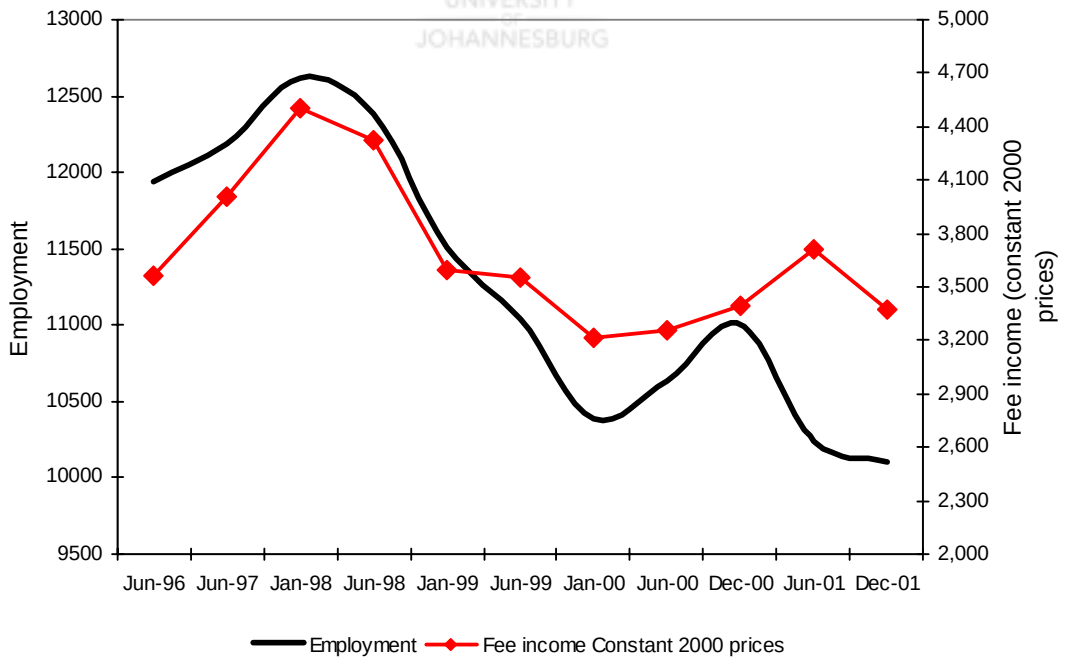
Productivity, measured as the total number of people employed to earn R1 million in professional fees

Date	06-96	06-97	01-98	06-98	12-98
Number employed	11 938	12 185	12 618	12 379	11 512
Fee income [R mill. At constant 2000 prices]	3 561	4 012	4 502	4 323	3 598
People per R 1 mill. inflation adjusted fees	3,352	3,037	2,802	2,864	3,199

Date	06-99	12-99	06-00	12-00	06-01
Number employed	11 035	10 382	10 634	11 006	10 236
Fee income [R mill. At constant 2000 prices]	3 558	3 212	3 259	3 395	3 716
People per R 1 mill. inflation adjusted fees	3,101	3,232	3,263	3,242	2,754

FIGURE 12.2

Employment against real value of fees earned



12.2.2 Consulting engineering industry salary cost

The total expenditure by firms on salaries represents an important indicator of activity levels in the local consulting engineering industry and of the salary levels, the main input cost in the industry. Changes in salary expenditure reflect changing economic activity and availability of staff.

Table 12.4 presents the actual total annual expenditure on salaries by the South African consulting engineering industry on the dates shown, i.e. as determined from the relevant quantitative survey question. It also shows the forecasts for changes in total salary expenditure as determined from the qualitative questions in the human resources section of each of the questionnaires.

Forecasting only commenced from the fifth survey onwards as it could not be done confidently from the few primary data points, but required the construction of historic time series from secondary data. The construction of the historic time series took place in the period up to March 1998 and forecasting commenced in December 1998 after testing of the time series. The simple short-term forecasting technique used is described in Annexure 5.

Figure 12.3 shows total salaries at current prices as a percentage of total fee income at current prices, indicating that total expenditure on salaries constituted only 34% of total fee income at the time of the last survey.

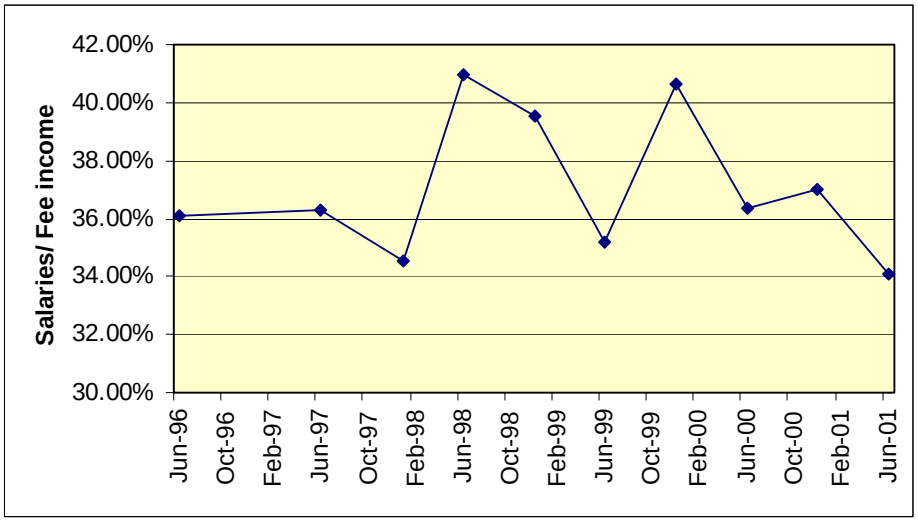
TABLE 12.4

Total salaries paid by the South African consulting engineering industry

Date	Actual salaries [R mill., current prices]	Forecast salaries	% deviation of actual from forecast	Comment on forecasts
Jun-96	961			No forecast information available prior to this study
Jun-97	1 185			Forecast not possible from pilot survey
Jan-98	1 332			Meaningful forecast not possible prior to construction of historic time series
Jun-98	1 554			Meaningful forecast not possible prior to construction of historic time series
Dec-98	1 321			No forecast done; testing historic time series
Jun-99	1 185	1 204	-1,578%	Forecast from December 1998 survey
Dec-99	1 244	1 062	+17,137%	Forecast from June 1999 survey
Jun-00	1 164	1 137	+2,375%	Forecast from December 1999 survey
Dec-00	1 280	1 113	+15,005%	Forecast from June 2000 survey
Jun-01	1 332	1 288	+3,416%	Forecast from December 2000 survey
Dec-01		1 568		Forecast from June 2001 survey

FIGURE 12.3

Salaries at current prices as a percentage of total fee income at current prices



12.2.3 Consulting engineering industry fee income

The annual total fee income (in real terms) earned by the South African consulting engineering industry was stagnant over the study period as indicated in Table 12.5 and Figure 12.2. The fee income figures shown were determined from the relevant quantitative survey question, and the fee income forecasts from the qualitative questions in each of the questionnaires.

Forecasting only commenced from the fifth survey onwards as it could not be done confidently using the few primary data points, but required the construction of historic time series from secondary data. The construction of the historic time series took place in the period up to March 1998 and forecasting commenced in December 1998 after testing of the time series. The simple short-term forecasting technique used is described in Annexure 5.

TABLE 12.5

Annual total fee income earned by the South African

consulting engineering industry

Date	Total fee income [R mill., constant 2000 prices]	Forecast fee income [R mill., constant 2000 prices]	% deviation of actual from forecast	Comment on forecasts
Jun-96	3 561			No forecast information available prior to this study
Jun-97	4 012			Forecast not possible from pilot survey
Jan-98	4 502			Meaningful forecast not possible prior to construction of historic time series
Jun-98	4 323			Meaningful forecast not possible prior to construction of historic time series
Dec-98	3 598			No forecast done; testing historic time series
Jun-99	3 558	3 668	-3,000%	Forecast from December 1998 survey
Dec-99	3 212	3 200	+0,375%	Forecast from June 1999 survey
Jun-00	3 259	3 129	+4,155%	Forecast from December 1999 survey
Dec-00	3 395	2 947	+15,202%	Forecast from June 2000 survey
Jun-01	3 716	3 312	+12,198%	Forecast from December 2000 survey
Dec-01		3 600		Forecast from June 2001 survey

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12.2.4 Changes in values of key business area indicators over time

The year-on-year percentage changes in the values of each of the inflation-adjusted key business area indicators over the study period are shown in Table 12.6 and illustrated in Figure 12.4. It can, for example, be seen in the figure that in the 12 months up to June 2001, employment reduced by 3,75%, while salary expenditure increased by 6,9% in real terms to represent 34% (Figure 12.3) of real gross fee income. The corresponding increase in gross fee income was 14,03%.

The increased salary expenditure, in spite of a reduction in the number of people employed, can possibly be attributed to one or more of the following factors:

- Firms are paying a premium for employing scarce professional staff from previously disadvantaged communities.
- Firms are increasingly using more cost effective, but more expensive contract workers.
- Respondents may not be reporting contract workers as employees.
- There may be a trend towards employing proportionally more graduate professionals and fewer technicians.

The forecast for the six months following June2001, as shown at the bottom of Table 12.6, is that salary expenditure will increase significantly faster than the increase forecast for total fee income, in spite of a further reduction in the number of people employed in the consulting engineering industry.

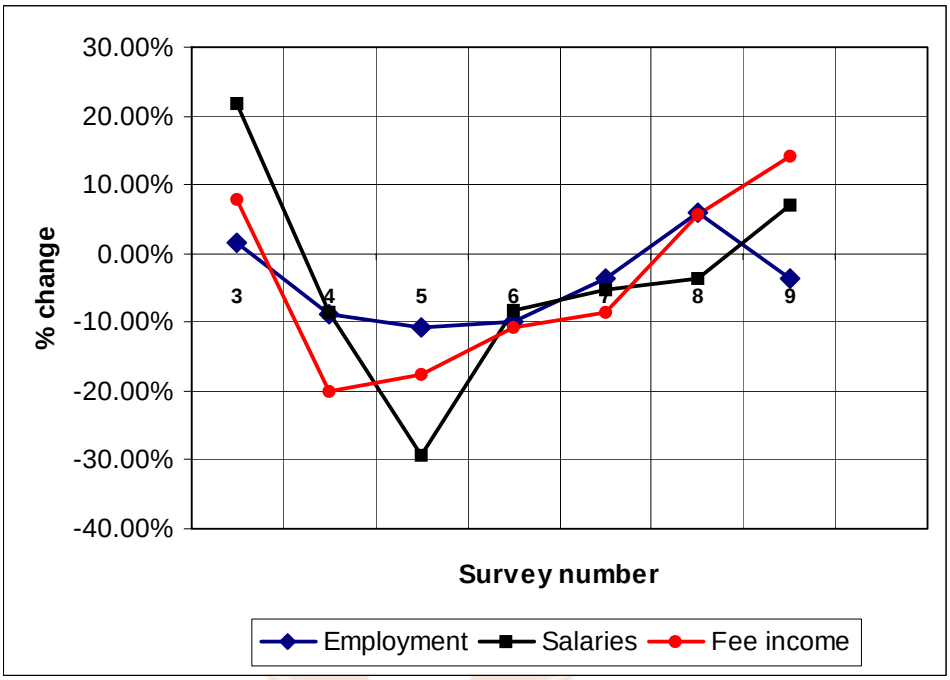
TABLE 12.6

Percentage year-on-year change in inflation-adjusted key business area indicators

Year/ survey no.	Employment	Salaries	Fee income
Jun-98/ 3	1,59 %	21,7%	7,74%
Dec-98/ 4	-8,77 %	-8,6%	-20,07%
Jun-99/ 5	-10,86 %	-29,3%	-17,69%
Dec-99/ 6	-9,82 %	-8,2%	-10,74%
Jun-00/ 7	-3,60 %	-5,4%	-8,42%
Dec-00/ 8	6,01%	-3,6%	5,70%
Jun-01/ 9	-3,75%	6,9%	14,03%
Dec-01 / forecast	-1,88%	14,5%	6,03%

FIGURE 12.4

Percentage year-on-year change in inflation-adjusted indicators



12.3 Features of the South African consulting engineering market

Detailed information on the nature of the South African consulting engineering market has always been lacking. This study provided such detailed information on the type and geographic distribution of work undertaken by the industry as well as of the nature of client organisations that use consulting engineering services. Market trends were established by tracking changes in this data throughout the study period. Certain market features were furthermore tracked by firm size to establish market trends for various size firms.

12.3.1 Type of work

The total fee value derived from work undertaken in each of the surveyed discipline areas or categories of competence was determined from the relevant quantitative questions in the general questions section of the survey questionnaires. The categories were chosen to coincide with the competency areas in the annual declaration forms [172], which all SAACE member firms have to complete. Respondents were therefore familiar with the various category definitions.

Table 12.7 presents typical survey data as obtained from the last three surveys conducted and show the percentage contribution of each of the discipline or competency areas to the total fee income of the consulting engineering industry at the time of the last survey (January to June 2001). The year-on-year change shown is the percentage change in the fee value earned from each discipline area between the June 2000 and June 2001 surveys.

The proportional contributions made by each of the five largest disciplines to the total fee income earned by the consulting engineering industry, as captured in the last 4 surveys, are shown in Figure 12.5. The five disciplines, civil engineering, transportation engineering, structural engineering, project management and electrical engineering jointly represent 75% of the consulting engineering market.

The changes that occurred in the proportional contributions made by each of the disciplines or categories of competence to the total fee income earned are shown in Figure 12.6 for the period June 2000 to June 2001.

TABLE 12.7

Fee income earned from various disciplines or categories of competence

Discipline or category of competence	End date of survey period (R mill, 2000 prices)			Percentage	
	Jun-00	Dec-00	Jun-01	Contribution to total fee earned in Jun-01	Year-on-year change to Jun-01
Acoustics	0	0	0	0.00%	-
Agriculture	8	28	18	0.48%	118.91%
Architecture	5	0	15	0.41%	192.17%
Building Services	57	241	101	2.73%	77.86%
Chemical	1	0	0	0.01%	-42.99%
Civil Works	892	1 539	1 363	36.67%	52.76%
Development	124	79	183	4.93%	47.92%
Dispute Resolution	8	4	9	0.25%	18.77%
Electrical	160	93	174	4.67%	8.66%
Electronic	10	10	30	0.80%	194.23%
Environmental	53	30	71	1.92%	35.13%
Facilities / Maintenance Management	38	30	69	1.85%	81.84%
Geotechnical	76	49	70	1.89%	-7.91%
Industrial	150	15	62	1.66%	-58.86%
IT	280	41	126	3.40%	-54.87%
Land Surveying	2	0	0	0.00%	-100.00%
Marine	111	2	2	0.05%	-98.33%
Mechanical	127	53	68	1.82%	-46.93%
Mining	17	41	1	0.04%	-91.40%
Management Consulting	76	29	74	1.98%	-3.53%
Process Engineering	12	17	12	0.32%	-3.99%
Project Management	263	260	317	8.54%	20.51%
Quantity Surveying	8	1	2	0.06%	-72.64%
Structural	385	470	488	13.14%	26.96%
Town planning	23	13	25	0.67%	7.59%
Transport	372	349	435	11.71%	16.91%
TOTAL	**3 259**	**3 395**	**3 716**	**100.00**	**14.03%**

FIGURE 12.5

Proportional contribution made to total fee income by the five largest disciplines

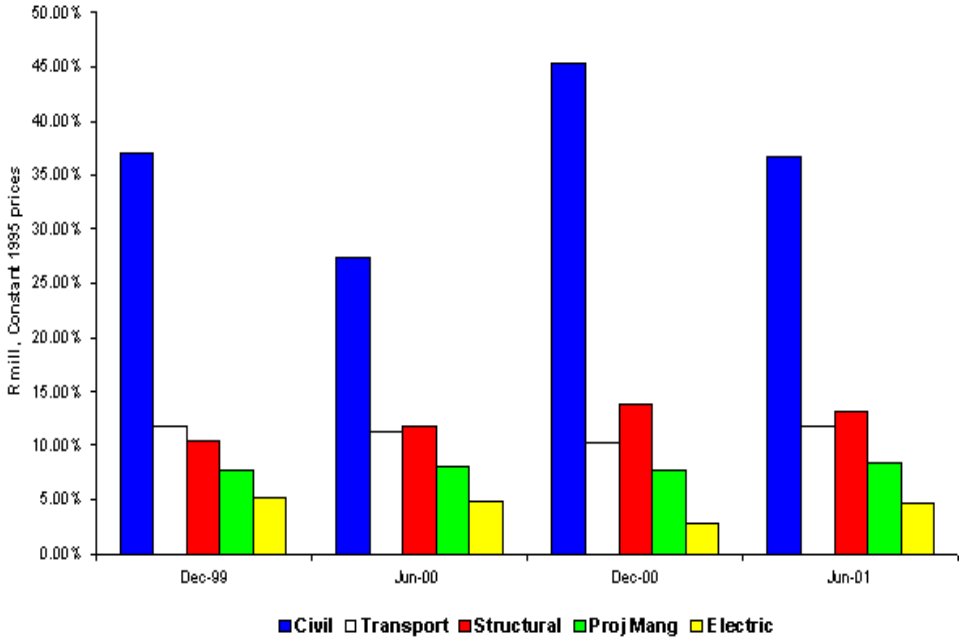
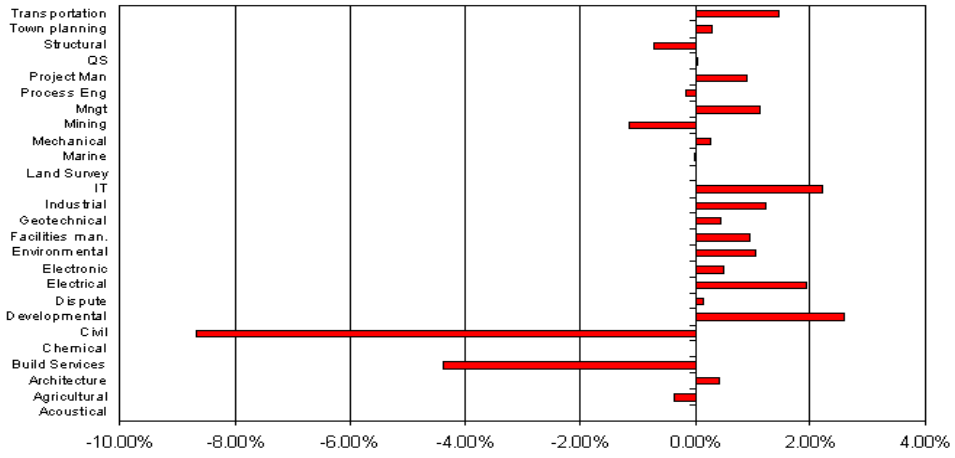


FIGURE 12.6

Change in the contribution made by each discipline to the total fee income earned: December 2000 to June 2001



Percentage points change in contribution to total fee income

***Note*: Percentage points change, e.g. Civil contribution to total fee income was 45,33% in December 2000 and 36,67% in June 2001 therefore percentage points change is –8,66%.**

The data shown for the civil engineering discipline can, for example, be interpreted as follows:

- Civil engineering work represents the largest sub-discipline

- Civil engineering lost 8,66 percentage points from the previous survey to the 36,67% contribution to total fee income earned during the survey period from January to June 2001

- The reduction in the contribution made by civil engineering work to the total fee income of the industry was partially in favour of increases in the contributions by information technology (up 2,2 percentage points to 3,40%), electrical work (up 1,93 points to 4,67%), transportation work (up 1,43 points to 11,71%) and developmental work (up 2,60 points to 4,93%)

- fee income generated from civil engineering work was estimated at R1 363 million (at constant 2000 prices) for the period January to June 2001, which was 52% higher than the R892 million earned during the same period in 2000.

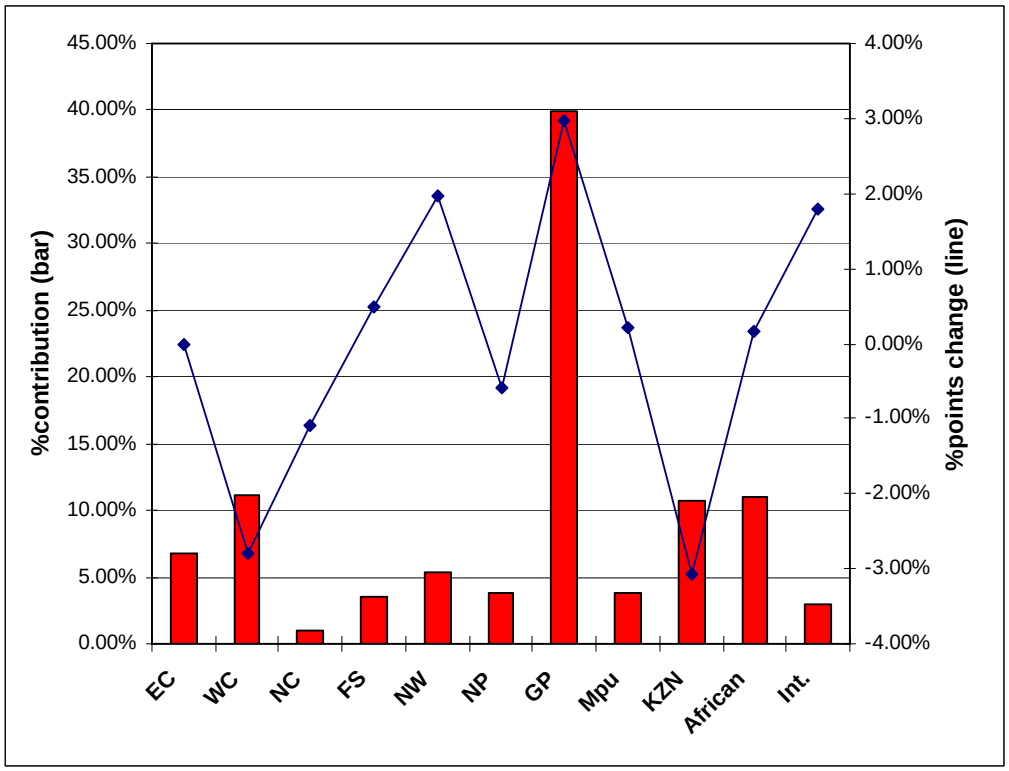
12.3.2 Geographic distribution of consulting engineering work

From the time of the initial pilot survey, firms were asked to provide quantitative information on the geographic distribution of their fee income sources. This was provided in the form of their gross fee income for the specific survey period and the proportion of such income originating from each province and from outside South Africa (Africa and the rest of the world were separated in the later surveys).

The changes in geographical income distribution were tracked over the study period and Figure 12.7 illustrates the distribution at the time of the last survey and the trends over the last 12 months of the study period.

FIGURE 12.7

Geographic distribution of fee income as at June 2001 and the percentage point change in contribution from June 2000 to June 2001



The graph illustrates clearly that Gauteng province is by far the largest contributor to South African consulting engineering income, followed by the Western Cape province, Africa (outside the RSA) and Kwa-Zulu Natal province. The contributions made by the Western Cape and Kwa-zulu Natal provinces

has however reduced sharply over the last year of this study, while the contributions by the Gauteng and North-west provinces and International (outside Africa) has increased over the corresponding period. Table 12.8 shows the value of total fee turnover per geographic area over the study period.

TABLE 12.8

Geographic distribution of South African consulting engineering fee income

[R million, 2000 prices]

Area	Survey period ending							
	Dec-97	**Jun-98**	**Dec-98**	**Jun-99**	**Dec-99**	**Jun-00**	**Dec-00**	**Jun-01**
EC	310	318	236	269	263	222	130	253
WC	679	453	561	543	507	456	254	416
NC	70	31	56	72	71	68	61	37
FS	256	198	245	106	154	98	101	130
NW	111	99	115	85	61	109	403	197
NP	169	208	177	131	119	143	204	141
GP	1,555	1,632	1,373	1,328	1,185	1,204	1,482	1,483
Mpu	174	202	140	199	119	117	105	141
KZN	896	762	421	485	369	449	275	398
Africa	0	254	192	269	292	353	336	409
Int.	282	169	84	70	71	39	41	111
TOTAL	**4502**	**4324**	**3598**	**3558**	**3212**	**3259**	**3395**	**3716**

Figure 12.8 illustrates how the domestic consulting engineering market has shrunk from 1997 to the end of the study period as well as the provincial contribution trends over the same period. Figure 12.9 depicts the value of the increased market penetration of South African consulting engineers outside South Africa.

FIGURE 12.8

Income per province at constant 1995 prices

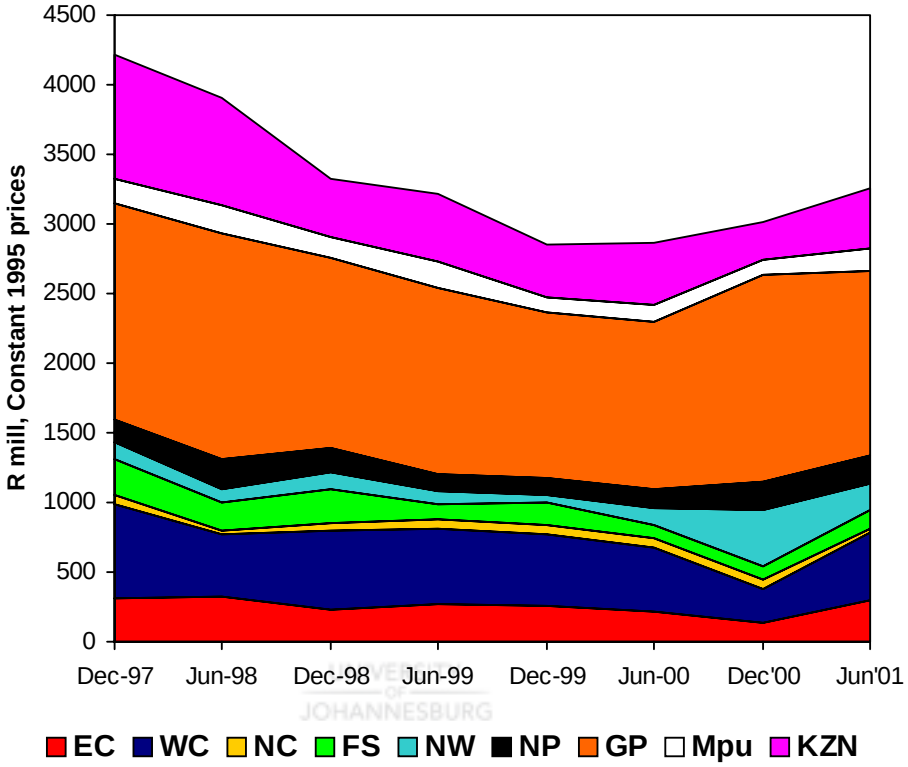
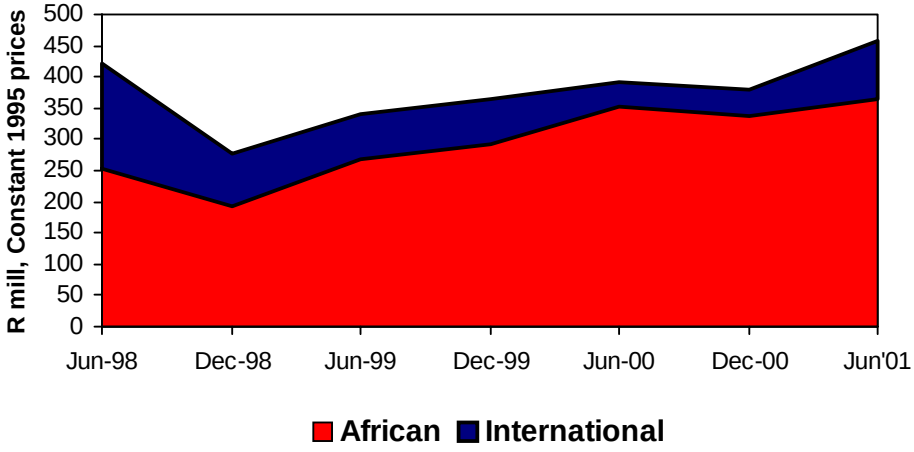


FIGURE 12.9

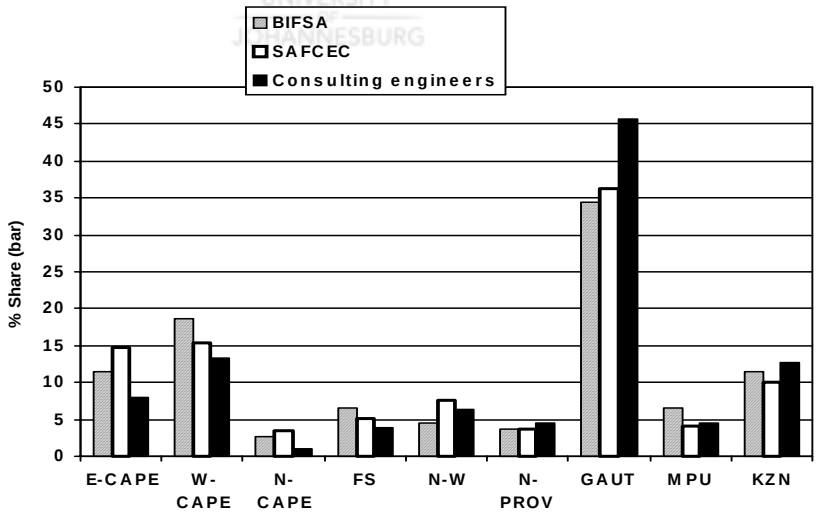
The value of the increased market penetration of South African consulting engineers outside South Africa



The graph in Figure 12.10 compares the provincial distribution of construction activity with that of consulting engineering activity. The large Gauteng province contribution to consulting engineering turnover (as against the proportion of building and civil engineering construction contracts) can probably be ascribed to the concentration of both big business and central government departments in Gauteng province, i.e. a department or company situated in Gauteng may commission a consulting engineer to design work that will be built in another province. It similarly illustrates how Kwa-Zulu Natal-based consulting engineers probably service projects executed in the Eastern Cape province and how building work in the Western Cape province is often designed in Gauteng province.

FIGURE 12.10

Geographic distribution of consulting engineering fee income and of building and construction contracts as at June 2001



Note: Construction values based on the value of awarded contracts during the period January to June 2001 as published by SAFCEC and BIFSA

12.3.3 Sectoral contribution to income

Respondents were asked to provide quantitative information on the value of fees earned from five client sector types, defined as:

- Central government,
- Provincial government,
- Local government,
- Parastatals and
- Private sector.

Figure 12.11 shows the percentage contribution to the total fee income earned by the South African consulting engineering industry by client sector or type. Table 12.9 shows the data on the total value of the fees earned from each client sector type at 2000 prices.

FIGURE 12.11

Percentage contribution to total fee income by client type

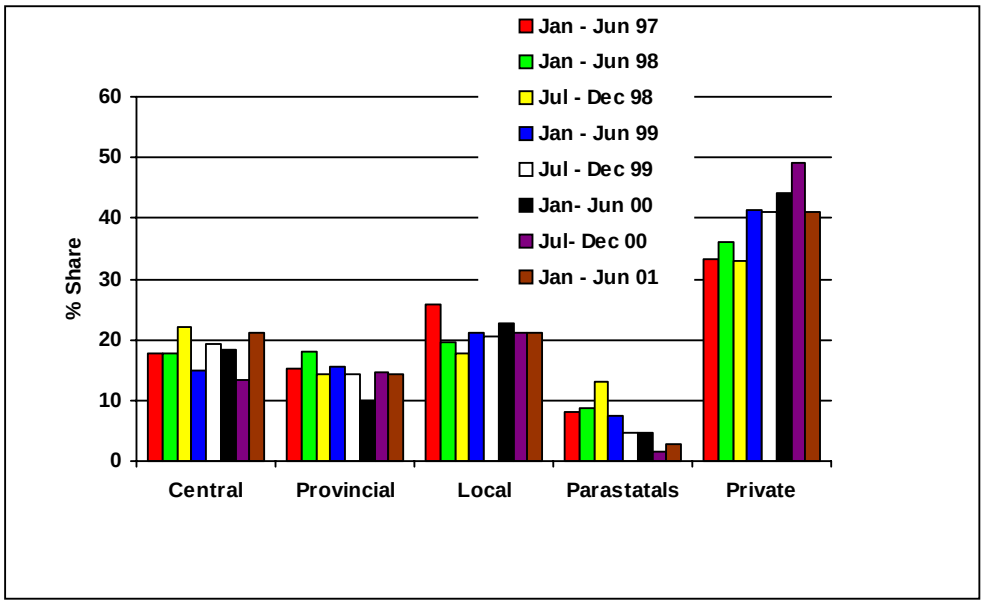


TABLE 12.9

Value of fees earned from each client sector type at 2000 prices

Client	Dec-98	Jun-99	Dec-99	Jun-00	Dec-00	Jun-01
Central	796	528	623	601	455	782
Provincial	520	551	457	329	498	528
Local	636	750	658	741	718	781
Parastatals	468	261	154	149	57	103
Private	1,180	1,468	1,320	1,438	1,667	1,552
Total	**3,599**	**3,558**	**3,212**	**3,259**	**3,395**	**3,716**

The private sector clearly is the largest single client grouping and its contribution to total fee income has shown a growth trend throughout the study period. This is in keeping with the government policy and the global trend towards smaller government and growth in the number and extent of public-private partnerships [107].

12.3.4 Size of consulting engineering firms

Primary survey data was identified and captured by firm size category throughout the study period. This was done to track changes in the firm size distribution in the industry, but more so to investigate how firm size related to business indicators such as client type, profitability and debtor age analyses.

Standard firm size categories were chosen as shown in Table 12.10. It was found that the total number of firms varied little over the duration of the study period. The distribution of firm sizes between the categories also varied little, but there was a general decrease in the average number of people employed per firm in all firm size categories, resulting in the reduction in total employment reported in 12.2.1.

TABLE 12.10

SAACE firm size distribution as in 2001 [191]

Size Category	Size by number of staff	Number of firms	% of firms
A	500 and more people	4	1,05
B	100 to 499 people	13	3,40
C	50 to 99 people	20	5,24
D	10 to 49 people	146	38,22
E	Less than 10 people	199	52,09
	TOTAL	382	100,00

Figure 12.12 shows the average client type distribution for each of the different firm size categories, in this case for the period January to June 2001. The client type distribution profiles for the A and E (largest and smallest firm) categories seem to deviate from the trend. This can probably be ascribed to the following:

- Large firms (A): The very small number of firms in this category and the geographical locations of these specific firms limit their market penetration in some of the provinces. The size and location of typical municipal appointments are often not attractive to the largest firms, therefore their smaller local authority market exposure. Municipalities are furthermore inclined to appoint consulting engineers with offices within their municipal boundaries and the overhead cost structures in

large firms are often such that it is not feasible to open offices in smaller centres.

The large private sector construction projects, which include toll road projects, very large industrial projects and very large commercial projects require substantial resources, which are normally only available in the large firms.

- Small firms (E): The large contribution that central and provincial government clients make to the total fee income of small firms can probably be ascribed to their office locations in specific municipal and provincial areas and the existence of roster type procurement systems in many of these client departments. Such systems appoint consultants by rotation, often irrespective of firm size or capacity, in which case the very small firms, who are the most numerous, will be allocated a large proportion of the work [123].

It is the opinion of the author that the abnormally large proportion of small firm (D) and very small firm (E) turnover originating from parastatal organisations can similarly be ascribed to the targeted procurement policies of organisations such as ACSA, TELKOM and TRANSNET that favour Black-owned small, medium and micro enterprises (SMME's) [7, 210].

FIGURE 12.12

Client type distribution by firm size [January to June 2001]

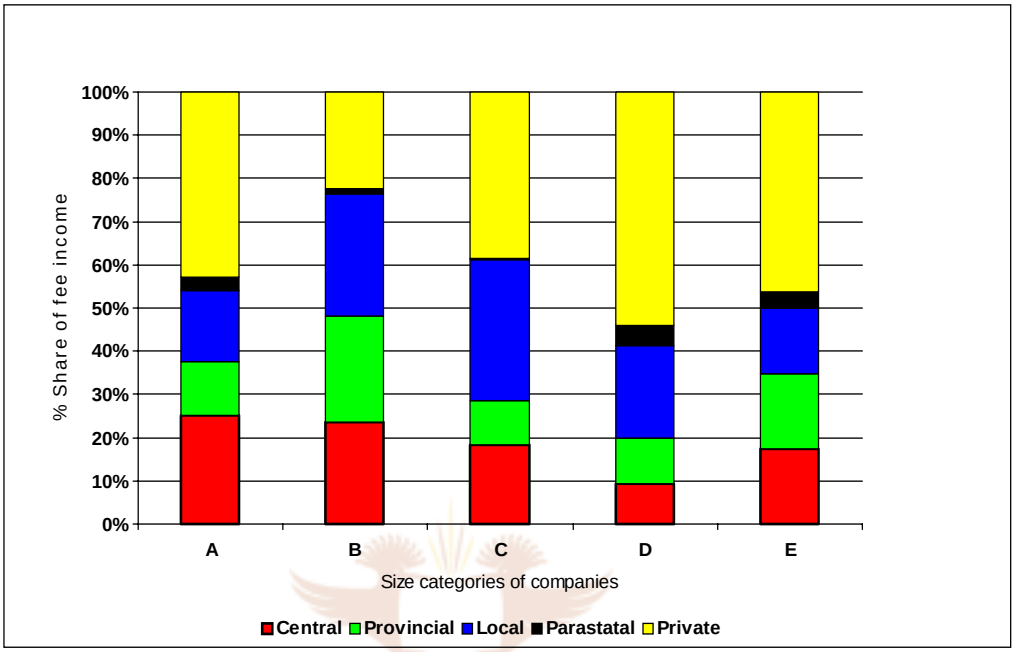


Table 12.11 shows the profitability of South African consulting engineering firms by firm size for the period June 2000 to June 2001. This trend can be expected during an economic downturn when larger firms normally carry more specialist staff that are not fully utilised and also tend to keep staff longer in an effort to retain their capacity to handle large projects. It can however be expected that this trend will reverse when activity in the construction industry increase and the larger firms are usually better able to exploit the opportunities because of their larger resource base or retained capacity.

The expected trend shown in the right hand side column of the table originates from the replies to the qualitative question on the perception regarding the developing trend regarding profit margins in the economic cycle indicators section of the last survey questionnaire (June 2001, survey number 9, Annexure

2.10). Respondents were asked to reply to a 3-point scale, i.e. will margins be receding, static or improving? As an example, in the large firm size category (A) 74% of the respondents indicated that they expected margins to be improving, 26% indicated that they expected margins to be static and no respondents expected profit margins to be receding.

TABLE 12.11

Profitability by firm size

Firm size category	Survey no. 7 (June 00)	Survey no. 8 (Dec. 00)	Survey no. 9 (June 01)	Expected trend for period July to December 01
A (>500 people)	3%	5	8	74% improving. 26% static
B (100-499 people)	1%	8	13	62% static, 38% improving
C (50-99 people	7%	8	12	30% receding, 39% static, 31% improving
D (10-49 people)	12%	13	11	50% receding, 44% static, 6% improving
E (<10 people)	14%	15	18	48% receding 31% static, 21% improving

12.4 Targeted procurement and the South African consulting engineering industry

Targeted procurement was not a primary focus area of the study, but as the state's targeted procurement policies and regulations are important external business environmental factors (Chapter 4) the response of the local consulting engineering industry to these policies and regulations was monitored. The

surveys included quantitative questions that targeted two aspects of this response, namely the volume of business done with affirmable business enterprises (ABE's) or affirmable professional service providers (APSP's) and the extent of targeted recruitment and employment of previously disadvantaged individuals (PDI's). The former aspect will be discussed in this section, while the latter aspect will be discussed under the heading of Human resources management in 12.11.

Table 12.12 reflects the relevant data that was received from the respondents to the last three surveys. The data obtained from the quantitative survey questions was not of sufficient quality to make extensive observations and conclusions about trends regarding the response to targeted procurement. This could be ascribed to any or all of the following:

- Survey questions that were not clear
- Respondents who did not understand targeted procurement terminology
- Limited exposure of those respondents who operate mainly in the private and smaller local authority sectors to targeted procurement requirements.

The data in the table is nevertheless interesting and it does provide some insight into the impact of targeted procurement legislation on the industry. The lower percentages shown in the last column may indicate that APSP's have already matured to the extent that they are appointed directly by clients and not only in joint ventures with, or as sub-consultants to, established firms as in the past.

TABLE 12.12

Targeted Procurement: Response of the South African consulting engineering industry

Survey number (end date of survey period)	6 (December 1999)	7 (June 2000)	8 (December 2000)	9 (June 2001)
% of respondents who undertook projects jointly with APSP's/ ABE's	40%	50%	72%	66%
% of total turnover outsourced to APSP's/ ABE's	18%	29%	15 – 20%	7%

12.5 Public Private Partnerships

The South African government's stated intention of increasingly utilising public-private partnerships (PPPs) in the creation, operation and maintenance of infrastructure [107] implies a potential major new external business environmental influence on the local consulting engineering industry. It was therefore decided to add two new questions to the general questions section in the survey questionnaire for the period June to December 1999. The questions were intended to quantify and track the extent to which consulting engineers were becoming involved in PPPs by determining:

- The value of PPP-related work executed by the consulting engineers and

- the roles in which consulting engineers participated in PPPs (e.g. advising the public sector, advising the private sector or participating as equity partner).

Table 12.13 shows the data gathered with regards to the participation of consulting engineers in PPPs. Public-private partnerships contributed slightly less (11,4%) to the industry's gross fee income in the first half of 2001 than in the last six months of 2000, when 17% of gross income was derived from PPPs. It is however significant that an increasing proportion of the consulting engineers who are involved in PPPs participate as equity partner. Although these survey questions are superficial and do not provide conclusive data, this information provides evidence of an important departure from the traditional consulting engineering business. The issue of participation by consulting engineers in PPPs provide scope for future research studies.

TABLE 12.13

Participation in Public-Private Partnerships

Survey number and end date	% of gross fee income from PPP's	Consulting engineer's role in PPP		
		Advising public sector	Advising private sector	Equity partner
Dec-99	10.9%	45.23%	35.40%	19.37%
Jun-00	3.5%	49.98%	19.10%	30.92%
Dec-00	17.0%	30.00%	24.00%	46.00%
Jun-01	11.4%	31.60%	12.72%	55.68%

12.6 Market condition perceptions

Several qualitative questions were included in the economic cycle indicators section of the survey forms. The questions were aimed at establishing short-term

trends in terms of the levels of economic activity, competition and profitability in the South African consulting engineering industry. The questions covered the perceptions of the respondents regarding the tempo of activity, level of competition and profit margins during each survey period, i.e. for the previous 6-month period, as well as for the next two 6-month periods, i.e. the respondent's perception of the future. The trends were reported descriptively in each of the survey reports.

The following description, which applies to the last survey (number 9, survey period January to June 2001) conducted during the study period, illustrates the descriptive reporting technique:

- *"Respondents are expecting the **tempo of activity** to decrease during the next six months and then to stabilise during the first half of 2002.*
- *Although **competition for work** remains very keen to fierce, respondents reported a slightly lower level of competition than during the previous survey period.*
- ***Profit margins** improved slightly, underpinned by expectations of further increases. An increasing number of respondents were satisfied with prevailing margins. This does, however, contradict respondents' expectations of a slowdown during the next 12 months.*
- ***Utilisation of capacity** remained stable at around 77%, with the majority of respondents expecting no change in the next 6 months. A slightly higher number of respondents are however expecting a decrease in utilisation, in line with the somewhat more pessimistic outlook for the next 6 to 12 months.*
- *The majority of the respondents have been working within **normal working hours**, or up to 5 hours overtime."*

12.7 Confidence about prospects in the consulting engineering industry

The consulting engineering confidence index reflects respondents' confidence about current and future prospects in the industry as indicated in their answers to the qualitative questions in the economic cycle indicators section of the survey questionnaires. The then SAFCEC economist, Henk Langenhoven first introduced this confidence index-concept for consulting engineers [refer to

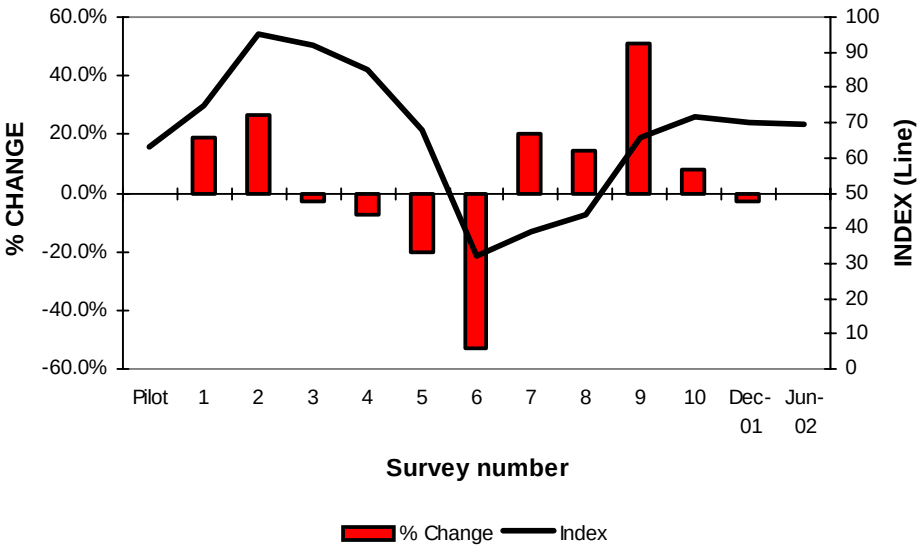
Annexure 3.1] based on his experience with a similar index used by the South African Federation of Civil Engineering Contractors for the construction industry. The confidence index is calculated by:

- Firstly weighting each respondent's data according to the number of people employed by the respondent's company
- Secondly discarding the data of any respondent who did not also submit returns for at least the previous two surveys
- Thirdly determining the percentage of respondents who were satisfied with business conditions, i.e. the (weighted) percentage of respondents expecting the tempo of business to be satisfactory, quite busy or very busy.

Figure 12.13 shows the confidence index as determined over the study period as well as the forecast for the twelve-month period following the study period, i.e. July 2001 to June 2002.

FIGURE 12.13

South African consulting engineering confidence index as at June 2001



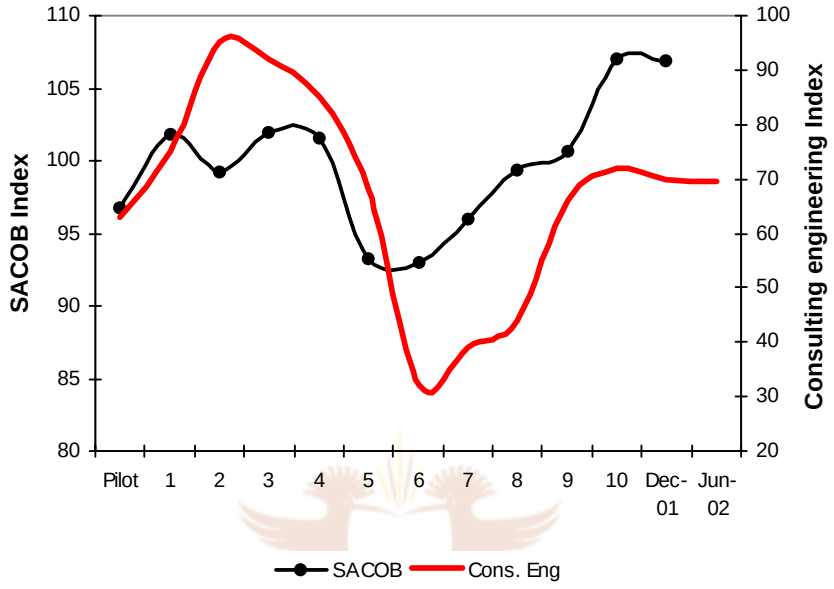
The South African Chamber of Business (SACOB) Business Confidence Index (BCI) as described in 8.4.1 is a market-related index that reflects what businesses are doing and experiencing, not what they are saying [202]. It is therefore not a perception-based index like the consulting engineering confidence index. The SACOB BCI was monitored as secondary data source to investigate its potential as a leading indicator for possible movements in the consulting engineering confidence index.

Figure 12.14 shows the relationship between the two indices over the study period. During 1999 the SACOB index was observed to reach a low turning point in early 1999 with the consulting engineering index following a similar trend six months later, appearing to follow the BCI as its leading indicator. Subsequent movements in the values of the two indices did however not show such a clear relationship and the two indices will have to be tracked over a much longer period to investigate the nature of their relationship. During the last two survey periods the BCI rose at a much faster rate than the consulting engineering index, which means that positive business conditions have a limited influence on perceptions in the consulting engineering industry.

Total industry fee income was plotted with the consulting engineering confidence index as shown in Figure 12.15. From the data gathered over the study period it seems that the consulting engineering confidence index can possibly be used as leading indicator to predict upper and lower turning points for business activity in the consulting engineering industry, but this will require further study.

FIGURE 12.14

The SACOB business confidence index and the South African consulting engineering confidence index



12.8 Phases of the consulting engineering product cycle

The qualitative question in this section of the survey questionnaires was aimed at establishing trends in terms of the various phases or stages of the product cycle of delivering traditional project-focused consulting engineering services. Respondents had to indicate whether they were experiencing receding, static or improving business condition indicators with regard to each of the identified product cycle phases, namely:

- Enquiries,
- pre-feasibility investigations or project proposals,
- preliminary planning and design,

- detailed planning and design,
- tender adjudication and appointment and
- construction.

FIGURE 12.15

Total fee income (constant 2000 prices) and the consulting engineering confidence index

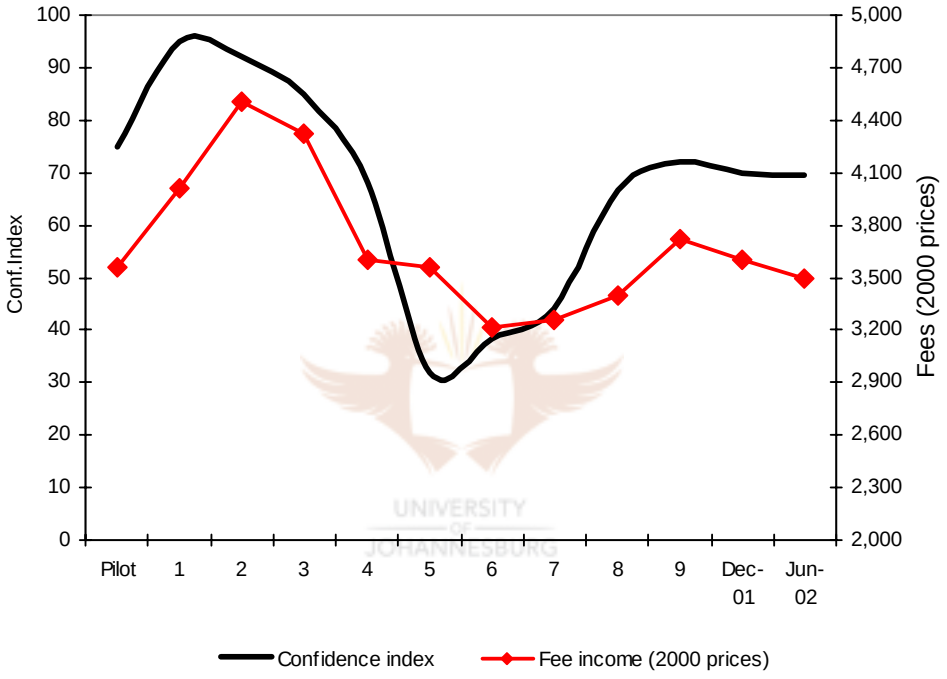
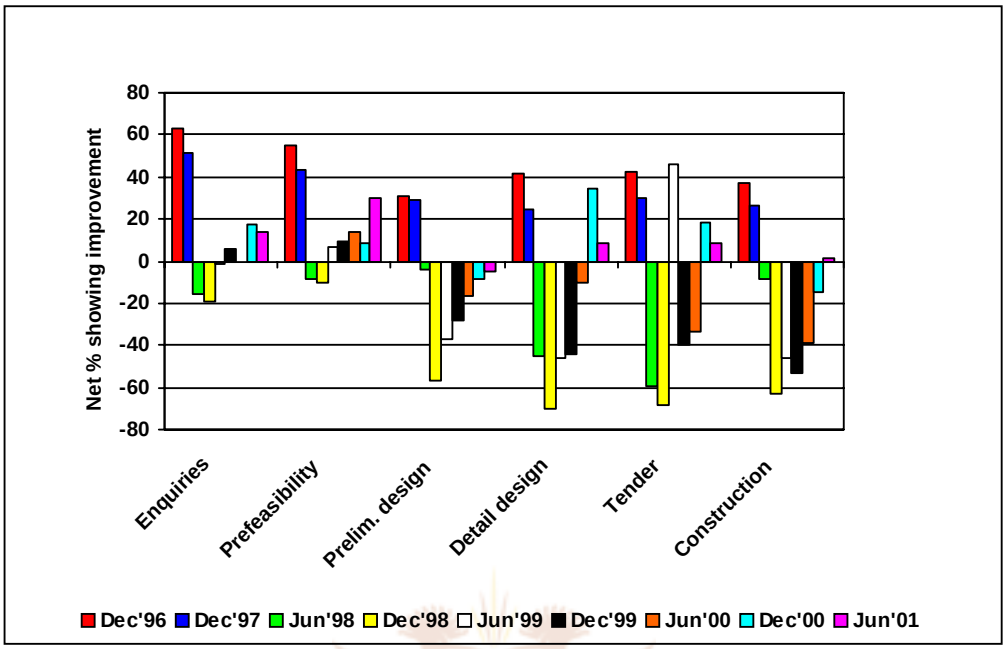


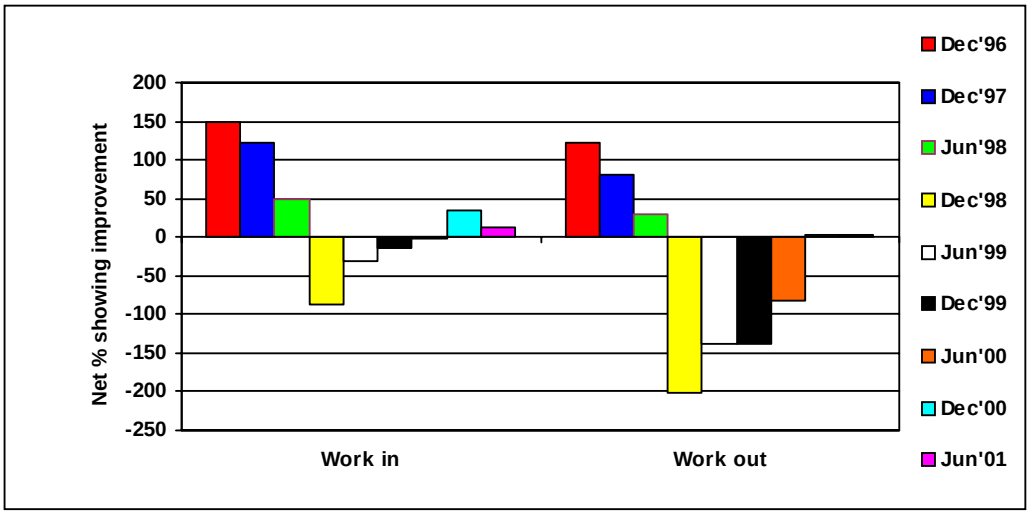
Figure 12.16 shows the trends in product cycle indicators over the study period. It can, for example, be seen that at the end of the study period the construction phase, for the first time during the last seven surveys, showed a positive net change, i.e. 1,76% of respondents weighted by firm size (number of people employed) showed that they were experiencing improving business conditions with regards to activity in the construction phase.

FIGURE 12.16
Product cycle indicators



The product cycle indicators can also be presented in two simplified stages, namely the work flowing in (Aggregated enquiries, pre-feasibility studies and preliminary design) and the work flowing out (Aggregated detailed design and documentation, tender process and construction) as shown in Figure 12.17.

FIGURE 12.17
Aggregated two stage product cycle indicators



12.9 Cost escalation trends in the South African consulting engineering industry

There is no published escalation index specifically for the South African consulting engineering industry. A very simple approximation was used for constructing historic time series from secondary data as described in 10.5. In terms of national statistics published by the South African Reserve Bank (SARB) consulting engineering is grouped in the financial, insurance, real estate and business services sector.

For the purposes of processing the primary data presented in this thesis the published civil engineering (construction) escalation index was used to determine consulting engineering price escalation. The civil engineering construction industry has however recently reverted to the use of a composite index comprising of four elements namely fuel, materials, plant and labour. The basic elements in this index has very little to do with the business of consulting engineering and it is therefore highly probable that the value of future (composite) civil engineering construction industry escalation indices may not reflect actual cost escalation in the consulting engineering sector.

Further research is required to investigate the continued applicability of the (composite) civil engineering construction industry escalation index to the consulting engineering industry. Should the continued use of the (composite) civil engineering construction industry escalation index become problematical, an alternative cost escalation index will have to be developed for the consulting engineering industry. Such development research will have to investigate the applicability of other currently available escalation indices to cost escalation in the South African consulting engineering industry or

alternatively to develop an industry-specific consulting engineering cost escalation index.

12.10 Education and training in the consulting engineering industry

Education and training trends in the consulting engineering industry were tracked by analysing the responses to a number of quantitative questions contained in each questionnaire. The main reasons for tracking education and training trends were:

- to monitor the industry's response to changing market demands and
- changes in the legislative environment (e.g. Acts relating to Employment Equity and Skills Development Acts [146, 163, 164] as well as
- for lobbying purposes, i.e. to have facts on the consulting engineering industry's contribution to education and training.

Table 12.14 contains the summarised survey data regarding the total expenditure by the South African consulting engineering industry on education and training.

It is of interest to note that at the end of the study period the average bursary amount was between R10 000 and R12 000 and that 54% of the bursaries awarded during the last survey period (January to June 2001) were to students from a previously disadvantaged background.

TABLE 12.14

South African consulting engineering industry expenditure

on education and training

6-month Period ending on	Total salaries [R million] at current prices	Bursaries [R million] at current prices	Bursaries as a percentage of total salaries	Training [R million] at current prices	Training as a percentage of total salaries
12/97	1332	11	0.86%	32.63	2.45%
6/98	1554	16	1.04%	34.50	2.22%
12/98	1321	14	1.03%	35.67	2.70%
6/99	1185	23	1.9%	9.12	0.77%
12/99	1244	9	0.75%	19.16	1.54%
6/00	1164	13	1.1%	33.76	2.90%
12/00	1280	8	0.6%	27.78	2.17%
6/01	1332	11	0,8%	27.16	2.04%

12.11 Human resources management trends

The recruitment intentions of South African consulting engineering firms were tracked by way of qualitative questions in the survey questionnaires and are shown in Figure 12.18. An interesting phenomenon illustrated in this figure is that firms intending to increase current employment levels of engineers and technical staff do not necessarily intend to increase support staff.

FIGURE 12.18

Percentage of firms wanting to increase staff

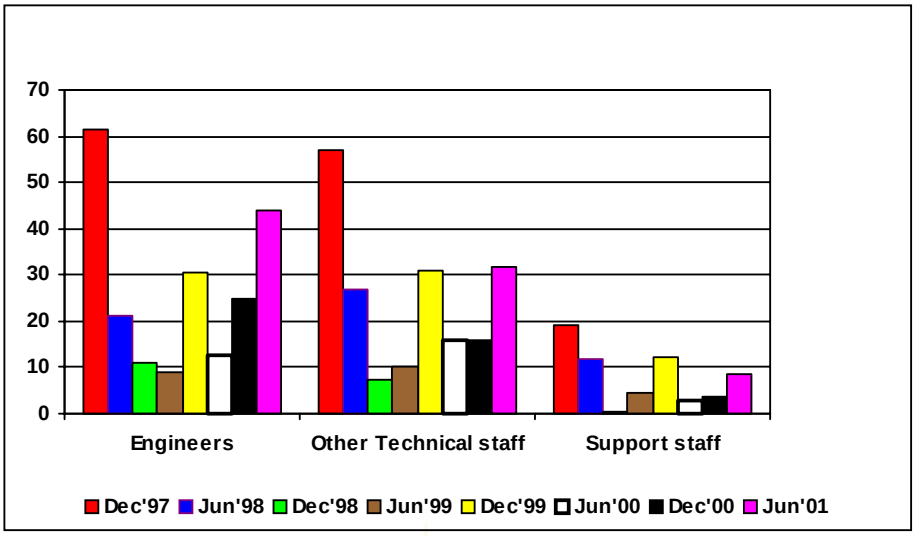
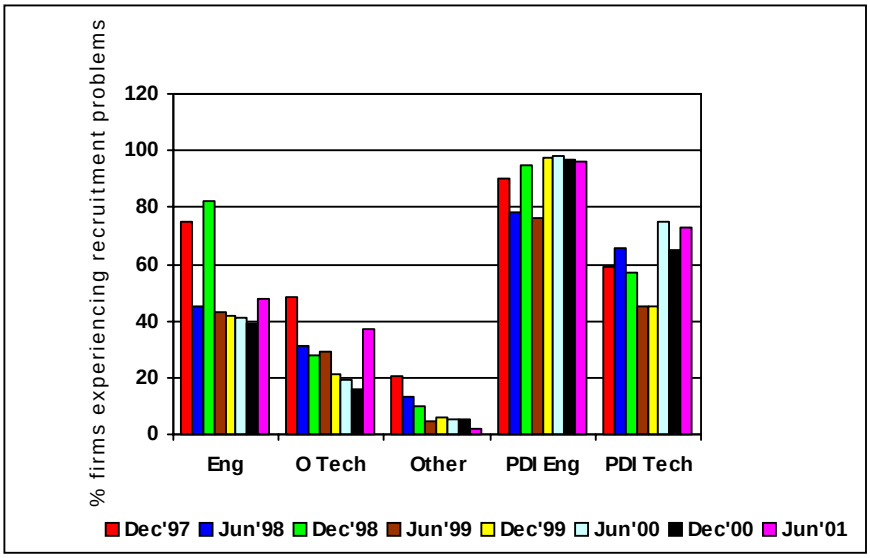


FIGURE 12.19

Number of respondents reporting recruitment problems



Note abbreviations used: Eng- graduate engineer, O Tech- other technical staff, Other- other staff, PDI Eng- graduate engineer from PDI category, PDI Tech- Technicians from PDI category

Figure 12.19 shows that the recruitment of appropriate technical staff, especially those in the PDI category, has been a problem throughout the study period. This indicates a potential major limitation to the industry's ability to cope with future domestic economic growth or to increase its market penetration in the international consulting engineering market, especially since total employment in the industry reduced substantially over the study period (Figure 12.2).

FIGURE 12.20

Employment breakdown by category

in the South African consulting engineering industry

over the period January to June 2001

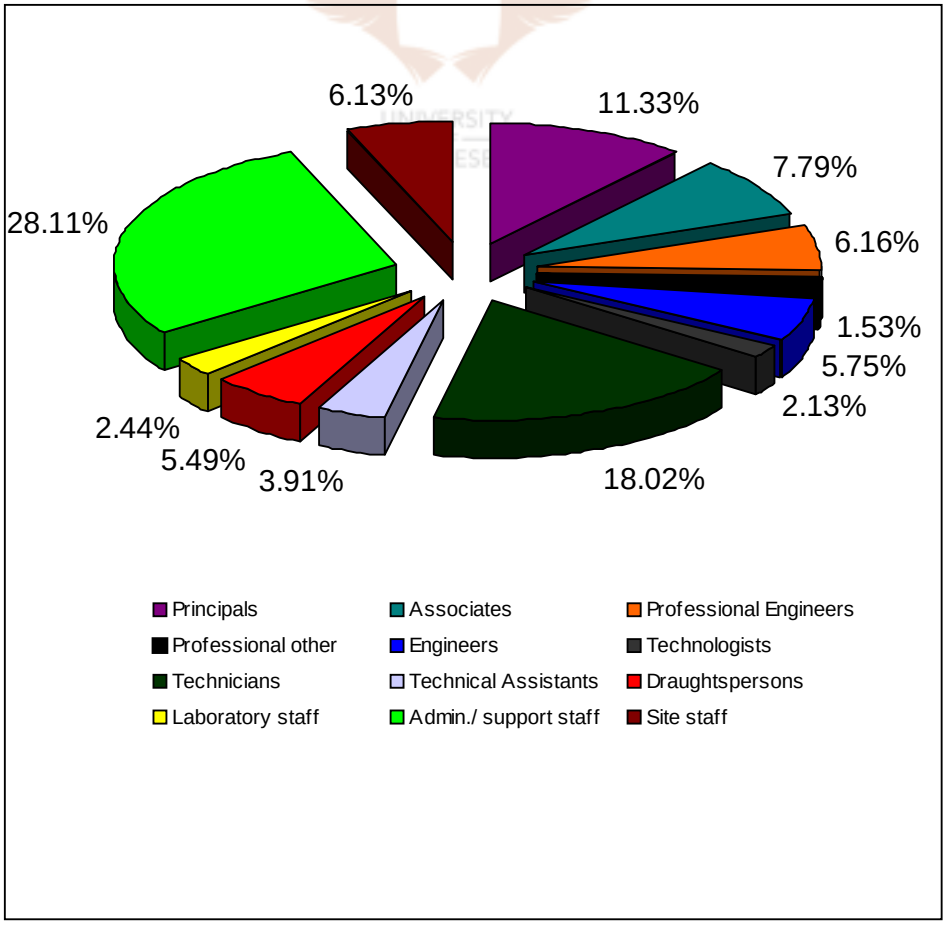


Figure 12.20 illustrates the employment categories and their proportional distribution in a typical South African consulting engineering firm at the end of the study period.

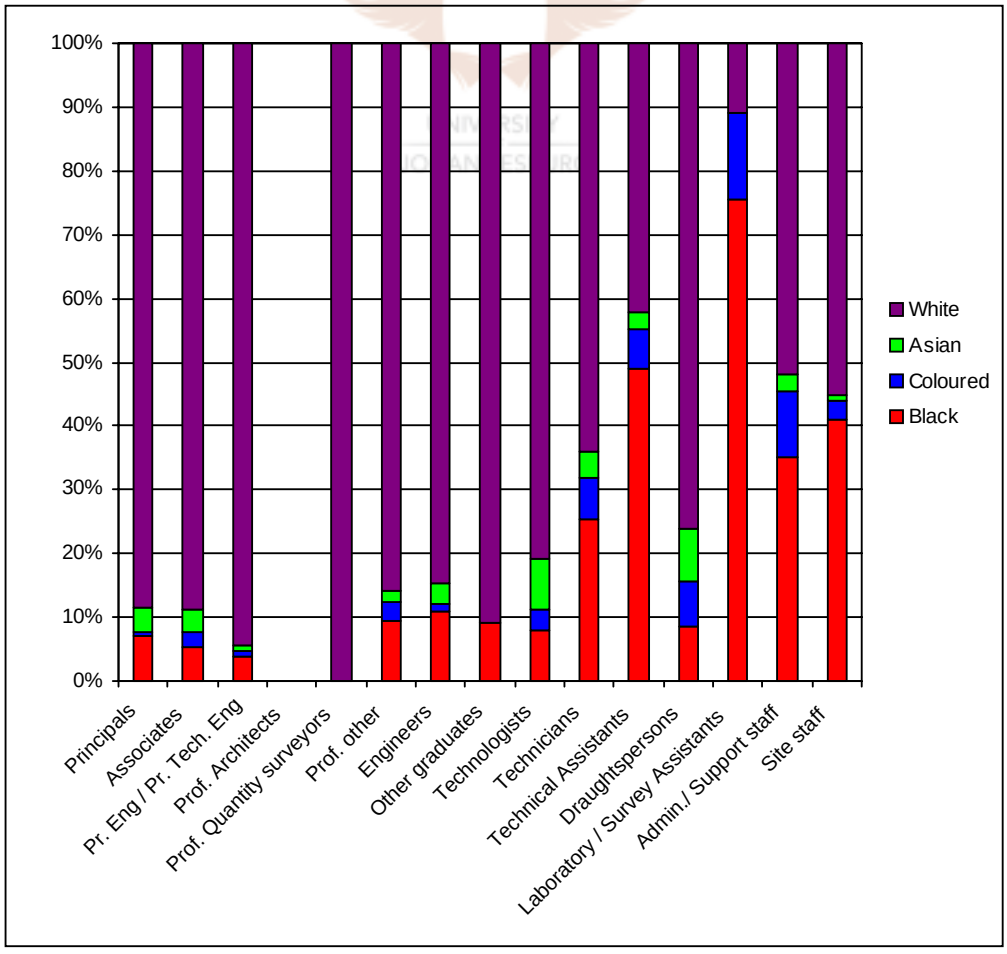
Figure 12.21 illustrates how skewed the proportional racial participation in the industry still was at the end of the study period, in spite of consistent efforts to improve demographic representivity in the industry.

FIGURE 12.21

Racial representation per employment category

in the South African consulting engineering industry

for the period January to June 2001



12.12 The problem of bad debtor performance

By the end of 1997 the consulting engineering industry was increasingly reporting problems with slow payment of invoices by their public sector clients. A new section titled "non-payment of accounts by clients" was therefore added to the survey questionnaire for the period June to December 1997. The quantitative questions in this section were intended to provide detailed information in order to determine:

- The extent (financial implications) of the problem

  and
- the location (level of government and geographic location) of the problem.

This intention was for the SAACE to use this information when approaching government on behalf of the industry in order to:

- Explain the implications that slow payment have for the industry and

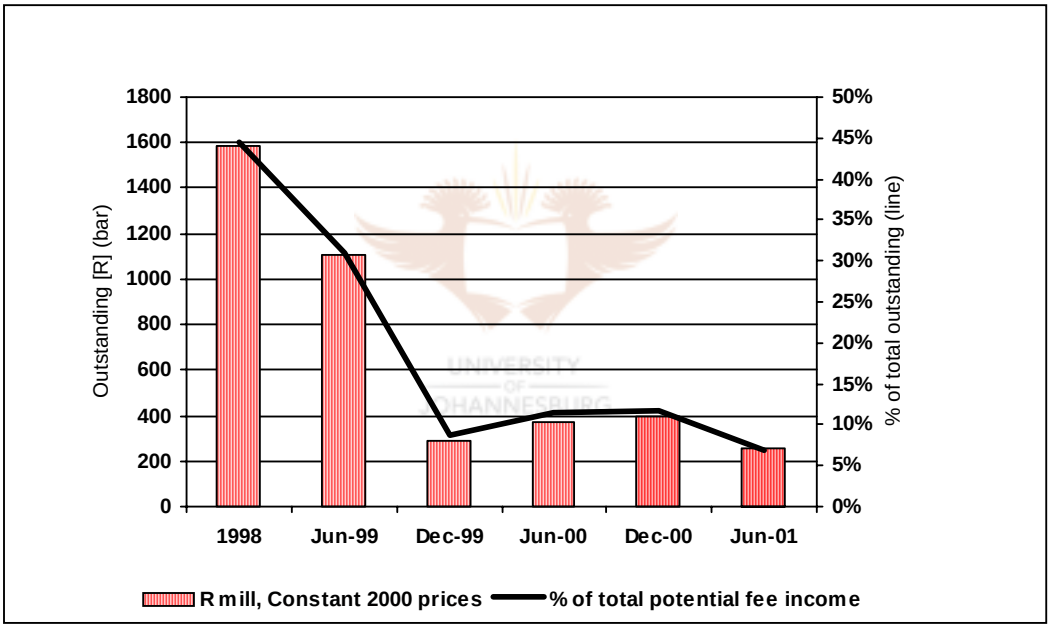
- assist in identifying problem areas where slow payment may be resulting from insufficient administrative capacity or inexperienced staff.

During subsequent surveys the survey questions were expanded to include private sector clients as the debtor performance of these clients also deteriorated as a result of a sudden increase in interest rates and the resultant financing costs at the time.

The survey data was used successfully in direct lobbying with central and provincial government departments and in media campaigns by the consulting engineering industry. The age of debt to the consulting engineering industry was still at an unacceptably high level at the end of the study period, but debtor performance did improve significantly as shown in Figure 12.22.

FIGURE 12.22

Total fees outstanding for 90 days or more



In spite of the reported improvement, the last survey still showed that 6,77% of the total potential fee income (fee income received plus all amounts still outstanding) or R250 million was outstanding for more than 90 days. This obviously has serious implications for a high-risk industry operating at low profit margins, such as the South African consulting engineering industry. The fact that the public sector is the largest contributor to this bad debt, while private

individual taxpayers own the majority of the consulting engineering practices adds insult to injury.

Table 12.15 shows how typical debtor age profiles vary for different firm sizes. It is clear that the smallest companies (employing less than 10 people), who make up approximately 50 percent of the firms in the industry and normally has the least favourable terms of access to sources of finance, are currently the hardest hit by slow payments.

TABLE 12.15

Fee payments outstanding for longer than 90 days as a percentage of gross fee income, by client category for the survey period January to June 2001

FIRM SIZE CATEGORY (No. Employed)	TOTAL PERCENTAGE	CLIENT CATEGORY				
		CENTRAL GOVERNMENT	PROVINCIAL GOVERNMENT	LOCAL GOVERNMENT	PARASTATAL	PRIVATE SECTOR
A (>500)	7.86	8.28	9.73	8.26	8.62	6.91
B (100-499)	5.90	1.11	2.08	4.97	1.95	12.98
C (50-99)	6.45	0.60	6.40	3.84	5.92	10.80
D (10-49)	4.65	3.77	3.62	7.31	5.35	3.92
E (<10)	8.34	0.76	6.05	13.67	0	12.07
Average	6.77	6.07	6.05	6.84	6.18	7.44

12.13 Conclusion and recommendations

This chapter showed how secondary data and primary data were used to create a SMIS for the South African consulting engineering industry.

The SMIS tracked quantum of and trends in:

- Key indicators of the health of the South African consulting engineering industry, e.g. employment, salaries, fee income and profits (including short-term forecasts) and

- several market features such as the type or discipline of work executed, the geographic distribution of work, the proportional contribution by client type category to the total industry turnover and the firm size distribution in the industry.

The response of industry to several specific changes in their operating environment was tracked. Such changes included:

- The application of targeted public sector procurement policies and regulations by the state

- International trends towards and the South African government's acceptance of the principle of Public Private Partnerships for providing, operating and maintaining infrastructure

- Changes in market conditions.

The SMIS was used to track economic cycle indicators in order to establish short-term trends with regard to the level of economic activity, competition and profitability in the South African consulting engineering industry. The consulting engineering confidence index, which is based on respondents' confidence about current and future prospects in the industry was introduced and changes in activity levels in the respective phases of the product cycle were tracked in

order to establish trends for the various phases or stages of the "product cycle" of delivering traditional project-focused consulting engineering services.

Further characteristics of the local consulting engineering industry that were tracked by the SMIS included cost escalation, education and training, recruitment and employment trends and poor debtor performance problems.

The following issues that provide scope for further investigation and research, were identified in this chapter:

- The industry's ongoing response to the national targeted procurement policy
- The nature and quantum of and trends in participation by consulting engineers in PPP projects
- The possible use of the SACOB business confidence index as a leading indicator for the consulting engineering confidence index
- The possible use of the consulting engineering confidence index as leading indicator to predict upper and lower turning points for business activity in the consulting engineering industry
- The applicability of readily available published escalation indices to cost escalation in the South African consulting engineering industry or the development of an industry-specific consulting engineering cost escalation index.

The next chapter will evaluate the developed SMIS against the criteria for a suitable industry-specific SMIS as stated in Chapter 6.