

Freight Movement Statistics - Report on ABS' Feasibility Study

Barry Reardon

*Manager, Transport Statistics
Australian Bureau of Statistics*

Abstract:

In 1991, the ABS undertook to investigate the demand for and feasibility of a collection of freight movement statistics. This field has been recognised as a major gap in current statistics but one which is likely to be one of the most difficult, not-to-say expensive, collections to mount.

In 1992, at the conclusion of an extensive round of discussions with users involved with transport policy and research, the ABS commenced field discussions with the freight movements industry, particularly focusing on road freight. These discussions were designed to ascertain the pattern of record keeping practices in the industry, thereby helping to assess data availability.

A collection strategy had been developed which takes into account the varying record keeping practices of businesses engaged in road freight movements, depending on their size, principle business activity and extent of computerisation.

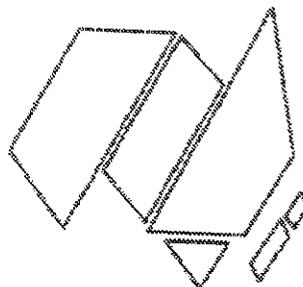
A pilot test is being conducted during 1992-92 involving a sample of nearly 700 businesses to assess whether the chosen methodology can produce useable results.

The paper will discuss the proposed methodology and the results of early testing as well as providing information about the future direction of this work.

Contact Author:

Barry Reardon
Transport Statistics
ABS
GPO Box 9817
BRISBANE Q 4001

Telephone: (07) 222 6184
Fax: (07) 229 6171



1. INTRODUCTION.

The Australian Bureau of Statistics (ABS) is currently undertaking a major development project aimed at producing an expanded range of information about freight movements within Australia (road, rail, air and sea). The impetus for this project came about as a result of strong representations from users of freight movement data for the ABS to significantly increase the range of data it currently produces in this field of statistics.

This paper discusses in some detail the work undertaken by the ABS on this project, and provides the reader with an understanding of the major issues and problems associated with attempts to collect reliable information about freight movements in Australia, particularly road freight.

The paper also discusses proposed future work by the ABS on this issue although the plans outlined in this paper should be regarded as tentative at this stage and subject to satisfactory completion of the development work currently in progress.

2. NATURE AND SIZE OF THE FREIGHT MOVEMENT INDUSTRY IN AUSTRALIA.

The following table, quoted by Holyman (1991) as being contained in the 1988 Industries Assistance Commission Report, contains the best available estimates of the size of the domestic freight task in Australia and is generally regarded in the transport industry as being reasonably representative of the relative contribution made by each of the modes used to move freight.

Table 1 Estimated annual domestic freight movements, 1986-87

Mode	Tonnes (million)	Percentage
Road	1,182	77.5
Rail-Govt	166	10.9
Rail- Non-Govt	132	8.7
Sea	45	2.9
Air	0.2	---
Total	1,525	100.0

Source: Industries Assistance Commission Report, 1988.

It can be seen from the above table that road transport dominates the freight task in terms of tonnes (as opposed to tonne kilometres) moved, and accounts for almost 80% of total tonnes moved.

Of the total road freight task it is estimated by the Victorian Road Transport Association in their publication "Facts on Freight" (undated) that only around 4% moves interstate, whilst 82% moves less than 100 kilometers from base

According to results published by the ABS from the 1988 Survey of Motor Vehicle Use, bulk commodities (grains, timber, fertilizers, stone, sand and gravel, coal, fuel, etc.) account for about 55% of total tonnages carried. Stone, sand and gravel account for almost half of the bulk commodity tonnage

Non-bulk freight (livestock, fresh fruit and vegetables, food, machinery and equipment, motor cars and transport equipment, clay, bricks and tiles, etc.) accounts for the other 45% with machinery and equipment being the predominant non-bulk commodity (about 22% of non-bulk movements).

3. FREIGHT MOVEMENT DATA CURRENTLY PRODUCED BY THE ABS.

The ABS currently conducts a quarterly interstate road freight movement collection of all enterprises which undertake more than 20,000 tonnes of interstate road freight movements in a year either for hire or reward under prime contract arrangements or on own account. This collection has been undertaken since September quarter 1982. The collection produces information on total tonnages of freight moved interstate for which road transport was used as the main mode.

The ABS also produces annual estimates of interstate freight movements by road, rail, air and sea. The rail estimates are based on information supplied to the ABS by the National Rail Corporation, whilst information on air and sea movements is based on data obtained by the Commonwealth Department of Transport and Communications. Again, only information on total tonnages moved interstate is available.

The ABS also undertakes a tri-ennial Survey of Motor Vehicle Use, which provides broad commodity estimates of tonne kilometres and tonnes carried by commercial vehicles in Australia

4. DEFICIENCIES IN CURRENT ABS DATA COLLECTION ARRANGEMENTS.

The ABS currently collects origin/destination information only on interstate freight movements. It is estimated that these movements account for around 4% of total freight movements throughout Australia. Users have expressed strong concerns to the ABS about the lack of information about the remaining 96% of freight movements. Only total tonnages of freight moved are collected in this survey, with no attempt to try to classify the information by type of goods moved. Again this is seen by many users as a restriction on the usefulness of the data

Although some attempt has been made to collect broad commodity data through the Survey of Motor Vehicle Use, the methodology employed only allows for the production of data at a broad geographical level, (eg, total urban, total non-urban) and in particular does not enable the ABS to derive origin/destination information.

5. NON-ABS SOURCES OF FREIGHT MOVEMENT DATA.

The University of Wollongong Centre for Transport Policy Analysis has, since 1989, been attempting to develop estimates of Australia's domestic freight movements using synthetic estimation techniques. A number of data sources are used in the calculation of the estimates, including production data, exports, imports, and population census data. First results of the study have been released, and show estimates of tonnages of freight moved between 91 regions across Australia, for 69 commodities, by all modes of transport. As a general rule these regions accord with ABS Statistical Division boundaries. The data relate to the 1986/87 and 1988/89 financial years. This is the only data available at a macro level for the whole of Australia, although numerous organizations, particularly the relevant State Departments of Transport, have produced more micro level data about freight movements within particular regions of interest. (eg, the New South Wales Department of Transport Study Group recently conducted a "Commercial Vehicle Usage" survey on freight moved in the Newcastle/Sydney/Wollongong/Blue Mountains area, whilst the Northern Territory Department of Transport and Works used to conduct an annual survey aimed at producing estimates of freight demand by surface transport both within the Territory and across Territory boundaries). This was discontinued after 1987-88.

Various other organizations in Australia have attempted to collect data on freight movements in Australia, including the NSW Roads and Traffic Authority, VicRoads, The Queensland Department of Transport, the Northern Area Regional Organization of Councils (located in NSW), the Overnight Air Freight Operators Association, the NSW Maritime Services Board, the WA Main Roads Department and the Australian Road Research Board.

6. THE ABS FREIGHT MOVEMENT FEASIBILITY STUDY

In October 1991 the ABS commenced a study to determine the feasibility of collecting an expanded range of information about freight movements within Australia. The study covered all major modes (road, rail, air and sea), and was completed in June 1992.

During this period over eighty users or potential users were approached and asked about their specific data requirements in relation to freight movement statistics. These users included Commonwealth and State Government Departments and Instrumentalities, associations within the Transport sector, research organizations and private business organizations. Discussions with these users confirmed the expected very strong demand for freight movement data, although there was a wide diversity of particular detailed requirements amongst these users. Almost 80% of them expressed concern about the lack of reliable information about freight movements in Australia.

Commonwealth and State Government Departments require the data to better understand and estimate the demand for transport services in Australia, to assist with transport infrastructure investment planning, to assist in determination of road construction and maintenance priorities, to aid in road use charging determinations, and to generally help with the development of strategic transport system plans. The data are also required to assist with specific industry and regional studies into freight movements and to assist in the production of state and regional Input-Output tables and State Accounts.

Rail Authorities are interested in monitoring movements of commodities by road compared with rail, for market share analysis.

Transport Industry Associations criticize the lack of data to support economic, policy and safety research into the land transport industry and make repeated requests for more work to be done in this area. Better data on freight movements is one component of this research task. Road versus rail movements is also of vital interest to these associations.

Transport companies are interested in monitoring freight flows of certain commodities along particular corridors to determine their market share, to assess current and potential new markets and to develop future expansion strategies.

Summary of user data requirements.

- * Almost all users expressed a requirement for both inter and intra state movements. About 80% expressed a need for "across statistical division" movements, whilst around 50% were also interested in "short haul" movements (within metropolitan/other urban areas and within statistical divisions). About 45% of users expressed a need for information on "corridor travelled" as opposed to just origin/destination details.
- * The predominant requirement was for a measure of tonnages moved, rather than for data on value of the goods moved (98% preferred tonnages to value).
- * Almost all users (92%) expressed a need for some commodity information, although the particular commodities, and the level of detail, they were interested in varied depending on the user.
- * Different users expressed requirements for other data items such as distance travelled, tonne-kilometres carried, number of trips made, fleet size, number of sub-contractors used and costs of transporting the freight. However, the demand for these items was not as strong as for the earlier mentioned items.

A total of around fifty businesses engaged in the movement of freight were also interviewed during the feasibility study, with the objective of assessing how easy or how difficult the task of collecting reliable information about freight movements was likely to be, in the event that the ABS decided to expand its collection activities in this area. Both transport "hire and reward" operators, and other businesses (eg manufacturers, retailers, wholesalers, farmers, etc) who move freight, were approached. A cross-section of businesses of varying size and type of freight moving activity was selected.

Summary of discussions with potential suppliers of data.

- * For rail, air and sea movements it should not be too difficult to obtain accurate data from the relevant authorities moving the freight. There are relatively few businesses involved and they generally keep very good computerized records of their freight movements. There may be some confidentiality restrictions where one or two organizations predominate in relation to the movement of certain commodities.
- * For road freight there is a wide variety in the standard of record keeping practices of the large number of businesses in the industry. Some (generally the larger freight movers) have very good computerized recording systems from which the data appear to be readily accessible, although in some cases special computer programs may need to be written to access the data in the required format.
- * Other companies have quite good manual recording systems, although this means that in many cases it would be necessary to aggregate individual consignment note level data to obtain the necessary information. This is likely to be very time consuming and expensive.

* Some companies (generally those involved in small volumes of freight movements) have no systematic means of recording their activities, and in these cases they could only provide estimates.

Conclusions and recommendations of feasibility study.

The collection of reliable information about freight movements within Australia which will satisfy the priority needs of users is likely to be difficult and expensive. The major problems are expected to occur in relation to road freight. However, demand for the data is unquestionably very strong.

Following completion of the feasibility study the ABS has continued its investigations into this field of statistics during 1992-93 and has undertaken some pilot studies within the road freight movement industry, with a view to developing an appropriate methodology which could be used for a full scale collection to be undertaken, possibly in 1994.

7. DEVELOPMENT OF ROAD FREIGHT STATISTICS - PROGRESS TO DATE.

This section explains the work which has been undertaken in relation to the development of a suitable methodology for the measurement of road freight movements, which, as mentioned before, is seen to be by far the most difficult of the four modes to address.

Work on the collection development commenced in July 1992.

The feasibility study highlighted some areas which needed to be addressed very early in the development phase. These were:

- * What particular data items should be collected?
- * Should the methodology attempt to measure all freight movements in Australia, or should there be a "distance" scope cut-off? For example, is it practical to measure every short haul movement of every good within all metropolitan or other urban areas in Australia?
- * What population frame should be used to identify businesses engaged in the movement of road freight?
- * Is it feasible to collect information from all businesses engaged in the movement of freight, or is it necessary for practical reasons to sample the businesses? If sampling is an option, how should the sample be selected?
- * Is there potential for duplication in recording road freight movements, particularly where one business sub-contracts work out to another business? If yes, how could this be overcome?
- * In view of the wide variation in the standard of record keeping practices amongst businesses in the industry, what is the most appropriate method (eg, questionnaire, telephone, personal visit) for collecting the data? Also, should a "recall" or a "record" methodology be used to collect the data?

Each of these issues is discussed below:

Data Items.

The feasibility study identified three priority data items required by users of freight movement data. These were origin/destination details, a measure of weight of the goods/materials moved, and at least a broad commodity dissection of the goods/materials moved. There was also strong demand from users for corridor information.

The ABS decided to proceed with testing the ability of businesses to supply the first three of these data items as there seemed to be sufficient evidence that a significant proportion of them at least recorded these details in their systems. On the other hand, it was clear that most did not record corridor information in their systems.

Scope cut-off.

The ABS recognizes that users require detailed information of both short haul and long haul freight movements. As mentioned previously, 80% of users contacted during the feasibility study expressed a need for "long haul" movements whilst 50% also required "short haul" movements.

However, because of cost considerations, the ABS has decided to restrict the scope of the study to the longer haul movements at this stage. Specifically, all road freight movements that are entirely within metropolitan or other urban areas, and all movements of less than 25 kilometres in rural areas, are excluded.

Population Frame.

The ABS has decided to use the commercial vehicle component of the motor vehicle register files from the various Motor Registry authorities in Australia as the framework for selection of businesses for the development phase of the collection. This framework was chosen because it provides the best available facility for identifying not only businesses involved in the transport "hire and reward" industry, but also the "ancillary" businesses (manufacturers, retailers, etc) involved in the movement of freight.

Sample versus complete enumeration.

There are approximately 200,000 businesses identified from the motor vehicle registry framework as owning one or more commercial vehicles.

To undertake a freight movement collection involving approaches to all of these businesses would be prohibitively expensive, so the only way the collection could be undertaken within a reasonable budget would be through the use of sampling techniques. It should be noted that sample survey methodology is widely used in ABS activities across many areas of subject matter.

Potential for duplication.

If businesses were simply asked to supply information about all of their freight movement activities over a given period, then there would be considerable scope for individual movements to be reported more than once, as many businesses sub-contract work out to other businesses in the industry. The way the ABS overcomes this problem is to ask businesses to report only that freight moved where that business holds the prime contract or where it moves the freight on its own account.

Collection method.

The ABS decided to adopt a "mail questionnaire" approach in the development phase of the collection. This is certainly the cheapest approach, but the ABS also recognizes the importance of thoroughly evaluating the results to ensure that the data reported by the businesses is accurate.

Based on discussions with the 50 businesses during the feasibility study, the ABS has also tested a "record" methodology for reporting of the data. Businesses were given advance notice of the period for which they would be required to supply data so that they could set up their systems to record details of all freight movements within the reference period.

Once these broad issues were resolved the ABS commenced work on the selection of a suitable sample of businesses from the motor vehicle registers for inclusion in a series of pilot studies. A total of around 800 public and private sector businesses, located mainly in New South Wales, Victoria and Queensland, were selected, with the sample including relatively more of the large freight moving businesses (as measured by the number of commercial vehicles owned by the business).

A two-phase approach was then used to obtain freight movement data from each business.

Phase 1 of pilot studies.

The first phase involved asking the businesses to answer a series of questions about the nature of their record keeping practices without asking them to supply actual data. They were asked to supply details of whether they were responsible for the movement of any goods or materials by road, and if so the proportion of short haul versus long haul movements. They were also asked questions about the nature of their record keeping systems and what information they held on their systems (eg measure of weight, type of good, origin and destination details, drop-offs en route, etc.) Questions designed to determine how easy or how difficult it would be for businesses to extract the relevant information from their records were also included on the questionnaire.

This phase was undertaken between October 1992 and February 1993. A response rate of over 90% was obtained, which indicates a willingness amongst these businesses to participate in the study.

The major findings were:

- * About half of the businesses surveyed proved to be out of scope. (ie., they did not undertake any freight movement activity, or they operated solely within metropolitan/other urban areas, or they only moved freight less than 25 kilometres in rural areas)
- * Almost 60% of "in scope" transport "hire and reward" businesses have either full or partially computerized recording systems compared with just over 40% of the "in scope" ancillary operators (Manufacturers, retailers, wholesalers, farmers, etc. who move freight on their own account.)
- * About 30% of the transport operators, and a similar proportion of the ancillaries, compile manual records about their freight movements.

* Only 9% of the transport businesses have neither a computerized nor a manual recording system, compared with 33% of the ancillaries.

* Of the transport operators surveyed, 80% record a measure of weight in their systems, 78% record origin/destination details, and 67% record type of goods/materials moved. For the ancillaries, the corresponding figures are 54% for weight, 57% for origin/destination, and 54% for type of goods/materials.

* Of the transport operators, 63% indicated that they could readily supply aggregate information from their records, 22% said that they would need to refer to individual consignment note details, and 14% indicated that they could only supply estimates to the ABS. The corresponding figures for ancillary operators were 36% for aggregates, 3% for individual details, and 61% for estimates.

Phase 2 of pilot studies.

The second phase of the pilot studies involved re-approaching those businesses identified in phase 1 as being within the scope of the collection and asking them to supply actual details of their road freight movements over a given period of time.

Phase 2 commenced in early March 1993, and at the time of writing this paper, the results are still yet to be finalized and evaluated. However, some early observations about how this phase is progressing are given later in this paper. The information will be updated prior to the 18th Australasian Transport Research Forum in September 1993 and provided to participants at that time.

Around 300 businesses were included in Phase 2. They were sent a questionnaire at the beginning of March and asked to report in respect of their road freight movements for the two week period Sunday 14 March to Saturday 27 March 1993. The ABS felt that a two week reference period would realistically reflect the typical freight moving activities of the majority of businesses whilst at the same time would not create an unacceptable reporting load for the businesses involved.

They were all asked to supply information on volumes of goods moved (in tonnes, litres, etc.) and to specify the origin and destination of the movement (at a city, town or shire level). They were also supplied with a list of 27 broad commodities (eg, chemicals, coal, fertilizers, livestock, steel, parcel freight, general freight, etc.) and asked to specify from this list the type of commodity moved. Finally, they were requested to indicate whether the commodity was bulk or non-bulk freight, whether it was classified as a dangerous good, whether it was moved under refrigeration, and whether or not it was containerized cargo.

However, whilst the actual data items requested were the same for all businesses, slightly different questionnaires were sent to different businesses depending on their responses to Phase 1. For example, those businesses who indicated in Phase 1 that they could supply aggregate information have been requested to supply details of all of their freight movements during the two week period. On the other hand, those businesses who said that they would need to access individual consignment notes have been requested, because of the reporting load on respondents, to provide information about only a sample of their freight movements during the reference period. Those businesses who said they could only provide estimates have been sent a different questionnaire which provides them with some guidelines to assist them in deriving these estimates.

A final evaluation of the results of phase 2 is not expected to be completed until July 1993, but early indications are that most businesses are both able and willing to supply the information requested. Response is very good and the quality of the information supplied by the businesses appears to be high, although this is yet to be confirmed through a series of post-enumeration interviews with responding businesses. The continued co-operation of the small number of very large companies involved in the freight movement industry will, of course, be crucial to the success of the project.

Another crucial factor will be how representative the freight movements of the sampled businesses are of the overall freight movements within the industry. At the very broadest level (total tonnages moved within each state) the ABS is confident that the sampling methodology being used will yield sufficiently reliable estimates for most user needs. However, the extent to which the broad estimates can reliably be broken down by origin/destination details, and also by commodity, has yet to be evaluated. The more detailed the estimates, the less reliable they can be expected to be.

8. FUTURE PLANS FOR ROAD FREIGHT STATISTICS.

A high priority is currently being given by the ABS to finalizing work on the pilot studies. By July 1993 it is expected that a final report on the studies will have been completed which will have addressed, and have answers to, the following critical issues:

- * What information, and at what level of detail, can the ABS realistically expect to be able to produce about road freight movements in Australia, taking into account the budget constraints under which the ABS operates. For example, is it only possible to produce reliable information for, say, the 10 to 20 most significant origin/destination combinations in terms of volume of freight moved, or can good estimates also be produced for some of the less used origin/destination flows? At what level of detail can commodity information be released? Will some of the current 27 commodity groups need to be combined and if so how should this be done?
- * What sample size will be required to undertake a full scale collection and what degree of reliability will the sample be able to attach to the final output?
- * What is likely to be the overall cost of a full collection? How often will a full collection be required, and how might a scaled down collection be designed for other periods?
- * Is there likely to be any seasonal effect? Will it be best to conduct a rolling survey over time throughout the year, or quarterly surveys, or only annual?

Once the answers to the above have been obtained, the ABS then intends to develop a firm proposal for a full freight movement collection which will be put to major users for consideration. Discussions with users are expected to be held during July and August 1993. If they are generally supportive of the proposal, then the issue of possible user funding of the full collection, or some elements of it, will be raised.

If these consultations with users indicate that the conduct of a full road freight movement collection is both necessary and viable, then the ABS plans to run the collection commencing in October 1993. As in the case of the pilot studies, it would be conducted in two phases. The first phase would be conducted from October 1993 to February 1994. Again, this would involve gathering information about the record keeping practices of the selected sample of businesses.

The second phase, the actual collection of data from those businesses identified in phase 1 as being within the scope of the collection, would be undertaken in respect of the year 1 April 1994 to 31 March 1995. Whilst some "fine tuning" of the collection methodology to be employed during this phase may be necessary pending final evaluation of the methodology used in the pilot studies, at this stage it is expected that businesses will be asked to supply information about their freight movements once a quarter during the reference period. (One alternative would be to ask all selected businesses to report in respect of the middle two weeks of each quarter; another alternative would be to split the sample into three segments and to ask the first segment to report in respect of the first month of the quarter, the second segment in respect of the second month, and the third segment in respect of the third month)

It is not expected that final annual results would be available until July 1995 at the earliest, although the ABS will consider the progressive release of quarterly data during the reference period, if it is satisfied that the data is of sufficient reliability to be of value to users.

The ABS has no firm plans at this stage to undertake further freight movement collections of this magnitude beyond 1995, although this option will be discussed with users at the appropriate time, once the usefulness of the results of the first collection have been thoroughly evaluated.

9. CONCLUSION.

The mission of the Australian Bureau of Statistics is "*to assist and encourage informed decision-making, research and discussion within governments and the community, by providing a high-quality, user-oriented and dynamic statistical service.*" The national freight movement project outlined in this paper is just one of many initiatives taken up by the ABS in recent years as it attempts to fulfil this mission.

The ABS is under no illusions about the magnitude of the task it has undertaken in attempting to provide the community with reliable information about the freight movement industry in Australia. To quote one major user interviewed during the feasibility study referred to earlier in this paper, "*Generations of researchers have broken their teeth trying to produce reliable measures of freight movements within Australia*" The experiences of statistical agencies in other countries in this field also strongly suggest that the task confronting the ABS is a difficult one.

However, with the active support of transport industry associations, researchers, government agencies and business, the ABS is cautiously optimistic at this stage of development that information can be produced about the freight movement industry in Australia which will be of substantial value to major users in the community. The extent to which this "cautious optimism" can be transformed into reality is something that only the passage of time will reveal.

10. REFERENCES

- Holyman, R (1991) Land Transport Reforms, Some Issues For Researchers, a paper presented to the sixteenth Australasian Transport Research Forum.
- Interstate Freight Movement, Australia (annual) ABS Cat No. 9212 0
- Interstate Road Freight Movement, Australia (quarterly) ABS Cat No. 9214 0
- Survey of Motor Vehicle Use, Australia, 30 September 1988, ABS Cat No. 9208 0

University of Wollongong, Centre for Transport Policy Analysis (1990), Project Document: Proposed modifications to the project "Estimating Australia's Domestic Freight Movements "

Victorian Road Transport Association Inc (undated) Facts on Freight