

Fiji Enterprise Surveys Data Set

1. Introduction

1. This document provides additional information on the data collected in Fiji between May 2009 and April 2010 as part of the Indicators Survey component of the survey East Asia and Pacific Enterprise Survey 2009.

The objective of the survey is to obtain feedback from enterprises on the state of the private sector in client countries (Lao PDR, Tonga, Samoa, Fiji, Timor Leste, Vanuatu, Federated States of Micronesia and Papua New Guinea) as well as to help in building a panel of enterprise data that will make it possible to track changes in the business environment over time, thus allowing, for example, impact assessments of reforms.

Through interviews with firms in the manufacturing and services sectors, the survey will assess the constraints to private sector growth and create statistically significant business environment indicators that are comparable across countries.

This report outlines and describes the sampling design of the data, the data set structure as well as additional information that may be useful when using the data, such as information on non-response cases and the appropriate use of the weights.

2. Sampling Structure

2. The sample for Fiji was selected using stratified random sampling, following the methodology explained in the Sampling Manual¹. Stratified random sampling² was preferred over simple random sampling for several reasons³:

a. To obtain unbiased estimates for different subdivisions of the population with some known level of precision.

b. To obtain unbiased estimates for the whole population. The whole population, or universe of the study, is the non-agricultural economy. It comprises: all manufacturing sectors according to the group classification of ISIC Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I). Note that this definition excludes the following sectors: financial intermediation (group J), real estate and renting activities (group K, except sub-sector 72, IT, which was added to the population under study), and all public or utilities-sectors.

c. To make sure that the final total sample includes establishments from all different sectors and that it is not concentrated in one or two of industries/sizes/regions.

d. To exploit the benefits of stratified sampling where population estimates, in most cases, will be more precise than using a simple random sampling method (i.e., lower standard errors, other things being equal.)

¹ The complete text can be found at http://www.enterprisesurveys.org/documents/Implementation_note.pdf

² A stratified random sample is one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum. (Richard L. Scheaffer; Mendenhall, W.; Lyman, R., "Elementary Survey Sampling", Fifth Edition).

³ Cochran, W., 1977, pp. 89; Lohr, Sharon, 1999, pp. 95

e. Stratification may produce a smaller bound on the error of estimation than would be produced by a simple random sample of the same size. This result is particularly true if measurements within strata are homogeneous.

f. The cost per observation in the survey may be reduced by stratification of the population elements into convenient groupings.

3. Two levels of stratification were used in this country: industry and establishment size. The original sample design with specific information of the industries chosen is described in Appendix E.

4. Industry stratification was designed in the way that follows: the universe was stratified into 23 manufacturing industries, and one services sector as defined in the sampling manual.

5. Size stratification was defined following the standardized definition for the rollout: small (5 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees). For stratification purposes, the number of employees was defined on the basis of reported permanent full-time workers. This seems to be an appropriate definition of the labor force since seasonal/casual/part-time employment is not a common practice, except in the sectors of construction and agriculture.

6. Regional stratification did not take place in Fiji due to the small sample size. The sampling region included the three greatest concentrations of economic activity in Fiji; Suva, Lautoka and Nadi.

3. Sampling implementation

7. Given the stratified design, sample frames containing a complete and updated list of establishments as well as information on all stratification variables (number of employees, industry, and region) are required to draw the sample for the Indicator Surveys.

8. The sample frame used in Fiji was obtained from Fiji National Provident Fund. The sample frame was reviewed and duplicate establishments or establishments with ineligible characteristics (industry sector, number of employees, geographic location) removed from the list. The modified sample frame was used to select the sample of establishments for the full survey. This database contained the following information:

- Name of the firm
- ISIC code
- Number of employees.

Contact details such as addresses and phone numbers were largely missing from the sample frame and posed a significant hurdle for the implementing team.

Counts from sample frame shown below:

Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	155	947	1102
	2-Medium	104	351	455
	3-Large	41	108	149
	Region Total	300	1406	1706
Grand Total		300	1406	1706

9. The enumerated establishments were then used as the frame for the selection of a sample with the aim of obtaining interviews at 150 establishments with five or more employees

10. The quality of the frame was assessed at the onset of the project through calls to a random subset of firms and local contractor knowledge. The sample frame was not immune from the typical problems found in establishment surveys: positive rates of non-eligibility, repetition, non-existent units, etc. Due to response rate and ineligibility issues, additional sample had to be extracted from the universe in order to obtain enough eligible contacts and meet the sample targets.

11. Given the impact that non-eligible units included in the sample universe may have on the results, adjustments may be needed when computing the appropriate weights for individual observations. The percentage of confirmed non-eligible units as a proportion of the total number of sampled establishments contacted for the survey was 19% (61 out of 329 establishments).⁴ Breaking down by industry, the following numbers of establishments were surveyed:

Manufacturing	52
Services	112

Local Agency team involved in the study:

Local Agency	Dr. Rohit Kishore of the University of the South Pacific Suva, Fiji Activities since: 1995
Name of Country Team Leader	Dr. Rohit Kishore
Local Survey Implementation Team:	10 – Parmod Achary (Survey Supervisor) 11 – Reshma 12 – Muni Radika 13 – Moureen 14 – Joshlyn 15 – Bharti

⁴ Appendix B shows the tabulations for the sample of registered firms of response codes that are classified as eligible and non-eligible.

	16 – Mary Chetty 17 – Doreen Narayan
Other staff involved:	Kristin Smart – MKE South Pacific Regional Coordinator

Sample Frame:

Characteristics of sample frame used	Variables: Name of establishment, activity, number of employees
Sources:	Fiji National Provident Fund
Year:	2008
Comments on the quality of sample frame:	No contact details for enterprises.
Year and organism that conducted the household and income survey (HIES) report census	2002 – 2003 Fiji Islands Bureau of Statistics [FIBOS]
Other sources for companies statistics	(None)

Sectors included in the sample:

Original Sectors	Manufacturing: 15,16,17,19,20,21,22,24,25,26, 28,29,36,37 Services: 45,50,51,52,55,60,61,62,63,64,72
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Sample:

Comments/ problems on sectors and regions selected in the sample	Sectors and regions in the Sample Frame represented the locations of the major businesses in Fiji. However businesses in Lautoka were difficult to arrange appointments with due to distance and enterprises canceling interview appointments.
Comments on the response rate	Businesses were skeptical in Fiji, given the recent change to a military regime in government. The response was low due to fear of the political environment among businesses.
Comments on the sample	(none)

design:	
Other comments:	(none)

Fieldwork:

Date of Fieldwork	20 th of April 2009 to May 2010
Location	Suva, Nadi & Lautoka, Fiji
Interview number	Manufacturing: 52 Services: 112
Problems found during fieldwork	Businesses canceling interviews after interviewer arrives to conduct interview.
Other observations:	Survey team was younger and may have had limited confidence during first few interviews.

4. Data Base Structure:

12. Only one questionnaire – the Indicator Questionnaire – was used for all sectors. This questionnaire had two versions—one for manufacturing and one for services firms.

13. All variables are named using, first, the letter of each section and, second, the number of the variable within the section, i.e. *a1* denotes section *A*, question *1*. Variable names preceded by a prefix “*EA*” indicate questions specific to East Asia and, therefore, they may not be found in the implementation of the rollout in other countries. All other suffixed variables are global and are present in all country surveys over the world. All variables are numeric with the exception of those variables with an “*x*” at the end of their names. The suffix “*x*” denotes that the variable is alpha-numeric.

14. There are 2 establishment identifiers, *idstd* and *id*. The first is a global unique identifier. The second is a country unique identifier. The variables *a2* (sampling region), *a6a* (sampling establishment’s size), and *a4a* (sampling sector) contain the establishment’s classification into the strata chosen for each country using information from the sample frame. The strata were defined according to the guidelines described above.

15. There are three levels of stratification: industry, size and region. Different combinations of these variables generate the strata cells for each industry/region/size combination.

16. All of the following variables contain information from the sampling frame and were defined with the sampling design. They may not coincide with the reality of individual establishments as sample frames may contain inaccurate information. The variables containing the sample frame information are included in the data set for researchers who may want to further investigate statistical features of the survey and the effect of the survey design on their results.

-*a2* is the variable describing sampling regions (oblasts)

-*a6a*: coded using the same standard for small, medium, and large establishments as defined above. The code -9 was used to indicate units for which size was undetermined in the sample frame.

-*a4a*: coded using ISIC codes for the chosen industries for stratification. These codes include most manufacturing industries (15 to 37), retail (52), and (45, 50, 51, 55, 60, 63, 72) for services.

17. The surveys were implemented following a 2 stage procedure. In the first stage a screener questionnaire was applied over the phone to determine eligibility and to make appointments; in the second stage, a face-to-face interview took place with the Manager/Owner/Director of each establishment. The variables *a4b* and *a6b* contain the industry and size of the establishment from the screener questionnaire. Variables *a8* to *a11* contain additional information and were also collected in the screening phase.

18. Note that there are additional variables for location (*a3x*) and size (*11*, *16* and *18*) that reflect more accurately the reality of each establishment. Advanced users are advised to use these variables for analytical purposes.

19. Variable *a3x* indicates the actual location of the establishment. There may be divergences between the location in the sampling frame and the actual location, as establishments may be listed in one place but the actual physical location is in another place.

20. Variables *11*, *16* and *18* were designed to obtain a more accurate measure of employment accounting for permanent and temporary employment. Special efforts were made to make sure that this information was not missing for most establishments.

5. Universe Estimates

21. The enumerated totals were adjusted to take account of the establishments found to be ineligible when interviews were attempted. Then ratios of the total numbers of blocks of each type to the totals enumerated were formed. Those ratios were then applied to the eligible establishments enumerated to provide universe estimates.

22. Appendix C shows the overall estimates of the numbers of establishments in Fiji based on the sample frame.

23. For some establishments where contact was not successfully completed during the screening process (because the firm has moved and it is not possible to locate the new location, for example), it is not possible to directly determine eligibility. Thus, different assumptions about the eligibility of establishments result in different adjustments to the universe cells and thus different sampling weights.

24. Three sets of assumptions on establishment eligibility are used to construct sample adjustments using the status code information.

25. Strict assumption: eligible establishments are only those for which it was possible to directly determine eligibility. The resulting weights are included in the variable w_{strict} .

$$\text{Strict eligibility} = (\text{Sum of the firms with codes 1,2,3,4,\&16}) / \text{Total}$$

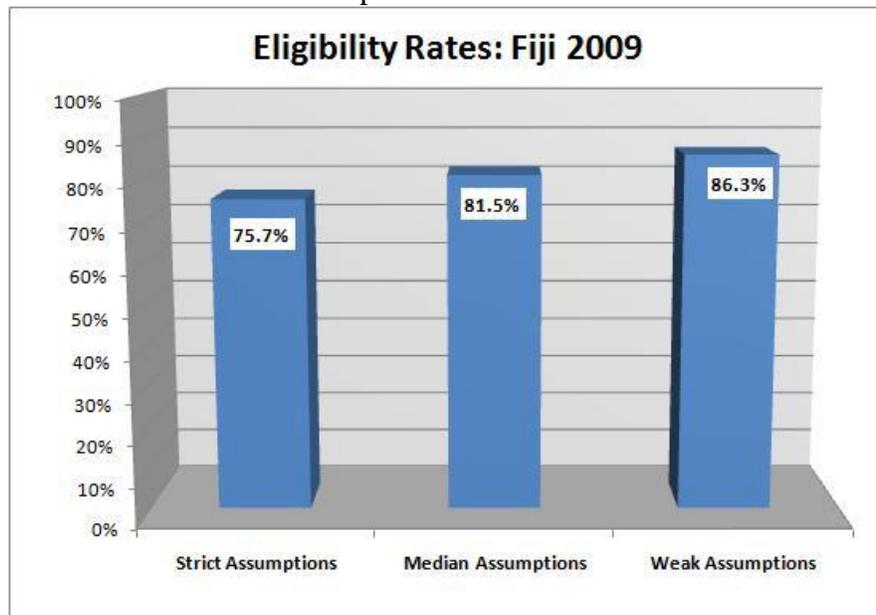
26. Median assumption: eligible establishments are those for which it was possible to directly determine eligibility and those that rejected the screener questionnaire or an answering machine or fax was the only response. The resulting weights are included in the variable w_{median} .

$$\text{Median eligibility} = (\text{Sum of the firms with codes 1,2,3,4,16,10,11, \& 13}) / \text{Total}$$

27. Weak assumption: in addition to the establishments included in points a and b, all establishments for which it was not possible to contact or that refused the screening questionnaire are assumed eligible. This definition includes as eligible establishments with dead or out of service phone lines, establishments that never answered the phone, and establishments with incorrect addresses for which it was impossible to find a new address. Under the weak assumption only observed non-eligible units are excluded from universe projections. The resulting weights are included in the variable w_{weak} .

$$\text{Weak eligibility} = (\text{Sum of the firms with codes 1,2,3,4,16,91,92,93,10,11,12,\&13}) / \text{Total}$$

28. The indicators computed for the Enterprise Survey website use the median weights. The following graph shows the different eligibility rates calculated for firms in the sample frame under each set of assumptions.



29. Universe estimates for the number of establishments in each industry-region-size cell in Fiji were produced for the strict, weak and median eligibility definitions. Appendix C shows the universe estimates of the numbers of registered establishments.

30. Once an accurate estimate of the universe cell projection was made, weights for the probability of selection were computed using the number of completed interviews for each cell.

6. Weights

31. Since the sampling design was stratified and employed differential sampling, individual observations should be properly weighted when making inferences about the population. Under stratified random sampling, unweighted estimates are biased unless sample sizes are proportional to the size of each stratum. With stratification the probability of selection of each unit is, in general, not the same. Consequently, individual observations must be weighted by the inverse of their probability of selection (probability weights or pw in Stata.)⁵

32. Special care was given to the correct computation of the weights. It was imperative to accurately adjust the totals within each region/industry/size stratum to account for the presence of ineligible units (the firm discontinued businesses or was unattainable, education or government establishments, establishments with less than 5 employees, no reply after having called in different days of the week and in different business hours, out of order, no tone in the phone line, answering machine, fax line, wrong address or moved away and could not get the new references) The information required for the adjustment was collected in the first stage of the implementation: the screening process. Using this information, each stratum cell of the universe was scaled down by the observed proportion of ineligible units within the cell. Once an accurate estimate of the universe cell (projections) was available, weights were computed using the number of completed interviews.

33. Appendix D shows the cell weights for registered establishments in Fiji.

7. Appropriate use of the weights

34. Under stratified random sampling weights should be used when making inferences about the population. Any estimate or indicator that aims at describing some feature of the population should take into account that individual observations may not represent equal shares of the population.

35. However, there is some discussion as to the use of weights in regressions (see Deaton, 1997, pp.67; Lohr, 1999, chapter 11, Cochran, 1953, pp.150). There is not strong large sample econometric argument in favor of using weighted estimation for a common population coefficient if the underlying model varies per stratum (stratum-specific coefficient): both simple OLS and weighted OLS are inconsistent under regular conditions. However, weighted OLS has the advantage of providing an estimate that is independent of the sample design. This latter point may be quite relevant for the Enterprise Surveys as in most cases the objective is not only to obtain model-unbiased

⁵ This is equivalent to the weighted average of the estimates for each stratum, with weights equal to the population shares of each stratum.

estimates but also design-unbiased estimates (see also Cochran, 1977, pp 200 who favors the used of weighted OLS for a common population coefficient.)⁶

36. From a more general approach, if the regressions are descriptive of the population then weights should be used. The estimated model can be thought of as the relationship that would be expected if the whole population were observed.⁷ If the models are developed as structural relationships or behavioral models that may vary for different parts of the population, then, there is no reason to use weights.

8. Non-response

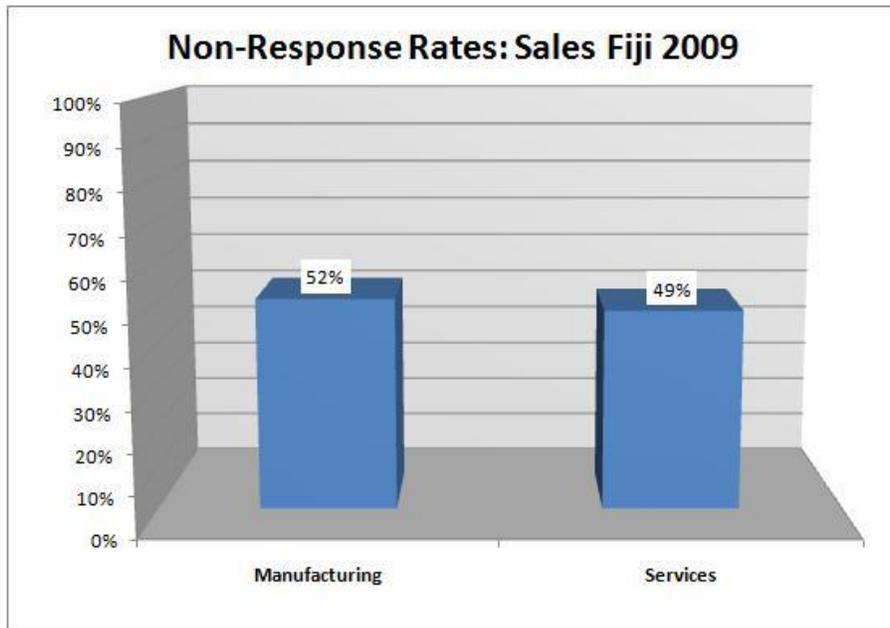
37. Survey non-response must be differentiated from item non-response. The former refers to refusals to participate in the survey altogether whereas the latter refers to the refusals to answer some specific questions. Enterprise Surveys suffer from both problems and different strategies were used to address these issues.

38. Item non-response was addressed by two strategies:

- a- For sensitive questions that may generate negative reactions from the respondent, such as corruption or tax evasion, enumerators were instructed to collect the refusal to respond as a different option from don't know (-7).
- b- Establishments with incomplete information were re-contacted in order to complete this information, whenever necessary. However, there were clear cases of low response. The following graph shows non-response rates for the sales variable, *d2*, by sector. Please, note that the coding utilized in this dataset does not allow us to differentiate between "Don't know" and "refuse to answer", thus the non-response in the table below reflects both categories (DKs and NAs).

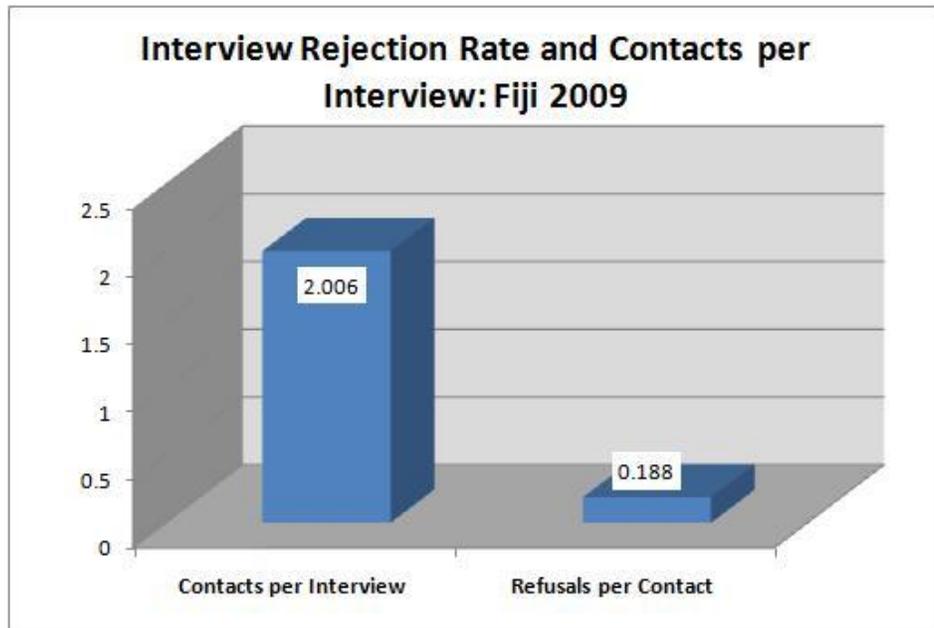
⁶ Note that weighted OLS in Stata using the command `regress` with the option of weights will estimate wrong standard errors. Using the Stata survey specific commands `svy` will provide appropriate standard errors.

⁷ The use weights in most model-assisted estimations using survey data is strongly recommended by the statisticians specialized on survey methodology of the JPSM of the University of Michigan and the University of Maryland.



39. Survey non-response was addressed by maximizing efforts to contact establishments that were initially selected for interview. Attempts were made to contact the establishment for interview at different times/days of the week before a replacement establishment (with similar strata characteristics) was suggested for interview. Survey non-response did occur but substitutions were made in order to potentially achieve strata-specific goals. Further research is needed on survey non-response in the Enterprise Surveys regarding potential introduction of bias.

40. As the following graph shows, the number of contacted establishments per realized interview was 2.01. This number is the result of two factors: explicit refusals to participate in the survey, as reflected by the rate of rejection (which includes rejections of the screener and the main survey) and the quality of the sample frame, as represented by the presence of ineligible units. The number of rejections per contact was 0.188.



41. Details on the rejection rate, eligibility rate, and item non-response are available at the strata level. This report summarizes these numbers to alert researchers of these issues when using the data and when making inferences. Item non-response, selection bias, and faulty sampling frames are not unique to Fiji. All enterprise surveys suffer from these shortcomings, but in very few cases they have been made explicit.

Appendix A

Questionnaires:

Problems for the understanding of questions (write question number)	None, although businesses did not want to give financial information or details about their highest level of education.
Problems found in the navigability of questionnaires (for example skip patterns)	Problem with skip pattern for L.10 in the Manufacturing version of the questionnaire. Question L.6 instructed skip to L.30 when should have said skip to L.10. Data on L.10 missing for Manufacturing firms.
Comments on questionnaire length:	Questionnaires were short enough to be completed quickly.
Suggestions or other comments on the questionnaire:	Clear up skip patterns and formatting to make more favorable to enumerator.

Database:

Comments on the data entry program	Data entry program chosen: CSPro The software programme required some training by the MKE Data Entry Team coordinator but was overall easy to use. The data entry program allowed for mistakes in skip patterns to be entered by the data entry team if they were did not use CSPro correctly. It would be helpful to use a different data entry program in the future that allows for stronger limits on data entry team errors.
Comments on the data cleaning	Checking for data errors and inconsistencies was conducted by MKE and a quality control report and list of corrections was provided to the data entry staff

Country Situation:

General aspects of the economic, political or Social situation in your territory that could affect the results of the survey:	In April 2009 the military backed government suspended the constitution and increased the military control of the government, resulting in the September 2009 suspension of Fiji from the Commonwealth and the Pacific Island Forum. This context heavily impacted both the incentive of businesses to respond and the level of trust they had in the survey, particularly with releasing financial information.
Relevant local events occurred during fieldwork:	Above mentioned political events

Other aspects:	The Fiji country team cannot stress enough how big the impact of the above mentioned political events has had on the entire business and social climate for the country.
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Appendix B

Status Codes:

	Code	#
Eligibles	1. Eligible establishment (Correct name and address)	249
	2. Eligible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment)	0
	3. Eligible establishment (Different name but same address - the firm/establishment changed its name)	0
	4. Eligible establishment (Wrong address - the firm/establishment has changed address and the address could be found)	0
Ineligibles	5. The establishment has less than 5 permanent full time employees	11
	6. The firm discontinued businesses	4
	7. Not a business: private household	1
	8. Ineligible activity: education, agriculture, finances, governments...	2
Unobtainable	91. No reply (after having called in different days of the week and in different business hours)	10
	92. Line out of order	3
	93. No tone	1
	10. Answering machine	0
	11. Fax line - data line	0
	12. Wrong address/ moved away and could not get the new references	2
	13. Refuses to answer the screener	19
	14. In process (the establishment is being called/ is being contacted - previous to ask the screener)	6
	151. Out of target - outside the covered regions, firm moved abroad	21
	152. Out of target - firm moved abroad	0
	Total	329

Response Outcomes:

	Fiji
Sample Target	150
Complete interviews (Total)	163
Incomplete interviews	1
Elegible in process	42
Refusals	43
Out of target	24
Impossible to contact	16
Ineligible - coop.	21
Refusal to the Screener	19
Total	329

Appendix C

Universe Estimates, Fiji:

SAMPLE FRAME				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	155	947	1102
	2-Medium	104	351	455
	3-Large	41	108	149
	Region Total	300	1406	1706
Grand Total		300	1406	1706
STRICT UNIVERSE ESTIMATES				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	100	732	832
	2-Medium	79	294	373
	3-Large	28	93	121
	Region Total	207	1118	1326
Grand Total		207	1118	1326
MEDIAN UNIVERSE ESTIMATES				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	108	810	918
	2-Medium	83	319	402
	3-Large	30	96	126
	Region Total	220	1226	1446
Grand Total		220	1226	1446
WEAK UNIVERSE ESTIMATES				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	131	830	961
	2-Medium	85	325	410
	3-Large	30	108	138
	Region Total	246	1263	1509
Grand Total		246	1263	1509

Appendix D

Strict Cell Weights Fiji:

STRICT Weights			
Region	Size	Manufacturing	Services
Fiji	1-Small	4.71	13.04
	2-Medium	4.03	7.65
	3-Large	2.63	5.18

Median Cell Weights Fiji:

MEDIAN Weights			
Region	Size	Manufacturing	Services
Fiji	1-Small	5.08	14.48
	2-Medium	4.23	8.27
	3-Large	2.69	5.46

Weak Cell Weights Fiji:

WEAK Weights			
Region	Size	Manufacturing	Services
Fiji	1-Small	5.69	15.45
	2-Medium	4.45	8.28
	3-Large	2.93	5.66

Appendix E

Original Sample Design, Fiji:

SAMPLING DESIGN				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	35	35	70
	2-Medium	20	20	40
	3-Large	20	20	40
Fiji Total		75	75	150
Grand Total		75	75	150

The original aim was to obtain 75 interviews with manufacturing establishments and 75 interviews with establishments in the services sectors. However, upon inspection of the available sampling frame it became clear that this was an unrealistic goal.

A total of 329 eligible establishments were enumerated within manufacturing and services. Due to the size of the economy and Fiji's reliance on tourism we found relatively few manufacturing establishments on this list. The 300 manufacturing enterprises were divided into 4 preferences while the 1406 services establishments were divided into four preferences. In total, all 1706 establishments were issued. Interviewers were to attempt interviews with the first preferences before they could move on to subsequent preferences.

Completed Interviews, Fiji:

Realized DESIGN				
Region	Size	Manufacturing	Services	Grand Total
Fiji	1-Small	22	56	77
	2-Medium	19	39	58
	3-Large	11	17	28
	Region Total	52	112	163
Grand Total		52	112	163