

The Thailand 2016 Enterprise Surveys Data Set

I. Introduction

This document provides additional information on the data collected in Thailand between November 2015 and June 2016. The objective of the Enterprise Survey is to gain an understanding of what firms experience in the private sector.

As part of its strategic goal of building a climate for investment, job creation, and sustainable growth, the World Bank has promoted improving the business environment as a key strategy for development, which has led to a systematic effort in collecting enterprise data across countries. The Enterprise Surveys (ES) are an ongoing World Bank project in collecting both objective data based on firms' experiences and enterprises' perception of the environment in which they operate.

The ES currently cover over 155,000 firms in 148 countries, of which 139 have been surveyed following the standard methodology. This allows for better comparisons across countries and across time. Data are used to create statistically significant business environment indicators that are comparable across countries. The ES are also used to build a panel of enterprise data that will make it possible to track changes in the business environment over time and allow, for example, impact assessments of reforms.

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.

II. Sampling Structure

The sample for 2016 Thailand ES was selected using stratified random sampling, following the methodology explained in the *Sampling Note*¹. 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.

¹ The complete text can be found at http://www.enterprisesurveys.org/~media/GIAWB/EnterpriseSurveys/Documents/Methodology/Sampling_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

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.)

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.

Three levels of stratification were used in this country: industry, establishment size, and region. The original sample design with specific information of the industries and regions chosen is described in Appendix C.

Industry stratification was designed in the way that follows: the universe was stratified into five manufacturing industries and two services industries- Food and Beverages (ISIC Rev. 3.1 code 15), Garments (ISIC code 18), Rubber and Plastics (ISIC code 25), Electronic Products (ISIC codes 31 and 32), Other Manufacturing (ISIC codes 16,17, 19-24, 26-29, 30, 33-37), Retail (ISIC code 52) and Other Services (ISIC codes 45, 50, 51, 55, 60-64, and 72).

For the Thailand ES, size stratification was defined as follows: small (5 to 19 employees), medium (20 to 99 employees), and large (100 or more employees).

Regional stratification for the Thailand ES was done across five regions: Bangkok, Central, North, Northeast, and South.

III. Sampling implementation

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. Great efforts were made to obtain the best source for these listings.

Mekong Economics was the main contractor Kadence International was the subcontractor and CSN Research was the sub-subcontractor that implemented the Thailand 2016 ES.

The sample frame consisted of a listings of firms from the National Statistical Office of Thailand; no panel firms were included in the sample frame for Thailand ES 2016.

Table 1: Thailand ES Sample Frame (Fresh)

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	33	72	144	93	120	177	201	2,016
	Medium	75	123	117	126	72	36	207	
	Large	82	101	40	122	21	27	27	
Central	Small	55	100	159	61	176	156	166	2,488
	Medium	97	171	196	91	196	23	58	
	Large	123	183	198	110	126	23	20	
North	Small	78	17	16	90	27	85	68	844
	Medium	76	12	8	59	29	27	34	
	Large	47	6	26	13	37	42	47	
Northeast	Small	54	12	9	73	34	118	57	820
	Medium	49	19	13	65	27	25	29	
	Large	91	15	22	31	21	30	26	
South	Small	16	64	8	34	23	92	86	757
	Medium	64	46	1	12	32	29	36	
	Large	67	63	0	1	28	28	27	
		1,007	1,004	957	981	969	918	1,089	6,925

Source: National Statistical Office of Thailand.

The quality of the frame was enhanced by the verification process conducted Mekong Economics. However, the sample frame was not immune from the typical problems found in establishment surveys: positive rates of non-eligibility, repetition, non-existent units, etc.

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 1.5% (73 out of 4866 establishments)⁴.

Breaking down by industry and size, the following sample targets were achieved (based on the sampling information):

⁴ Based on out of target and ineligible contacts

Table 2: Achieved Interviews (Fresh)

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	5	12	18	10	16	24	23	274
	Medium	9	17	23	16	8	4	23	
	Large	12	19	8	19	2	3	3	
Central	Small	10	12	19	9	22	23	23	326
	Medium	15	24	23	17	23	3	9	
	Large	18	19	20	15	16	3	3	
North	Small	11	3	3	9	5	12	10	131
	Medium	10	4	3	13	3	3	4	
	Large	12	2	6	8	4	3	3	
Northeast	Small	10	3	2	10	7	17	12	143
	Medium	11	5	3	14	4	3	4	
	Large	12	4	5	8	3	3	3	
South	Small	5	10	2	8	3	14	13	126
	Medium	8	11	1	3	4	3	3	
	Large	13	15	0	1	3	3	3	
		161	160	136	160	123	121	139	1,000

IV. Data Base Structure:

The structure of the data base reflects the fact that 2 different versions of the survey instrument were used for all registered establishments. Questionnaires have common questions (*core* module) and respectfully additional manufacturing- and services-specific questions. The eligible manufacturing industries have been surveyed using the **Manufacturing** questionnaire (includes the *core* module, plus manufacturing specific questions). Retail firms have been interviewed using the **Services** questionnaire (includes the *core* module plus retail specific questions) and the residual eligible services have been covered using the **Services** questionnaire (includes the *core* module). Each variation of the questionnaire is identified by the index variable, *a0*.

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 (some exceptions apply due to comparability reasons). Variable names preceded by the prefix “EA” or “MYA” indicate questions specific to Thailand and other countries in East Asia and Pacific 2016, 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.

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.

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. A distinction should be made between the variable *a4a* and *d1a2* (industry expressed as ISIC rev. 3.1 code). The former gives the establishment’s classification into one of the chosen industry-strata based on the sample frame, whereas the latter gives the establishment’s actual industry classification (four digit code) based on the main activity at the time of the survey.

All of the following variables contain information from the sampling frame. They may not coincide with the reality of individual establishments as sample frames may contain inaccurate or outdated 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

- a6a*: coded using the same standard for small, medium, and large establishments as defined above.

- a4a*: coded following the stratification by sector as defined above.

The surveys were implemented following a 2 stage procedure. Typically first a screener questionnaire is applied over the phone to determine eligibility and to make appointments. Then a face-to-face interview takes place with the Manager/Owner/Director of each establishment. However, sometimes the phone numbers were unavailable in the

sample frame, and thus the enumerators applied the screeners in person. 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.

Note that there are variables for size (*l1*, *l6* and *l8*) that reflect more accurately the reality of each establishment. Advanced users are advised to use these variables for analytical purposes. Variables *l1* (number of permanent full-time workers at the end of the last complete fiscal year), *l6* (number of full-time seasonal workers employed during last complete fiscal year) and *l8* (average length of employment of full-time temporary employees during last complete fiscal year) 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.

The fiscal period goes from January to December with the last complete fiscal year being 2014 or 2015, depending on the date of the interview. Variable *eea3a3y* (last complete fiscal year) can be used to obtain the last complete fiscal year for each firm.

For questions pertaining to monetary amounts, the unit is the Thai Bhat.

V. Universe Estimates

Universe estimates for the number of establishments in each cell in Thailand were produced for the strict, weak and median eligibility definitions described below. The estimates were the multiple of the relative eligible proportions.

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.

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

Strict assumption: eligible establishments are only those for which it was possible to directly determine eligibility. The resulting weights are included in the variable *wstrict*.

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

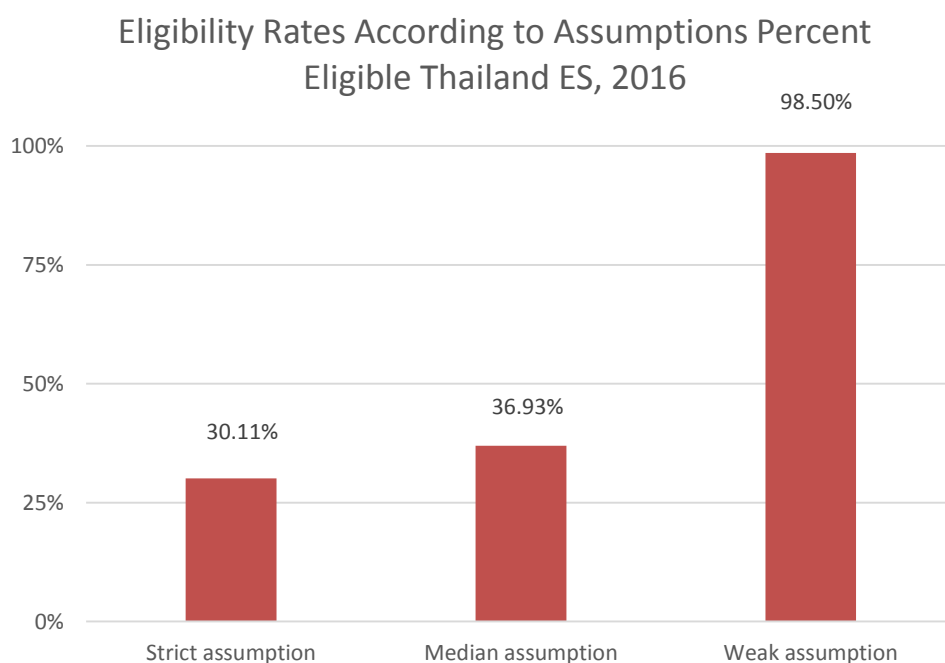
Median assumption: eligible establishments are those for which it was possible to directly determine eligibility and those that rejected the screener questionnaire or an answering machine or fax was the only response. The resulting weights are included in the variable *wmedian*.

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

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 *wwweak*.

$$\text{Weak eligibility} = (\text{Sum of the firms with codes, 1,2,3,4,16,10,11,13,91,92,93,94,12}) / \text{Total}$$

The indicators computed for the ES 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.



Universe estimates for the number of establishments in each industry-region-size cell in Thailand were produced for the strict, weak and median eligibility definitions. Appendix B shows the universe estimates of the numbers of registered establishments that fit the criteria of the ES.

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.

VI. Weights

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

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, no reply after having called in different days of the week and in different business hours, no tone in the phone line, answering machine, fax line⁶, 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.

VII. Appropriate use of the weights

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.

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 have the advantage of providing an estimate that is independent of the sample design. This latter point may be quite relevant for the ES as in most cases the objective is not only to obtain model-unbiased estimates but also design-unbiased estimates (see also Cochran, 1977, pp 200 who favors the use of weighted OLS for a common population coefficient.)⁷

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.⁸ If the models are developed

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

⁶ For the surveys that implemented a screener over the phone.

⁷ 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.

⁸ 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.

as structural relationships or behavioral models that may vary for different parts of the population, then, there is no reason to use weights.

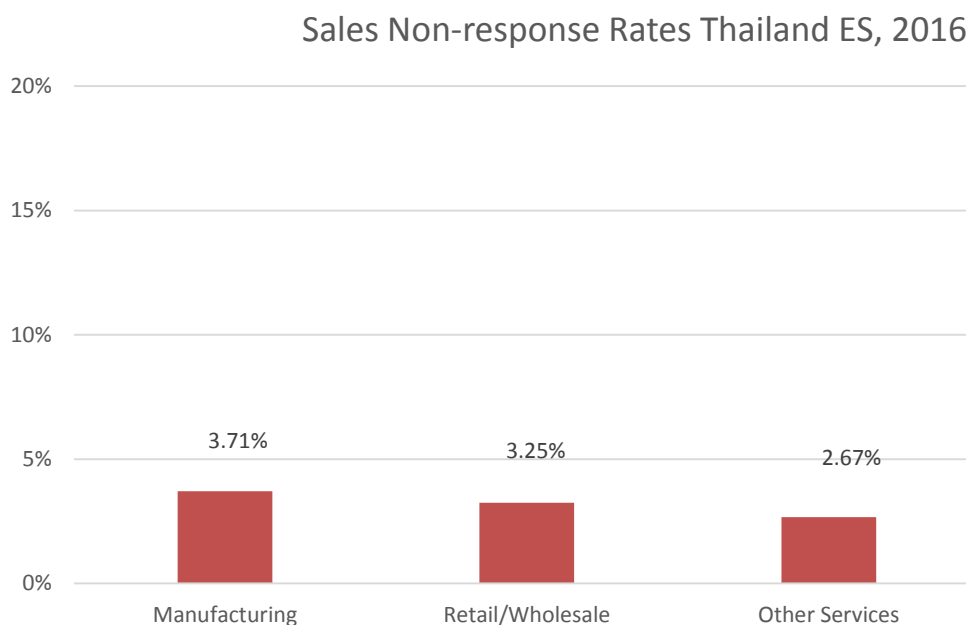
VIII. Non-response

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.

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 (-8) as a different option from don't know (-9).

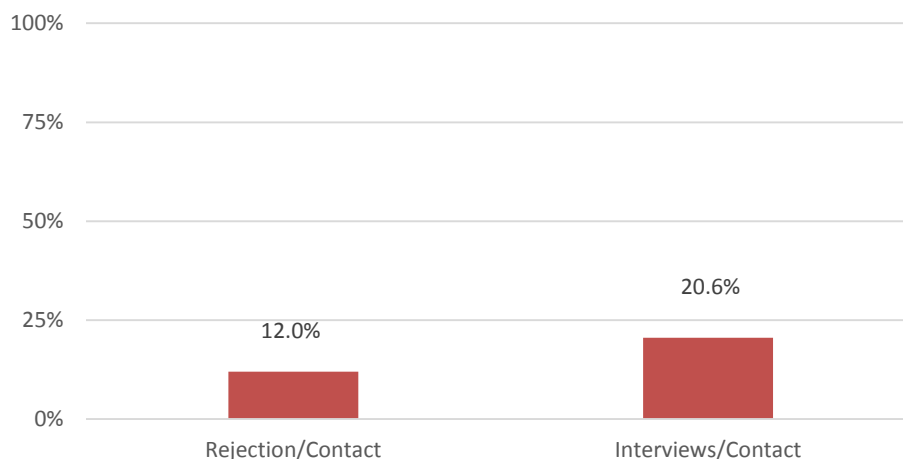
b- Establishments with incomplete information were re-contacted in order to complete this information, whenever necessary. However, there were clear cases of low response. The following graph shows non-response rates for the sales variable, *d2*, by sector. Please, note that for this specific question, refusals were not separately identified from "Don't know" responses.



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; whenever this was done, strict rules were followed to ensure replacements were randomly selected within the same stratum. Further research is needed on survey non-response in the Enterprise Surveys regarding potential introduction of bias.

As the following graph shows, the number of interviews per contacted establishments was 0.21.⁹ 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 share of rejections per contact was 0.12.

Rejection rate and Interviews per Contact
Thailand ES, 2016



Details on the rejection rate, eligibility rate, and item non-response are available at the level strata. 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 Thailand. All enterprise surveys suffer from these shortcomings, but in very few cases they have been made explicit.

References:

- Cochran, William G., Sampling Techniques, New York, New York: John Wiley & Sons, 1977.
- Deaton, Angus, The Analysis of Household Surveys, Baltimore, Maryland: Johns Hopkins University Press, 1998.
- Levy, Paul S. and Stanley Lemeshow, Sampling of Populations: Methods and Applications, New York, New York: John Wiley & Sons, 1999.
- Lohr, Sharon L. Sampling: Design and Techniques, Boston, Massachusetts: Brookes/Cole, 1999.
- Scheaffer, Richard L.; Mendenhall, W.; Lyman, R., Elementary Survey Sampling, Fifth Edition, 1996.

⁹ The estimate is based on the total no. of firms contacted including ineligible establishments.

Appendix A

Status Codes Enterprise Survey (ES):

0	Screening in process	14. In process (the establishment is being called/ is being contacted - previous to ask the screener)	0
1465	Eligible	1. Eligible establishment (Correct name and address) 2. Eligible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment) 3. Eligible establishment (Different name but same address - the firm/establishment changed its name) 4. Eligible establishment (Moved and traced) 16. Eligible establishment (Panel Firm - now less than five employees; this code applies only to panel firms.)	1463 0 2 0 0
287	Screener refusal	13. Refuses to answer the screener	287
32	Ineligible	5. The establishment has less than 5 permanent full time employees 616. The firm discontinued businesses - (Establishment went bankrupt) 617. 618. The firm discontinued businesses - (Original establishment disappeared and is now a different firm) 619. The firm discontinued businesses - (Establishment was bought out by another firm) 620. The firm discontinued businesses - (It was impossible to determine for what reason) 621. The firm discontinued businesses - (Other) 7. Not a business: Private household 8. Ineligible activity: Education, Agriculture, Finances, Government, etc.	2 5 0 7 0 14 0 4 0
41	Out of target	151. Out of target - outside the covered regions 152. Out of target - moved abroad	33 0

		153. Out of target - Not registered with Statistical Authority	0
		154. Out of target - establishment is HQ without production or sales of goods or services	1
		155. Out of target - establishment was not in operation for the entirety of last fiscal year	0
		156. Duplicated firm within the sample	7
3041	Unobtainable	91. No reply after having called in different days of the week and in different business hours	2693
		92. Line out of order	136
		93. No tone	90
		94. Phone number does not exist	43
		10. Answering machine	9
		11. Fax line- data line	36
		12. Wrong address/ moved away and could not get the new references	34

4866	Total contacted
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Response Outcomes : Thailand ES 2016:

Target and totals	Sample target	1000
	Sample target completion rate	100.0%
	Total contacts available in frame	6925
	Total contacts issued	4968
	Total contacts contacted	4866

Screening phase	Screening in process	0
	Eligibles	1465
	Screeners refusal	287
	Ineligible + out of target	72
	Unobtainable	3041
Interview phase (only if eligible)	Complete interviews without extra module	1000
	Complete interviews with extra module	0
	Eligible in process + incomplete interviews	143
	Interview refusal	297

Percent breakdown (relative to total contacted)	Screening in process rate	0.0%
	Screeners refusal rate	5.9%
	Ineligible + out of target rate	1.5%
	Unobtainable rate	62.5%
	Interview conversion rate	20.6%
	Eligible in process + incomplete interviews rate	2.9%
	Interview refusal rate	6.1%

Appendix B: Universe Estimate Based on Sampling Weights

Strict Universe Estimates – Fresh:

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	429	11	7	100	608	1,465	1,799	5,535
	Medium	110	6	4	26	216	151	428	
	Large	23	2	10	14	43	32	52	
Central	Small	176	3	2	63	485	819	911	3,077
	Medium	59	4	2	13	172	94	188	
	Large	17	3	4	6	18	17	22	
North	Small	215	101	47	32	1,024	1,761	2,268	8,256
	Medium	153	140	51	18	777	152	602	
	Large	115	97	67	25	469	36	106	
Northeast	Small	139	217	74	201	1,668	4,000	7,103	17,676
	Medium	63	110	41	122	709	415	2,013	
	Large	31	43	15	45	197	100	370	
South	Small	136	65	4	16	197	1,184	1,516	3,927
	Medium	53	16	0	4	82	116	361	
	Large	24	22	0	0	33	19	79	
		1,743	842	327	683	6,698	10,359	17,818	38,471

Median Universe Estimates – Fresh:

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	435	11	8	101	633	1,331	1,693	5,428
	Medium	124	7	4	29	250	152	447	
	Large	27	3	12	16	53	34	58	
Central	Small	247	5	3	89	700	1,030	1,187	4,198
	Medium	92	6	3	20	275	131	272	
	Large	27	6	7	9	30	25	34	
North	Small	251	119	59	38	1,233	1,850	2,466	9,711
	Medium	199	184	70	23	1,039	177	727	
	Large	159	135	98	34	667	45	137	
Northeast	Small	150	236	84	216	1,848	3,864	7,105	18,440
	Medium	76	133	52	146	872	445	2,235	
	Large	39	55	20	57	257	114	437	
South	Small	150	72	4	18	224	1,170	1,550	4,139
	Medium	65	19	0	4	103	127	410	
	Large	31	29	0	0	44	22	96	
		2,074	1,020	427	801	8,228	10,515	18,853	41,917

Weak Universe Estimates – Fresh:

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	914	20	16	218	1,365	2,223	3,416	11,175
	Medium	326	16	11	78	675	318	1,130	
	Large	63	6	27	39	126	62	127	
Central	Small	788	13	10	292	2,294	2,613	3,637	13,182
	Medium	370	22	13	83	1,128	416	1,046	
	Large	95	17	22	34	107	69	114	
North	Small	817	342	182	126	4,119	4,784	7,706	32,143
	Medium	811	660	272	98	4,347	574	2,844	
	Large	564	423	330	125	2,427	127	465	
Northeast	Small	282	392	150	419	3,572	5,786	12,854	34,319
	Medium	178	277	115	354	2,111	835	5,065	
	Large	81	100	40	120	542	186	862	
South	Small	370	157	10	45	566	2,292	3,670	9,800
	Medium	202	53	1	14	327	311	1,215	
	Large	84	70	0	1	121	47	247	
		5,944	2,566	1,198	2,046	23,827	20,643	44,397	100,620

Appendix C: Original Sample Design

Original Sample Design (Fresh)

		Food and Beverages	Rubber and Plastics	Electrical and Communications	Apparel	Other Manufacturing	Retail	Other Services	Grand Total
Bangkok	Small	5	12	18	11	16	23	23	274
	Medium	9	17	23	16	8	4	23	
	Large	12	19	8	18	3	3	3	
Central	Small	10	12	19	9	22	23	23	326
	Medium	15	20	23	14	23	3	9	
	Large	17	22	23	18	15	3	3	
North	Small	11	4	4	9	4	12	10	131
	Medium	10	4	3	13	3	3	4	
	Large	12	2	6	8	3	3	3	
Northeast	Small	10	3	2	10	7	17	12	143
	Medium	11	5	3	14	4	3	4	
	Large	12	4	5	8	3	3	3	
South	Small	5	10	2	8	3	14	13	126
	Medium	9	11	1	3	3	3	4	
	Large	12	15	0	1	3	3	3	
		160	160	140	160	120	120	140	1,000