

## **Enterprise Survey (Productivity and Investment Climate Survey) in South Africa Sample Survey Design**

### **1. Survey coverage**

The World Bank Enterprise Survey in South Africa targeted establishments located in Johannesburg, Cape Town, Port Elizabeth and Durban in the following industries (according to ISIC, revision 3.1): all manufacturing sectors (group D), construction (group F), retail and wholesale services (sub-groups 52 and 51 of group G), hotels and restaurants (group H), transport, storage, and communications (group I), and computer and related activities (sub-group 72 of group K).

### **2. Sampling Methodology**

#### **Establishments with five or more full-time paid permanent employees**

Based on the distribution of employment per industry, as well as UNIDO's distribution of contribution of value added by industry (1999) distribution of establishments per industry (1996), the original sampling plan for South Africa called for a multi-tiered approach based on separating the economy on the basis of priority industries under study.

The original stratification called for a focus on food (ISIC 15), garments (ISIC 18), chemicals (ISIC 24), fabricated metal products (ISIC 28), furniture (ISIC 36) and retail (ISIC 52) as first-tier industries for which the objective was analysis at the industry level.

Unfortunately, EEC Canada was unable to obtain a satisfactory sample frame from South African statistical agency (STASA) or its Department of Revenue which confirmed population characteristics supporting such a stratification. The best alternative solution was a list obtained from the Department of Trade and Industry Companies and Intellectual Property Registration Office (CIPRO), which contained about 800 000 establishments when delineating in-scope cities and industries, but which had incomplete firm characteristics necessary for stratification purposes (e.g. contact information, size).

In order to determine the sample frame, EEC Canada randomly drew 9 550 units and contacted them. The following describes the result of this drawing and the subsequent eventual contacts:

1. 42% of names in the list could not be identified through contact information, either because the contact information was incorrect or insufficient, or the entity could not be found or cross-referenced with other bases containing names and contact information.
2. Of the residual 58%, 74% did not meet the size criterion of at least 5 full time permanent employees
3. The size stratification for the 26% of 58% varied per industry and location, but was in total : 77% small, 19% medium and 4% large

The process allowed the identification of 1 439 valid establishments, constituting the sample drawn (of which 706 were sampled and 733 refused to participate) in the list of the 9 550 randomly drawn units. Inferring this ratio to the entire population, EEC Canada identified a sample frame of 120 545 establishments, described in Table 1.

Furthermore, the effective population distribution of establishments in South Africa called for a stratification of the population different from the originally anticipated one. Accordingly, for establishments with five or more full-time permanent paid employees, the sample was stratified according to the following categories of industry (ISIC sub-group in parentheses) in consistency with the structure of the inferred sample frame:

1. Manufacturing: Food and Beverages (Group D, sub-group 15), Machinery and Equipment (Group D, sub-group 29), Electrical Machinery and Equipment (Group D, sub-group 31);
2. Manufacturing: Textiles (Group D, sub-group 17), Garment (Group D, sub-group 18), Leather and Footwear (Group D, sub-group 19), Paper and Paper Products (Group D, sub-group 21), Printing and Publishing (Group D, sub-group 22);
3. Manufacturing: Non-Metallic Mineral Products (Group D, sub-group 26), Basic Metals (Group D, sub-group 27), Fabricated Metal Products (Group D, sub-group 28);
4. Manufacturing: Wood and Wood Products (Group D, sub-group 20), Furniture (Group D, sub-group 36)
5. Manufacturing: Refined Petroleum Products (Group D, sub-group 23), Chemical Products (Group D, sub-group 24), Rubber and Plastics (Group D, sub-group 25)
6. Retail Trade: (Group G, sub-group 52);
7. Rest of the universe, including:
  - Other Manufacturing (Group D excluding sub-groups in strata 1-5);
  - Construction (Group F);
  - Wholesale trade (Group G, sub-group 51);
  - Hotels, bars and restaurants (Group H);
  - Transportation, storage and communications (Group I);
  - Computer related activities (Group K, sub-group 72).

The original target sample stratification required a third of the sample in each size category. However, this percentage (33.3%) did not appear to reflect the structure of the population but rather represented an objective which was aimed at countering the potential perception bias stemming from having too many small and medium size establishments in the survey. In agreement with The World Bank, EEC Canada therefore altered the sample stratification and set the target for large firms to a minimum of 15% of the sample.

The survey also sampled a selection of micro establishments (establishments with less than five full-time permanent paid employees) from the targeted universe in Johannesburg, without stratification by industry.

In South Africa, the survey included panel data collected from establishments surveyed in the 2003 ICS of South Africa. That survey included establishments in the manufacturing and the rest of universe strata, distributed across Gauteng

(Johannesburg), KwaZulu Natal (Durban), Western Cape (Cape Town) and Eastern Cape (Port Elizabeth) provinces.

In order to collect the largest possible set of panel data, an attempt was made to contact and survey valid establishments (579) in the panel list provided which was part of the Enterprise Survey's scope. Of the 716 establishments provided to EEC Canada from those surveyed in 2003, there were 35 doubles, 8 out-of-scope, 89 excluded from this survey by The World Bank to avoid over representing Construction in a single Residual stratum, and 5 with undefined ISIC codes. This left a total potential of 579 panel establishments. EEC Canada surveyed 231 panel establishments or 40% of the total potential panels without eliminating those establishments which had closed. Once eliminated, this percentage coverage exceeded 55%.

Given the non-random nature of panel establishment selection, these establishments are not allocated probability weights in the final dataset.

### **Micro-establishments**

In this survey, the micro establishment stratum covers all establishments of the targeted categories of economic activity with less than 5 employees located in Johannesburg. For many reasons including the small size of establishments, their expected high rate of turnovers, the high level of "informality" of establishments in many activities and consequently the difficulty to obtain trustworthy information from official sources, EEC Canada selected an aerial sampling approach to estimate the population of establishments and select the sample in this stratum for all regions of the survey.

First, to randomly select individual micro establishments for surveying, the following procedure was followed: i) select *districts and specific zones* of each district in Johannesburg, where there was a high concentration of micro establishments; ii) *count all micro establishments* in these specific zones; iii) based on this count, create a virtual list and select establishments at random from that virtual list; and iv) based on the ratio between the number selected in each specific zone and the total population in that zone, create and apply a skip rule for selecting establishments in that zone.

The districts and the specific zones were selected at first according to our national sources. The EEC team then went in the field to verify these national sources and to count micro establishments. Once the count for each zone was completed, the numbers were sent back to EEC head office in Montreal.

At head office the following procedure was followed: The count by zone was converted into one list of sequential numbers for the whole survey region, and a computer program performed a random selection of the determined number of establishments from the list. Then, based on the number that the computer selected in each specific zone, a skip rule was defined to select micro establishments to survey in that zone. The skip rule for each zone was sent back to the EEC field team.

In Johannesburg, enumerators were sent to each zone with instructions as to how to apply the skip rule defined for that zone as well as how to select replacements in the event of a refusal or other cause of non-participation.

3. Population and sample size

Table 1 : Population size by stratum and sampling region

Stratum	Size	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	Small	503	251	4,440	335	5,529
	Medium	921	838	5,361	838	7,958
	Large	335	670	2,094	1,173	4,272
2	Small	1,089	251	4,440	838	6,618
	Medium	419	1,508	10,974	419	13,319
	Large	168	503	1,005	335	2,010
3	Small	670	1,089	2,178	419	4,356
	Medium	670	3,435	3,853	84	8,042
	Large	168	0	1,005	0	1,173
4	Small	3,183	586	8,963	419	13,152
	Medium	754	1,173	2,932	335	5,194
	Large	251	84	2,346	251	2,932
5	Small	586	335	1,340	670	2,932
	Medium	1,089	503	3,183	670	5,445
	Large	0	84	1,257	0	1,340
6	Small	1,005	838	9,550	670	12,063
	Medium	503	2,346	2,513	251	5,613
	Large	0	0	419	0	419
7	Small	503	3,435	6,702	1,675	12,314
	Medium	0	670	4,691	0	5,361
	Large	0	84	419	0	503
Total	Small	7,539	6,785	37,613	5,026	56,964
	Medium	4,356	10,471	33,508	2,597	50,932
	Large	921	1,424	8,545	1,759	12,649

**Table 2 : Final sample size by stratum and sampling region (including panel firms, excluding Micros)**

<b>Stratum</b>	<b>Size</b>	<b>Cape Town</b>	<b>Durban</b>	<b>Johannesburg</b>	<b>Port Elizabeth</b>	<b>Total</b>
1	Small	6	1	42	2	51
	Medium	11	10	38	7	66
	Large	6	4	35	5	50
2	Small	14	2	42	5	63
	Medium	8	11	39	3	61
	Large	9	9	13	4	35
3	Small	5	8	22	3	38
	Medium	7	11	28	1	47
	Large	7	3	25	1	36
4	Small	12	5	36	3	56
	Medium	7	9	24	3	43
	Large	3	1	12	3	19
5	Small	5	2	13	6	26
	Medium	11	5	32	3	51
	Large	3	3	22	2	30
6	Small	13	8	54	6	81
	Medium	7	10	30	2	49
	Large	2	0	9	0	11
7	Small	5	16	34	5	60
	Medium	2	7	40	0	49
	Large	2	2	9	2	15
<b>Total</b>	<b>Small</b>	<b>60</b>	<b>42</b>	<b>243</b>	<b>30</b>	<b>375</b>
	<b>Medium</b>	<b>53</b>	<b>63</b>	<b>231</b>	<b>19</b>	<b>366</b>
	<b>Large</b>	<b>32</b>	<b>22</b>	<b>125</b>	<b>17</b>	<b>196</b>

**Table 3 : Final sample size by stratum and sampling region (excluding 231 panel firms and 120 Micros)**

Stratum	Size	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	Small	4	1	42	2	49
	Medium	4	7	27	6	44
	Large	2	4	14	4	24
2	Small	10	2	41	5	58
	Medium	4	9	32	2	47
	Large	1	3	5	2	11
3	Small	5	8	21	3	37
	Medium	5	10	19	1	35
	Large	1	0	5	0	6
4	Small	12	5	36	3	56
	Medium	4	9	23	3	39
	Large	2	1	6	2	11
5	Small	4	2	13	5	24
	Medium	3	4	26	3	36
	Large	0	1	6	0	7
6	Small	9	7	54	6	76
	Medium	4	10	24	2	40
	Large	0	0	3	0	3
7	Small	4	16	34	5	59
	Medium	0	6	34	0	40
	Large	0	1	3	0	4
Total	Small	48	41	241	29	359
	Medium	24	55	185	17	281
	Large	6	10	42	8	66

4. Participation

Table 4 : Refusal rate by stratum and sampling region

Stratum	Size	Cape Town		Durban		Johannesburg		Port Elizabeth		Total	
		N	%	N	%	N	%	N	%	N	%
1	Small	2	33%	2	67%	11	21%	2	50%	17	26%
	Medium	7	64%	3	30%	37	58%	4	40%	51	54%
	Large	2	50%	4	50%	11	44%	10	71%	27	53%
2	Small	3	23%	1	33%	12	23%	5	50%	21	27%
	Medium	1	20%	9	50%	99	76%	3	60%	112	70%
	Large	1	50%	3	50%	7	58%	2	50%	13	54%
3	Small	3	37%	5	38%	5	19%	2	40%	15	29%
	Medium	3	37%	31	76%	27	59%	0	0%	61	64%
	Large	1	50%	0	---	7	58%	0	---	8	57%
4	Small	26	68%	2	29%	71	66%	2	40%	101	64%
	Medium	5	56%	5	36%	12	34%	1	25%	23	37%
	Large	1	33%	0	0%	22	79%	1	33%	24	69%
5	Small	3	43%	2	50%	3	19%	3	37%	11	31%
	Medium	10	77%	2	33%	12	32%	5	63%	29	45%
	Large	0	---	0	0%	9	60%	0	---	9	56%
6	Small	3	25%	3	30%	60	53%	2	25%	68	47%
	Medium	2	33%	18	64%	6	20%	1	33%	27	40%
	Large	0	---	0	---	2	40%	0	---	2	40%
7	Small	2	33%	25	61%	46	58%	15	75%	88	60%
	Medium	0	---	2	25%	22	39%	0	---	24	38%
	Large	0	---	0	0%	2	40%	0	---	2	33%
Total	Small	42	47%	40	49%	208	46%	31	52%	321	47%
	Medium	28	54%	70	56%	215	54%	14	45%	327	54%
	Large	5	45%	7	41%	60	59%	13	62%	85	56%

5. Sample weights

Table 5 : Sample weights by stratum and sampling region

Stratum	Size	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	Small	125.65	251.31	105.71	167.54	112.83
	Medium	230.37	119.67	198.57	139.62	180.87
	Large	167.54	167.54	149.59	293.19	178.01
2	Small	108.90	125.65	108.29	167.54	114.10
	Medium	104.71	167.54	342.93	209.42	283.39
	Large	167.54	167.54	201.05	167.54	182.77
3	Small	134.03	136.13	103.72	139.62	117.73
	Medium	134.03	343.46	202.81	83.77	229.77
	Large	167.54	---	201.05	---	195.46
4	Small	265.27	117.28	248.98	139.62	234.86
	Medium	188.48	130.31	127.48	111.69	133.17
	Large	125.65	83.77	390.93	125.65	266.54
5	Small	146.60	167.54	103.10	134.03	122.16
	Medium	363.00	125.65	122.43	223.39	151.25
	Large	---	83.77	209.42		191.47
6	Small	111.69	119.67	176.85	111.69	158.72
	Medium	125.65	234.56	104.71	125.65	140.31
	Large	---	---	139.62	---	139.62
7	Small	125.65	214.66	197.11	335.08	208.72
	Medium	---	111.69	137.97	---	134.03
	Large	---	83.77	139.62	---	125.65
Total	Small	157.07	165.50	156.07	173.32	158.67
	Medium	181.50	190.39	181.12	152.76	181.25
	Large	153.58	142.41	203.44	219.90	191.66



6. Panel data

Table 6 : Panel Sample

Stratum	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	19	3	93	2	117
2	36	13	39	6	94
3	9	7	75	2	93
4	19	3	54	1	77
5	16	3	62	4	85
6	14	2	34	0	50
7	8	4	48	3	63
Unknown	2	0	0	3	5
Construction	21	2	66	0	89
Out of scope / Invalid ISIC	3	1	4	0	8
Double	0	0	35	0	35
Total	147	38	510	21	716

Table 7 : Panels Surveyed

Stratum	Size	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	Small	2	0	0	0	2
	Medium	7	3	11	1	22
	Large	4	0	21	1	26
2	Small	4	0	1	0	5
	Medium	4	2	7	1	14
	Large	8	6	8	2	24
3	Small	0	0	1	0	1
	Medium	2	1	9	0	12
	Large	6	3	20	1	30
4	Small	0	0	0	0	0
	Medium	3	0	1	0	4
	Large	1	0	6	1	8
5	Small	1	0	0	1	2
	Medium	8	1	6	0	15
	Large	3	2	16	2	23
6	Small	4	1	0	0	5
	Medium	3	0	6	0	9
	Large	2	0	6	0	8
7	Small	1	0	0	0	1
	Medium	2	1	6	0	9
	Large	2	1	6	2	11
Total	Small	12	1	2	1	16
	Medium	29	8	46	2	85
	Large	26	12	83	9	130

Table 8 : Panel Completion Rate

Stratum	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	68%	100%	34%	100%	43%
2	44%	62%	41%	50%	46%
3	89%	57%	40%	50%	46%
4	21%	0%	13%	100%	16%
5	75%	100%	35%	75%	47%
6	64%	50%	35%	---	44%
7	63%	50%	25%	67%	33%
Total	55%	60%	32%	67%	40%

Addendum.

<b>Table 9: Population size including panel firms</b>						
Stratum	Size	Cape Town	Durban	Johannesburg	Elizabeth Port	Total
1	Small	505	251	4440	335	5531
	Medium	928	841	5372	839	7980
	Large	339	670	2115	1174	4298
2	Small	1093	251	4441	838	6623
	Medium	424	1510	10981	420	13334
	Large	176	509	1013	337	2034
3	Small	670	1089	2179	419	4357
	Medium	672	3436	3862	84	8054
	Large	174	3	1025	1	1203
4	Small	3183	586	8963	419	13,152
	Medium	757	1173	2933	335	5198
	Large	252	84	2352	252	2940
5	Small	587	335	1340	671	2934
	Medium	1097	504	3189	670	5460
	Large	3	86	1273	2	1363
6	Small	1009	839	9550	670	12068
	Medium	506	2346	2519	251	5622
	Large	2	0	425	0	427
7	Small	504	3435	6702	1675	12315
	Medium	1	671	4697	0	5369
	Large	2	85	425	2	514
Total	Small	7551	6786	37615	5027	56980
	Medium	4385	10479	33554	2599	51017
	Large	947	1436	8628	1768	12779

<b>Table 10. Weights including fresh and panel firms*</b>						
Stratum	Size	Cape Town	Durban	Johannesburg	Port Elizabeth	Total
1	Small	84.2	251.0	105.7	167.5	108.5
	Medium	84.4	84.1	141.4	119.9	120.9
	Large	56.5	167.5	60.4	234.8	86.0
2	Small	78.1	125.5	105.7	167.6	105.1
	Medium	53.0	137.3	281.6	140.0	218.6
	Large	19.6	56.6	77.9	84.3	58.1
3	Small	134.0	136.1	99.0	139.7	114.7
	Medium	96.0	312.4	137.9	84.0	171.4
	Large	24.9	1.0	41.0	1.0	33.4
4	Small	265.3	117.2	249.0	139.7	234.9
	Medium	108.1	130.3	122.2	111.7	120.9
	Large	84.0	84.0	196.0	84.0	154.7
5	Small	117.4	167.5	103.1	111.8	112.8
	Medium	99.7	100.8	99.7	223.3	107.1
	Large	1.0	28.7	57.9	1.0	45.4
6	Small	77.6	104.9	176.9	111.7	149.0
	Medium	72.3	234.6	84.0	125.5	114.7
	Large	1.0		47.2		38.8
7	Small	100.8	214.7	197.1	335.0	205.3
	Medium	0.5	95.9	117.4		109.6
	Large	1.0	42.5	47.2	1.0	34.3
Total	Small	125.9	161.6	154.8	167.6	151.9
	Medium	82.7	166.3	145.3	136.8	139.4
	Large	29.6	65.3	69.0	104.0	65.2

\* The weights for the panel firms were computed as if they were randomly selected.