23rd Australasian Transport Research Forum
Perth, Western Australia 29 September – 1 October 1999

Recent Australian Bureau of Statistics Initiatives in the Development of Reliable Measures of the Freight Task in Australia

Eddie Maitland and Ros Higgins
Australian Bureau of Statistics, Queensland

Abstract

While the demand for detailed and reliable national freight data in Australia has long existed, the call for official statistics in this field from transport planners and a diversity of industry groups has increased in recent years. The current focus on freight industry reforms, cost efficiencies, logistics management and increased competition in the movement of freight has contributed to the need for appropriate information to be collected and published.

This paper outlines recent Australian Bureau of Statistics (ABS) experience and feasibility studies undertaken with the objective of producing reliable measures of the Australian freight task disaggregated by mode, commodity and origin and destination. The main difficulties encountered by a national statistical agency in collecting detailed freight data are discussed together with solutions that can be adopted to overcome them. Issues discussed include methods of collecting the data, sampling and non sampling errors, data quality, confidentiality of providers' information and data release practices. Strategies developed to overcome or minimise the biases present in these surveys are also covered. Statistical output expected to be released from an ABS conducted survey is also discussed.

The paper then outlines strategies for the future collection of freight movements by the ABS and major users' reactions to these proposals.

Contact Author

Eddie Maitland
Australian Bureau of Statistics
GPO Box 9817
Brisbane Qld 4001

Phone: +61 7 322 6336 Fax: +61 7 3222 6334
e-mail: eddie maitland@abs gov au

Introduction

While issues associated with transporting freight in our major cities are gaining in importance the Australian freight task is characterised by the predominant need to efficiently move goods over long distances. In the last few years initiatives have been taken by governments in Australia to increase competition between the main modes thereby placing downward pressure on the cost of transport services. This has led to a strong and growing demand for the ABS to expand the range of transport statistics it produces to enable transport planners and those in the industry to be better informed about the size and composition of the task.

In response to these demands, in 1998-99 the ABS completed a series of major studies which examined alternative methods of producing an expanded range of information about freight movements by road, rail, sea and air.

This paper outlines ABS involvement in the collection and publication of freight statistics during the 1990s prior to describing all major stages of development work completed during the last two years which was undertaken to overcome data quality problems inherent in earlier official freight statistics. Acceptance of ABS collection proposals by users of the data and future plans for the survey are also discussed.

Summary of user needs

The ABS has conducted a number of studies to determine users_ needs for freight statistics. These studies have confirmed that key statistics relating to freight flows between geographic areas (whether they be inter-regional or intra-urban) are a high priority unmet need. User needs, in summary, have been identified as:

- tonnage of freight moved between regions (Statistical Division or lower);
- tonne-kilometres and tonnes data;
- broad commodity dissection;
- method of transportation (e.g. container, bulk);
- mode of transport (road, rail, sea, air);
  - for road, freight by type of vehicle (e.g. articulated truck);
  - urban freight movements; and
  - information on an annual basis.

The latest review carried out in 1997 found that the main requirement of a Freight Movements Survey (FMS) is to provide information on an annual basis. While more frequent results would be useful to examine seasonal factors, the vast majority of research undertaken by transport planners is based on annual changes. Because of the volatile nature of the transport task and the need to regularly monitor shifts occurring between modes due to deregulation and other reforms (e.g. rail privatisation and changing logistics) there is strong support for annual freight statistics.

Freight movement data published by the ABS

The ABS has produced a range of freight statistics from a number of collections. Some of these collections are still continuing while others have been replaced or suspended.

The Survey of Motor Vehicle Use (SMVU) provides considerable road freight data at broad levels to assist in the allocation of funds between the Commonwealth and the States/Territories. However it provides little by way of detail to assist in allocating funds within an individual State or Territory and is of no assistance in policy and planning deliberations that affect modes other than road.

The SMVU has generally been conducted triennially from 1963 until 1995. Data relating to the use of vehicles including freight carried, distance travelled and broad area of operation are collected in this sample survey throughout Australia. Following a review of the survey and the introduction of a new methodology, from 1997-98 the survey will be conducted annually with statistics from the first new survey scheduled for release later in 1999.

The extent of freight related data available from the SMVU is limited to tonnes carried, total and average tonne-kilometres, splits by vehicle type (light commercial vehicles, rigid trucks and articulated trucks), broad commodities carried and area of operation (capital city, other urban areas of State/Territory of registration, other areas of State/Territory of registration and interstate).

Until 1994 the ABS produced quarterly interstate road freight movements data from the Interstate Road Freight Movement Survey (IRFMS) of businesses which moved more than 20,000 tonnes of interstate freight annually. It was estimated that the data collected in this particular survey accounted for only four percent of all movements by road throughout Australia. The ABS also produced annual estimates of interstate movements by rail, sea and air until 1991-92. In these collections only information on the total tonnage moved interstate was available.

In view of the user needs outlined previously and the deficiencies and inadequacies of the freight surveys conducted by the ABS at the time, in the early 1990s work commenced on a study to determine the feasibility of collecting an expanded range of information about freight movements within Australia. The study, which covered all major modes, (road, rail, sea and air) led to the introduction of the Freight Movements Survey from June quarter 1994. Results were published in *Experimental Estimates of Freight Movements, Australia* (9217.0) from the June quarter 1994 to the September quarter 1995.

In the case of road transport, the experimental estimates were based on information supplied by a sample of 4,400 organisations involved in moving freight outside urban areas. These organisations were selected from a stratified population based on numbers of trucks registered in each individual name/business entity. This process of deriving a population frame is known as fleeting-up.

For rail, sea and air, all public authority and private business operators were included. Data available from this series are:

- origin of freight (ABS Statistical Division);
- destination of freight (ABS Statistical Division);
- tonnage of freight moved between Statistical Divisions;
- total tonnes moved;

- broad commodity dissection;
- method of transportation (e.g container, bulk); and
- mode of transport (road, rail, sea, air).

Review of the Freight Movements Survey

Concerns over the quality of the estimates and the underlying methodology of the road component of the FMS began to surface when results from the first quarter were available for analysis. The three main issues of concern were the creation of the survey framework, the small sample size relative to the population size (less than two percent), and the use of sub-quarterly reporting periods. A major review of the survey was conducted during 1995-96. This review concluded that the methodology was seriously flawed in respect of the road mode.

Release of road survey data was discontinued following the September quarter 1995. However, data for the rail, sea and air modes are compiled as a census and as such are not subject to the same problems as the road data. As a result, data continue to be compiled and are available from the ABS for these modes.

The methodological review of the road component of the FMS concentrated on the creation of the survey framework, the design of the sample, the period of reporting and the type of estimation used in the survey. The methodological review found a number of major limitations with the survey methodology which impacted on the quality of the published estimates of road freight movements. These are summarised below.

(a) Major problems with the survey population frame and motor vehicle registration records:
- lack of an effective, cost efficient way to link vehicle registrations with businesses with a resulting poor frame quality;
- lack of useful information sufficiently closely related to the output classifications from the survey to enable it to be used to improve the efficiency of the sample design; and
- the frame quickly became out of date due to the dynamic nature of transport activity.

(b) A very small sample of transport businesses were surveyed. The small sampling fraction was contracted even further by low response rates and the high number of responding businesses (predominantly urban operators) which had no in-scope freight movements.

(c) Early feasibility studies indicated that most businesses would be prepared to provide data for only a two week period each quarter. As a result the survey reporting period was restricted to the middle two weeks of the quarter for the majority of organisations. Subsequent investigations indicated that this was a potential source of bias as this short period did not adequately represent activities for the full quarter.

The main recommendations of the review were as follows:

- abandon the process of fleeting-up vehicles to create a survey frame; instead select a sample of vehicles rather than businesses;
- create an up-to-date survey framework as frequently as possible (at least annually);
- examine options to improve the quality of motor vehicle registry records;
- undertake additional work to identify an improved sample design; and
- investigate the ability of a two-week reporting period (the middle two weeks of the quarter) to represent freight movements for the entire quarter, with the aim of using more representative reporting periods.

Rail, sea and air modes

For the rail, sea and air modes it is not too difficult to obtain freight data from the relevant operators moving the freight. They are small in number and generally have very good computerised records of movements. The collection and release of data has, however, become more difficult in recent times for rail movements with the privatisation of some government owned railways and the entry of new private operators on some routes. In cases where one operator is responsible for moving all or a large proportion of the freight between two centres the ABS requires consent from the organisation before the statistics can be released. The failure of some operators to provide full consent has placed some restrictions on the amount of fine level detail that the ABS is able to provide.

Development of a new Freight Movements Survey

As a result of the review recommendations, a number of major research activities associated with a redevelopment of the road component of the FMS were undertaken. A summary of the work undertaken is outlined below.

Record Keeping Practices Survey

In order to determine the type of information available from freight businesses a Record Keeping Practices Survey (RKPS) was conducted in September 1997. A survey form was sent to approximately 1000 businesses which had been in the previous FMS. The aims of the survey were to identify a number of characteristics including:

- whether businesses with freight carrying vehicles kept records on an individual vehicle basis;
- the length of time records were retained;
- the extent to which freight movements varied due to seasonal factors; and
- whether value of goods carried was available.

Although the RKPS frame was business-based the results were analysed, where possible, from the perspective of the proposed redeveloped methodology i.e. vehicle

based. Responses to questions regarding the availability of data items were expressed in terms of *_always_*, *_sometimes_*, *_never_* or *_don_t know_*. The main findings in relation to the survey aims are presented below.

- More than 60 percent of businesses with articulated vehicles have freight records which *_always_* identify individual vehicles. Overall, the survey demonstrated that operators of articulated vehicles can report on particular vehicles in their fleets.
- Most businesses retain their records for more than twelve months. However a significant proportion (39 percent) of _own account_ operators (i.e. carrying their own goods) retain their records for less than three months.
- All types of operators perceived seasonal differences in commodities carried, origins and destinations and volumes. This question was asked to establish whether it would be necessary to obtain data for every time period or whether it might be possible to _time sample_ as was done in the discontinued road FMS. There seems to be no scope to time sample.
- Value of goods carried, as demonstrated in previous pilot studies and field interviews, is generally not available.

Survey of Articulated Vehicles (SAV) Pilot Test

Based on the findings of the RKPS and the methodological review of the road component of the _old_ FMS a pilot test of the proposed methodology was conducted.

The new approach recommended a vehicle-based rather than a business-based survey. Following investigations using 1995 SMVU data, it was decided to initially consider including only registered articulated vehicles. Articulated vehicles are a relatively small portion of the truck population (about 15 percent) but, in 1995, they contributed about 85 percent of the non-urban tonne-kilometres travelled by heavy vehicles. In addition, they contributed about 75 percent of total tonne-kilometres and most long haul interstate movements (95 percent of interstate tonne-kilometres).

The sample was designed to produce Relative Standard Errors (RSEs) of five percent for estimates of total kilometres travelled, total tonnes carried and total tonne-kilometres for each state of registration. This resulted in a sample size of approximately 14,000 per annum. To overcome seasonal factors the sample is spread evenly over 26 fortnightly reporting periods during the year so that it is _self weighting_ in respect to these effects. The sample is stratified according to the state of registration, area of registration (capital city, rest of state) and year of vehicle manufacture. Each selected vehicle is monitored once in each year.

To test the validity of proposed new methodology the SAV pilot test was conducted in November 1997. This test also trialed a combined SMVU-FMS collection form.

The broad aims of the test were to determine whether:

- a single questionnaire could collect information for both the SAV and the SMVU;
- the owners of the selected vehicles could supply data for those vehicles, and
- if SMVU data could be derived from SAV data.

In order to mimic the _real survey_, questionnaires were mailed at the start of two consecutive fortnightly reporting periods to the registered owners of 546 articulated vehicles randomly selected from the 1996 Motor Vehicle Census (MVC). The questionnaire incorporated a diary format to collect data about a fortnight_s activity. Data collected from the survey were not processed, instead information about the completeness and consistency of the reported data was recorded.

The pilot test showed it is possible to collect both SMVU and FMS data using a single collection instrument. There was no apparent difference in the data quality in SMVU data items as reported on the combined form when compared with a SMVU only questionnaire. Vehicle owners were able to report on the selected vehicles with few exceptions. Vehicles in remote locations were the principal exception, which is similar to SMVU experience. From the data supplied in trip records it is theoretically possible to derive SMVU information on main area of travel.

The previous FMS asked respondents to report the name of the commodity carried. High costs were incurred in manually coding the data according to the Australian Transport Freight Commodity Classification (ATFCC). The pilot test form asked providers to select the appropriate commodity description from a list provided. This approach worked in the majority of cases. Another innovation was the addition of kilometres travelled to the trip record. This information had previously been considered too difficult to collect, however respondents were able in most cases to report this item.

On average it took respondents approximately one hour to complete the questionnaire. There were few complaints received, however a number of calls were received from operators of short haul use vehicles seeking advice on how to complete the form. Suggested improvements to the form were collated to be used in conjunction with information from a post enumeration survey (see next section) to revise the form prior to conducting a dress rehearsal.

SAV Pilot Test Post Enumeration Survey (PES)

A Post Enumeration Survey (PES) on the pilot test for the SAV was conducted during January 1998. The aims of the PES were to identify deficiencies in the questionnaire design particularly the trip record and instruction booklet sections and shortcomings in the dispatch and collection control procedures.

The specific objectives were to:

- assess respondents understanding of concepts/questions;
- identify sources of data;
- improve data quality; and
- quantify/reduce respondent load.

Structured questionnaires were used for both respondents and non-respondents to the SAV. Due to concerns about the low response rate for the pilot test the sample was weighted in favour of non-respondents. The PES results were analysed to help plan the next stage of the redevelopment process which was the dress rehearsal.

Generally, on first seeing the questionnaire the initial reaction was that it was a complex form, however in most cases this perception altered once a start had been made on compiling the information requested. Some of the problems encountered in providing information included:

- getting the form to the drivers in remote locations;
- some data are not usually recorded e.g. load weights and distances travelled;
- records may be difficult to access if stored by date rather than by vehicle; and
- current method for recording details of frequent, short, often repeated trips is too onerous

Dress Rehearsal

A dress rehearsal of the SAV was conducted between March and May 1998. The aims of the dress rehearsal were to:

- test the operational feasibility of conducting continuous fortnightly dispatches;
- measure data quality including frame quality, distribution of data items, estimates and associated relative standard errors and non response characteristics;
- measure response rates and gain information on the best strategies for improving them; and
- estimate the cost of conducting a live survey.

Similar processes and procedures to those used in the pilot test were used for the dress rehearsal. There were some enhancements to the form design and dispatch and collection control procedures e.g. vehicle owner name and address updates were sought from Motor Vehicle Registries (MVRs). The survey data were processed to order to be able to measure data quality and processing rates.

For the dress rehearsal four consecutive fortnightly dispatches were made. The fourth period was used to test the practicality of redispatching forms where a change of vehicle ownership had been advised in the previous periods.

SAV Dress Rehearsal Findings

Operational feasibility: Based on the dress rehearsal experience it is operationally feasible, albeit comparatively complex and expensive to conduct a vehicle based freight movement survey with continuous fortnightly dispatches.

Data quality: Where appropriate the SAV data quality was compared with that obtained from the SMVU. Subsequent analysis focused on producing estimates and associated RSEs for SAV only.

Frame quality: Approximately four percent of vehicles on the survey framework coded as articulated vehicles were found to be a different type of vehicle. In addition, approximately 15 percent of the in-scope frame consists of vehicles which contribute zero to the estimates (i.e. they are either register mismatches, deregistered vehicles or

sold vehicles where the new owners are on the frame). This represents a very high sample loss.

Sample quality. Examination of the quality of the sample revealed that of the 1,638 articulated vehicles selected for the dress rehearsal:

- seven percent of the sample were unable to be dispatched due to MVR notification that the vehicles had been deregistered or name and address details were unavailable;
- a further 18 percent of the sample was lost due to vehicles being deregistered, sold, out of scope or untraceable; and
- 20 percent of the sample was lost due to non-response.

Response rates. The average response rate for the three periods of the dress rehearsal was 66 percent (deregistered vehicles are included as responses). The response rate for the first and third fortnightly periods was higher than the response rate for the second fortnightly period, which indicates there may be a reference period effect on the response rates. The first and third fortnightly periods covered the middle part of a month and the second fortnightly period covered the end of one month and the beginning of the next month. The response rate achieved in SMVU for articulated vehicles is slightly higher at 72 percent. This indicates that an average response rate higher than 75 percent for the SAV may not be achievable unless initiatives are introduced to improve response.

Distribution analysis of main data items. The main data items are total kilometres travelled, total tonnes carried and total tonne-kilometres. As the last item is derived it was omitted from the distribution analysis.

The distribution of total kilometres travelled and total tonne carried for the first three fortnightly periods of the dress rehearsal were fairly similar. There was generally more agreement with the first and third fortnightly periods than with the second fortnightly period. This may indicate that there is a reference period effect in the reported data. There were also a couple of extreme values for total tonnes carried in Western Australia and Northern Territory.

The distribution of total kilometres travelled in SMVU was relatively similar to that from the dress rehearsal, with the exception of Victoria, Queensland and Tasmania where SMVU data had a broader distribution. The distribution of total tonnes carried in SMVU was relatively similar to that from the dress rehearsal for all states.

Estimates and relative standard errors (RSEs). RSEs were calculated for single fortnightly periods to provide information about the change over fortnights. The data were used to obtain an indication of the expected annual RSEs.

SAV fortnightly estimates and RSEs were compared with those from data collected in the SMVU. The SMVU estimates were scaled down to relate to a single fortnight. Under this adjustment, any variability over the fortnights within the quarter was smoothed.

The dress rehearsal was designed to produce five percent RSEs for the annual estimates of total tonnes carried for each state of registration. This was generally achieved with the exception of the Northern Territory and the Australian Capital Territory, which were 14.7 percent and 18.1 percent respectively. Refinements to the sample design will address this issue.

The estimates of total kilometres travelled, total tonnes carried and total tonne-kilometres were reasonably consistent for the three fortnightly periods. In general the estimates for the first and third fortnightly periods were more alike than those of the second fortnight. This may indicate that a reference period effect may exist as alluded to earlier. Investigations prior to the original FMS revealed that transport operators were busiest at the beginning of the month.

The estimates from the dress rehearsal were mostly lower than the corresponding estimates from SMVU. This difference could be caused by several factors:

- there is more potential for recall bias in SMVU;
- the frame was more out of date when the dress rehearsal was conducted;
- there could be some undetected outliers in the SMVU data; and
- there also appeared to be a higher proportion of zero-use vehicles in the SAV than in the SMVU.

The comparisons above were based on RSEs and estimates by state of registration. It should be noted however, that output is produced by state of origin and destination, and then further broken down by Statistical Division (SD). Interstate operators can be registered anywhere and it is feasible that many of the Australian Capital Territory and the Northern Territory operators register their vehicles in New South Wales and South Australia respectively.

When the data were examined on the basis of state of origin and state of destination of trips a similar pattern was observed to that above. The estimates of total kilometres travelled were generally more stable and had lower RSEs than the estimates of total tonnes carried and total tonne-kilometres.

An additional analysis which combined estimates for the fortnightly periods revealed RSEs for total Australia in the range of 1.7 percent to 31.2 percent (including tonnes, kilometres and tonne-kilometres). Furthermore only four estimates had RSEs above 25 percent. The release of smaller area data by state or even selected origin-destination SD pairs for specific commodities or commodity groups therefore appears to be feasible.

Non-response bias An issue for both the SAV and SMVU is non-response bias (i.e. the assumption that non-respondent vehicles are the same as the respondent vehicles). It is difficult to collect information about the characteristics of the non-respondent vehicles. Therefore, it is hard to determine if there is a statistical difference between these vehicles and respondent vehicles. While survey information is not available for non-respondent vehicles, the survey framework information is available. The survey framework characteristics (i.e. state of registration, area of registration - capital city; rest of state, year of manufacture, and heavy vehicle type) of non-respondent vehicles were compared with those of respondent vehicles. For these characteristics no significant

difference between the proportions of respondent and non-respondent vehicles was detected. The overall similarity in the proportions of respondents and non-respondents would suggest that the populations do not differ significantly from each other. Hence the likelihood of non-response bias is minimal.

Strategies for improving response rates. For the dress rehearsal, both FMS and SMVU data were collected from all 546 fortnightly selections. Subsequently, a study was conducted to determine the feasibility of collecting SMVU data from a subset only of the total selections.

The current stratification for both SMVU and FMS is state x age x area. Using this scheme a sample size of 205 articulated vehicles per fortnight produces estimates with an annual RSE of 1.83 percent. By collapsing the sample across area it is possible to produce estimates with an annual RSE of 2.17 percent (compared with the current value for SMVU of 2.15 percent) using a sample size of 121 vehicles per fortnight. Other advantages of this approach include a significant reduction in respondent load and fewer ABS resources are needed to process 121 sets of SMVU data items rather than the original 546.

Another initiative likely to improve the response rate is the introduction of a two phase dispatch process. Owner and vehicle details will be collected during phase one and trip information during phase two. Two advantages of this approach are that the individual forms appear less complex than a combined form and using this method will permit redispatch prior to the reference period of forms to vehicles where a change of ownership has been identified from phase one.

Further enhancements will be achieved through:

- closer liaison with the MVRs to improve the quality sample frame;
- creating a register of businesses which have multiple vehicles selected to enable negotiation with respect to reporting arrangements;
- improved form design; and
- using the powers of the *Census and Statistics Act* to encourage compliance.

Survey costs. Costings have been prepared to cover two eventualities:

- running the survey for two years in succession, in which case the cost of conducting the survey in successive years can be based on the second year_s costs; and
- conducting the survey for 2000-2001 and reactivating the survey at some time in the future

The cost of conducting the survey for two years in succession is $2.0 million per annum with an estimated cost of $1.8 million per annum for the third and subsequent years. The cost of conducting the survey in 2000-2001 is $2.1 million with the cost of reactivating the survey in a future year at $2.0 million.

Freight Surveys Conducted by Other Statistical Agencies

Research was undertaken into freight movement surveys successfully conducted by other statistical bodies. The experiences of agencies such as Statistics Sweden, the United Kingdom (UK) Office of National Statistics and the United States Bureau of Transportation Statistics were examined in order to gauge how applicable their methods might be in the Australian context. Due to the apparent success and longevity of the UK Continuing Survey of Road Goods Transported (CSRGT) it was selected for in depth study. Meetings were held in the UK and Brisbane with staff from the UK Department of Transport which is responsible for the UK collection, and their documentation, forms, etc. have been scanned to gain an appreciation of how the survey is conducted.

The UK survey is vehicle based and covers movements by both articulated and rigid trucks. It is a continuous survey using a one week diary and results are produced on an annual basis. The major difference between this survey and ABS SAV pilot test and dress rehearsal is that the UK survey achieves a very high response rate - in excess of 90 percent. While there are no doubt many reasons for their better response rates, the most obvious are:

- they have a single, very current frame;
- they use a smaller form;
- they openly threaten to prosecute recalcitrant respondents with large fines;
- the department conducting the survey is also responsible for issuing licences to vehicle operators; and
- the survey has been in operation for a number of years and therefore has an education and acceptance element.

The positive message is that this kind of survey can be done successfully. The note of caution is that the Australian situation is quite different from that in the UK and a collection here will necessarily be more expensive and will, at least initially, have a lower response rate.

Reinstating the ABS Interstate Freight Movement Survey (IFMS)

An investigation into the viability of reinstating the IFMS was conducted in October 1998. To test the feasibility of using the ABS Business Register as a survey frame the coverage of Queensland transport businesses was examined. Management units on the register with Australian and New Zealand Standard Industrial Classification (ANZSIC) classes of 6110 (road freight transport), 6642 (road freight forwarding) and 6509 (transport nec) were examined.

The study indicated that the ABS business register coverage issues haven_t changed since the earlier review. A number of problems still exist:

- the register is a list of businesses which employ wage and salary earners, therefore self-employed owner operators (who make up a significant component of the industry) are not listed;

- there is no way to measure transport activity of businesses which are predominantly non-transport but still have extensive transport activities;
- apparent high turnover of interstate road freight operators and the lag between commencement of business operations and inclusion on the register are problems; and
- the existence of defunct units on the register as well as the currency of location details are also issues of concern.

In addition to the problems associated with the survey framework, users require more detailed data than what would be produced by an IFMS. Based on these findings reinstatement of IFMS is not viable.

Recommendations

The ABS has recommended to major users of freight statistics that the new vehicle-based methodology for the road component of the FMS be introduced as an annual survey from April 2000. An ongoing annual survey, producing annual estimates is preferred as this will provide:

- improved quality of freight estimates for articulated vehicles when compared with what is currently available from the SMVU;
- the opportunity to allocate the sample based on the estimates of the total freight activity by sampling in proportion to how much each group contributes to the overall variability in activity (known from the previous year's survey); and
- cost savings as a result of the improved efficiency and effectiveness which can be attained from an ongoing survey with stable staffing arrangements.

The articulated vehicle component of SMVU should not be replaced by FMS until 2001. A parallel run of four quarters will provide sufficient time to obtain and analyse results from the first two quarters of FMS and to compare these results to the SMVU. Data from the first two quarters of SMVU and FMS would not be available for comparison until toward the end of the third quarter, and the analysis may extend into the fourth quarter. So a parallel run of less than four quarters is not practicable.

Parallel running will be more costly and have higher respondent load than cutting over immediately to the FMS and discontinuing the SMVU component from April 2000. However, it is safer, allows more analysis of results before committing to the new methodology, and will provide better information on the differences between data from the SMVU and the FMS.

The existing RSA collection should continue in its present form with some changes to make it consistent with the proposed new road collection. The most significant changes are the introduction of kilometres travelled and the inclusion of urban freight movements.

Adequate resource levels will be critical to the success of the survey and partial user funding will be sought for the survey to be conducted. Sufficient resources are also required to implement a continuous quality improvement program, including regular

annual reviews of systems, forms design, clerical processes and procedures, sample design (e.g. stratification and frame issues) and user needs. While some improvements will have an ongoing component (e.g. refinements to systems), more comprehensive and structured reviews of key elements will help the survey remain relevant and effective.

During the first year of the survey, investigations should be conducted into incorporating rigid vehicles into the FMS. As efficiencies increase with improvements to systems, procedures and staff familiarity it may be possible to introduce some classes of rigid vehicles into the survey without significantly increasing costs.

Ongoing liaison with motor registries must be maintained to improve the quality of the sample frame. In particular, developments with the National Exchange of Vehicle and Driver Information System (NEVDIS) will be monitored with a view to using it as a single source of frame data. This has the potential to reduce costs and time in generating the frame, and increase its quality.

ABS discussions with major users of freight statistics about the survey methodology and outputs have been very positive and supportive. While it is recognised that more needs to be done particularly in the area of measuring urban freight characteristics it is anticipated that the introduction of this survey would go a substantial way towards meeting the priority needs of users of freight data at the Commonwealth, state and regional levels. From a planners perspective the data would be invaluable for modelling freight flows, infrastructure planning, etc. Private sector businesses would also have access to freight data on an origin-destination basis which would quantify the demand for freight services enabling them to make decisions about market penetration rates, capital expenditure, charges, etc.

At the time of writing this paper negotiations with major Commonwealth, State and Territory transport agencies were at an advanced stage with the aim of introducing the survey in 2000.

Acknowledgments

The authors wish to thank their colleagues and members of the transport industry for their assistance in survey development, and all those who responded to the pilot tests.

References

Department of Transport (1997), *Quinquennial Review of the Continuing Survey of Road Goods Transport*, Statistics Bulletin (97)13, Department of Transport, London.

Department of Transport (1997), *Transport of Goods by Road in Great Britain 1997*, Department of Transport, London.

Statistics Sweden (1996), *Varutransporter med lastbil och j_rnv_g under 1996, (Swedish domestic road goods transport and freight traffic by SJ on the railway network in 1996), Statistics Sweden, Stockholm*