Chapter III

METHODOLOGY OF DATA COLLECTION AND ANALYSIS

This chapter aimed to describe the methodology accepted for the selection of the study sites, primary and secondary data collection methods and sources prevailed in the survey. The data analysis methods for this study were also prescribed.

3.1 Profile of the study sites for primary data

The socioeconomic features, cultivation practices and market performance of farmers and intermediaries were studied in Thonegwa and Pyinmana areas. Besides that marketing activity of central mung bean wholesalers were investigated in Yangon central market.

The criteria for selecting the study areas were on the basic of 1) the homogeneity of the study sites in terms of cropping system and socio-economic features of the farmers in Thonegwa and Pyinmana areas were the prime basis for selection of the study areas. 2) To precisely examine the existence and performance of market intermediaries in mung bean marketing channels, Thonegwa and Pyinmana and Yangon markets were selected as study sites.

Thonegwa area is located in the southern district of Yangon division which plays a vital role in the production of mung bean, southern and northern districts as shown in Appendix 1.3. In southern district, Thonegwa area has surplus production of mung bean, which is grown as a second crop after the monsoon rice. Mung bean from Thonegwa is famous for its quality and size which is preferable demand for overseas importers. Mung bean sown area is 45,624.47 ha at winter season in 2006. Most of the surplus mung bean is transported by vehicles and water-ways. The terminal market for Thonegwa mung bean is Bayintnaung wholesale market in Yangon.

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Pyinmana area is the central part of Myanmar, is located in Mandalay division. Mung bean sown areas for monsoon were 407.84 ha and 408.65 ha for winter. Pyinmana is famous for pulses growing. (See in Appendix 1.4)

Sampling procedure and data collection for primary data

Primary data were gathered by using structured questionnaires in the study sites. Primary sources included interviews with farmers and marketing intermediaries including assemblers, local wholesalers and central wholesalers. The survey of mung bean farmers were carried out in both regions surrounding the selected market places by using stratified random sampling. In order to obtain reliable qualitative data interpret the functioning of the market, a stratified sample of assemblers and wholesalers were taken. Total sample numbers of interviewees in study areas was shown in Table 3.1.

Table 3.1 Total sample numbers of interviewees in the study areas

Region	Farmers	Collectors/traders	Total
Thonegwa	40	15	55
Pyinmana	30	10	40
Total	70	25	95

Source: Survey, May 2006.

The questionnaires used in the survey cover the following topics:

(i) The demographic questionnaires investigated the social and economic characteristics of farmers and the market intermediaries.

(ii) The agricultural questionnaires were applied to all sampled farmers in order to collect the cropping system and farm expenses.

(iii) The market related questionnaires were used to collect marketing activities and marketing cost at farm-level and market level.

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3.2 Method of the secondary data collection

Mung bean wholesale prices on Yangon and Mandalay markets were officially released from Department of Agricultural Planning which is under Ministry of Agriculture and Irrigation. Mung bean wholesale prices of Yangon and Mandalay were taken from the first week of January 2000 to last week of December 2005. In total, 314 weekly observations of average wholesale prices were available.

Profiles of market places

Yangon, the capital of the country is situated on Yangon River, and is the focal point of the internal and external pulses trade. Agricultural produces enter Yangon city from surplus producing areas by road, rail and waterway. (See in Appendix 1.1). In Yangon city, Bayintnaung is the wholesale market for pulses. This is a big, modern wholesale market. The location of the market is strategic with easy access by truck from all parts of the country. Generally, pulses are coming into the Bayintnaung market all year round so that old crops and new crops usually overlap.

Mandalay is the second biggest city after Yangon, is situated on Ayeyarwady River and is the focal point of upper Myanmar. (See in Appendix 1.2). It is an important transit station for trade with the rest of the country and is also the hub for mung bean marketing in the central part of Myanmar. The city has access by highway, railway and waterway to the lower part of the country and its surrounding areas. Mandalay wholesale supply the local market but ever more importantly arrange supplies for Yangon wholesalers and exporters.

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3.3 Method of analysis

Data processing was done after collecting the data. To evaluate and focus on the economic and technical performance for mung bean, farm enterprise budgets were prepared. Mung bean wholesale price series from first week of January 2000 to last week of December 2005 of Yangon and Mandalay markets were used to evaluate the transmission of price information between central and local mung bean markets and to

predict the price effect of a shock in one regional market on the other regional market to which it is connected.

3.3.1 Production cost for farmers

All the farmers interviewed in the case study areas had the same desires to obtain better profit margin. Thus, they managed to produce the crop based on their land holding size and agronomic techniques advised by extension workers. As farm level, production costs incurred related to agronomic technique adopted by farmers, hired labor costs, availability of farm family laborer, used of agro- input, used of working capital, yield obtained by farmers, sold price received by farmers. The resources poor farmers purchased agro-input with late payment basis and paid 8 percent interest per month for buying value of foliar fertilizer. Critical production constraints were often shortage of working capital for resources poor farmers.

3.3.2 Marketing cost for farmers

Regarding with farmers marketing, the farmers in the study areas immediately sold their mung bean after harvesting due to requirement of cash (they need to pay cash to fertilizer retailers not to increase interest rate and use for family requirement) which inevitably lead to fall in price. Additionally marketing costs to farmers such as produce preparation, packaging materials cost, processing and transport cost were incurred.

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Nature of some cost items for farmer

The nature of some cost items involved were listed below:

(a)Preparation	:	Mung bean preparation such as cleaning, sorting, grading was carried out by farmers.
(b)Packaging materials	:	For long-distance transportation, appropriate packaging materials such as polyethylene bags.
(c) Processing	:	The hired labor picked mung bean pods and carried them to farmer's home to process the grain, for getting 1 basket of grain from 10 basket mung bean pods process, an average of 1 basket was 200 myk.
(d) Transportation	:	Transport cost for fertilizer and pesticide from market to field, mung bean pods from the farm to home and grain to first point of sale.

Note: 1 bsk=32.65 kg

3.3.3 Marketing costs for market intermediates

Primary data were also collected to estimate marketing cost of mung bean various traders. Marketing costs may be divided into handling costs and overhead costs. Handling cost may further be classified into two categories, i.e. those direct costs which were determined by the volume of sales (unit costs) and those which were determined by the value of sales. The former included bags, pre-packing, packing, loading, unloading and transportation. The later was commission paid to the brokers. Overhead costs included interest charged for capital invested. Additionally marketing cost such as crop value added to interest lost, hired storage cost, prevention of product quality by using with pesticide were incurred.

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Nature of some cost items for trader

The nature of some cost items involved were listed below:

(a) Bag	:	Mung bean was normally packed in polyethylene bags containing the equivalent of 1.5 baskets, the weight of one bag was 50 kg.
(b) Pre-packing	:	Mung bean involved grading was done by temporary labor and was paid on a weight or basket basis.
(c)Packing	:	Occurred after pre-packing; it was done by temporary labor paid on a basket basis.
(d)Loading and unloading	:	Undertook by temporary labor paid on unit basis, the average cost was approximately 25-30 myk per basket.
(e) Transportation	:	Mainly by truck about 200 myk per basket.
(f) Broker commission	:	The rate charged for mung bean was 1 percent of sale value.
(g) Storage	:	Stored before the news crop supplied to the market. Cost of chemical to be protected storage pests and hired cost of warehouse, interest value (lost) and opportunity cost of stored crop value were considered.

3.3.4 Marketing margins for farmer and market intermediates

Marketing margins were differences between prices at different levels in the marketing channel. It captured the proportion of the final selling price to each particular agent in the marketing channel. Gross margin obtained by farmers was closely linked to three main factors such as farmer's yield, production costs and selling price.

Data included representative costs and returns from the main participants in transportation, processing and storage. Analysis estimated the costs of all inputs, subtracting these costs from returns then gave profits at each level of the system.

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In this study, marketing margin was calculated by concurrent method. Price at consecutive levels of the marketing channel was compared at the same point in time. Hence, a marketing margin was specified as follows:

$$M_t = P_t^L - P_t^{L-1} \quad (1)$$

Where:

M_t = Marketing margin between level L and its preceding level L-1

P_t^L = Price at market level L

P_t^{L-1} = Price at market level L-1

3.3.5 Marketing channels in the study areas

A general knowledge of the commonly used marketing channel was valuable to understand the marketing system and the relation of markets and market agencies to one another. Market performance was a function of the number of scale and role of market intermediaries who provided services involving the transfer of produce from producers to end user.

The marketing channel showed the flow of mung bean from the production site (producer) to intermediaries and on to the exporters. To understand how the commodities moved through the various channels, it was necessary to identify the role of various market places and marketing agents involved. By knowing the marketing channel and they can choose the appropriate markets and analysis was made the different shares of specific intermediaries who participated at the marketing channels.

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3.4 Time Series Price data analysis

3.4.1 Time series data, static and dynamics

From the theoretical point of view a time series is a collection of random variables $[P^M]$. Such a collection of random variables ordered in times is called a stochastic process.

The model:

$$P_t^M = \beta P_{t-1}^Y + \varepsilon_t \qquad (2)$$

is static. If $[P^Y]$ changes, $[P^M]$ immediately responds and no further change takes place in $[P^M]$ if $[P^Y]$ the remains constant. The system is therefore always observed in an equilibrium position.

A dynamic element may be injected into the above equation by introducing lagged values of the explanatory variable. A very simple modification is:

$$P_t^M = \beta_0 P_t^Y + \beta_1 P_{t-1}^Y + \varepsilon_t \qquad (3)$$

If $[P^Y]$ increases by one unit, the expected value of $[P^M]$ increases immediately by β_0 units but the full change of units is $\beta_0 + \beta_1$ only felt after one whole time period has elapsed.

An alternative way of introducing dynamic effects into a model is by means of a lagged dependent variable. Consider the specification:

$$P_t^M = \alpha P_{t-1}^M + \beta P_t^Y + \varepsilon_t \qquad (4)$$

Where:

α, β = Coefficients

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3.4.2 Serial correlation problems in time series data

A common finding in time series regressions is that the residuals are correlated with their own lagged values. This serial correlation violates the standard assumption of regression theory that disturbances are not correlated with other disturbances. The primary problems associated with serial correlation are:

- OLS is no longer efficient among linear estimators.
- Since prior residuals help to predict current residuals this information is useful for a better prediction of the dependent variable.
- Standard errors computed using the textbook OLS formula are not correct and are generally understated.
- If there are lagged dependent variables on the right-hand side, OLS estimates are biased and inconsistent.

3.4.3 Stationary and non-stationary

A stochastic process is said to be stationary if the joint and conditional probability distributions of the process are unchanged if displaced in time. In practice, it is more usual to deal with weak sense stationary, restricting attention to the means, variances and covariance of the process. Then, a stochastic process $[P_t]$ is said to be stationary if:

$$E(P) = \text{constant} = \mu \quad ; \quad Var(P) = \text{constant} = \sigma^2 \quad ; \quad Cov(P_t P_{t+j}) = \sigma_j$$

Thus the means and the variances of the process are constant over time, while the value of the covariance between two periods depends only on the gap between the periods and not the actual time at which this covariance is considered. If one or more of then conditions above are not fulfilled, the process is non-stationary (Harvey, 1990).

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3.4.4 Unit root testing

When discussing stationary and non-stationary time series, it is needed to test for the presence of unit roots in order to avoid the problem of spurious regression. If a variable contains a unit root then it is non-stationary, regressions involving the series can falsely imply the existence of a meaningful economic relationship. In principle, it is important to test the order of integration of each variable in a model, to establish whether it is non-stationary and how many times the variable needs to be differenced to result in a stationary series.

A non-stationary series which can be transformed to a stationary series by differencing (d)times is said to be integrated of order(d). A series integrated of order (d) is conventionally denoted as $P_t \sim I(d)$. Thus, for example, if $P_t \sim I(2)$, the first differences of the first differences of $[P_t]$ achieve stationary that is:

$$\Delta\Delta P_t = \Delta(P_t - P_{t-1}) = (P_t - P_{t-1}) - (P_{t-1} - P_{t-2}) = P_t - 2P_{t-1} + P_{t-2}$$

In order to illustrate the application of the conditions for stationary by using first order auto-regression process AR (1),

$$P_t = \phi P_{t-1} + \varepsilon_t, t = ...,-1,0,1,..... \quad (5)$$

Where ε_t is assumed to define a consequence of independently and identically distributed (IID) random variables with expected value zero and variance σ^2. The process is stationary when ϕ less than one in absolute value, i.e. is $-1 < \phi < 1$.

The fact that $E(P_t)$, $Var(P_t)$ and $Cov P_t - P_{t-1}$ do not depend on t means that AR (1) process is indeed stationary when ϕ is less than one in absolute value. The AR (1) process has a unit root, if and only if ϕ is 1. In this case the stationary condition is not satisfied. AR (1) process with a unit root is non-stationary.

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AR (1) case can be readily extended to higher order auto-regression processes. Consider the AR (2) process defined by:

$$P_t = \phi_1 P_{t-1} + \phi_2 P_{t-2} + \varepsilon_t \quad (6)$$

3.4.5 Spurious regression

Trends in the data can lead to spurious correlations that imply relationships between the variables in a regression equation, when all that presents are correlated time trends. The time trend in a trend stationary variable can either be removed by regression the variable on time (with the residuals from such a regression forming a new variable which is trend free and stationary) by including a deterministic time trend as one of the regressors in the model. In such circumstances, the standard regression model is operating with stationary series which have constant means and finite variances and thus statistical inferences (based on t and F tests) are valid.

Regression a non stationary variable on a deterministic trend generally does not yield a stationary variable (instead the series needs to be differenced prior to processing). Thus using standard regression techniques with non stationary data can be lead to the problem of spurious regressions involving invalid inferences based on t and F tests. As a consequence, there is often a problem of falsely concluding that a relationship exists between two unrelated non stationary series. This problem generally increases with the sample size and it cannot be solved by attempting to detrend the underlying series as would be possible with trend stationary. This leads to the question of when it is possible to infer a causal long-run relationship(s) between non-stationary time series based on estimating a standard regression.

3.4.6 Co-integration analysis

If a non-stationary series must be differenced (d) times before it becomes stationary then it contains (d) unit roots and is said to be integrated of order (d), denoted $I(d)$. Consider two time series P_t^M and P_t^Y, which are both $I(d)$. In general, any linear combination of the two series will also be $I(d)$; for example, the residuals

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obtained from regressing P_t^M on P_t^Y are $I(d)$. If, however, there exists a vector β, such that the disturbance term from the regression $(\varepsilon_t - P_t^M - \beta P_t^Y)$ is of a lower order of integration, $I(d-b)$, where $b > 0$, then Engle and Granger (1987) defined P_t^M and P_t^Y as co-integrated of order (d,b). Thus, if P_t^M and P_t^Y were both $I(1)$, and $\varepsilon_t \sim I(0)$, then the two series would be co-integrated of order $CI(1,1)$.

The economic interpretation of co-integration is that if two (or more) series are linked to form an equilibrium relationship spanning the long-run, then even though the series themselves may contain stochastic trends (i.e., be non-stationary) they will nevertheless move closely together over time and the difference between them will be stable (i.e., stationary). Thus the concept of co-integration mimics the existence of a long-run equilibrium to which an economic system converges over time, and ε_t defined above can be interpreted as the disequilibrium, it is possible to make sense of regression is involving non-stationary variables. If these are co-integrated then regressions analysis imparts meaningful information about long-run relationships.

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