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Searching for policy priorities in the formulation of a freight transport strategy: an analysis of freight industry attitudes towards policy initiatives

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Abstract:

An efficient and effective freight transport strategy can be aided by early professional contributions from key stakeholders. One broad group who have historically been given limited opportunity to influence the drafting of a freight strategy, at least in Australia, are commercial road users and shippers who manufacture and distribute goods. Utilizing a data set collected in Australia in 1996 from a sample of organisations involved directly and indirectly in road freight transportation, views were sought on road infrastructure changes, new road infrastructure, non-road infrastructure needs, and transport policies. An optimal scaling approach using non-linear canonical correlation is implemented to search for structural relationships between the underlying policy and infrastructure dimensions and the various industry categories This framework provides a very powerful mechanism for identifying policy priorities supported or otherwise by stakeholder classes.

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Introduction

In 1994, the New South Wales (NSW) State Road Network Strategy was developed and released for public discussion. The objective of the Strategy was to provide directions and a framework for road transport planning and management in New South Wales for the next 20 to 30 years (RTA, 1994). Strategies proposed include developing the strategic road network for the State based on economic and community transport needs, maintaining the road network to achieve maximum economic benefit and to provide acceptable levels of access, meeting transport needs in an environmentally responsible way; encouraging moderated traffic growth in urban areas through increasing private vehicle occupancy, increasing use of safety and speed reduction devices, improving facilities for pedestrians, bicyclists and public transport, reviewing parking provisions; and providing efficient road links to the major ports, airports and rail freight terminals

A very specific item highlighted in the strategy was the recognition that freight and commercial vehicle activities contribute substantially to the traffic as well as playing an important role in defining the State road network. What was missing, however, as inputs into the development of the Strategy, was an appreciation of freight-related industry needs, perceptions and expectations.

In recognition of a gap in the 'methodology' used in New South Wales (NSW) to establish policy priorities in the formulation of a freight transport strategy, we sought input from a sample of major organisations whose efficiency is influenced by the quality of the road system. These organisations operate at various points in the supply chain, and include firms in manufacture and extraction, retail, wholesale and distribution, freight hauliers, contract carriers and freight forwarders. Senior management responsible for logistics, operations, warehousing and transport were interviewed by telephone to gain a broad understanding and assessment of (1) the industry's perceptions and responses with regards to infrastructure and transport issues, (2) various scenarios for future infrastructure investment priorities and policy options for the management of freight and commercial vehicle travel, (3) the freight movement problem, issues of the past and specific barriers to transport and distribution productivity, (4) the underlying demand for freight-related transport, and (5) industry's preferences for road infrastructure improvements.

The following sections present the evidence obtained from the sample of key industry players. An optimal scaling approach using non-linear canonical correlation is implemented to search for structural relationships between the underlying policy and infrastructure dimensions and the various industry categories. This framework provides a very powerful mechanism for identifying policy priorities supported or otherwise by stakeholder classes; which can feed directly into a road network strategy.

The empirical context

The industry players for this study have been identified as the organisations involved in manufacturing, retailing, warehousing and distribution as well as those involved in providing general (utility) services (eg electricity, telecommunications), contract distribution, freight hauling, and freight forwarding. A sample size of 150 was pre-specified as a stratified random sample drawn from ITS's industry data base for the Sydney Metropolitan Area. Stratification was based on industry type - manufacturing, retailing/wholesaling, contract distribution, freight hauling, utility provider and freight forwarding.

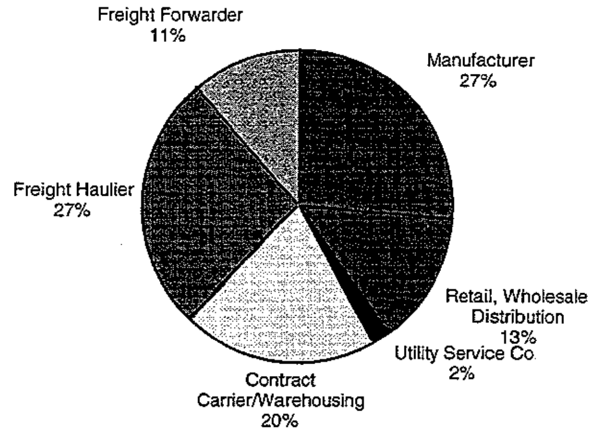
A Computer-Aided Telephone Interview (CATI) was administered between October 3 and October 21, 1996. A minimum of 10% of each of the 12 successful responses for each interviewer was validated by calling the respondent back and confirming name of respondent, title or position of respondent and the industry that the organisation is in. Table 1 indicates the response rate to the telephone survey. The response rate was 43% from the subset of individuals contacted. This is generally considered a good level of response to a telephone survey. Interviews with organisations are somewhat more difficult than those with households, given the difficulty in making contact with the appropriate person to interview in the organisation. This explains the high proportion of call backs Each interview averaged 23 minutes in length.

Table 1 CATI Response Rates

Description	Response	Percent
No Answer	248	16.8%
Refusals	112	7.6%
Call Backs	861	58.6%
Fax	14	1.0%
Screened Out (Non-quota)	85	5.8%
Actual Interviews	150	10.2%

The survey sample of 150 companies is broken down in Figure 1 by six industry types. There were too few (three) utility service companies to include this category in our analysis, so the final sample (n = 147) consisted of five types of freight industries.

In this paper we concentrate on the responses to a series of attitudinal questions in which each respondent was asked to respond on a 5-point scale, indicating whether they thought the initiative was a good or bad idea. Other aspects of the study are reported in Hensher et al (1996). Each item is discussed below where we use nonlinear canonical correlation to map attitudes and industry type in the search for priorities in the formulation of a freight transport strategy. Before presenting the findings, we need to briefly describe the scaling method.



Note: Each surveyed company was asked to describe its primary business. We recognise that some organisations may be players in more than one of these industry classes.

Figure 1 Breakdown of Sample by Industry Type

Methodology

Our objective is to summarize the opinions of commercial freight operators concerning the priorities of various policies for transport planning and management. The survey instrument measures attitude in terms of overall opinions about the worthiness of each of a series of infrastructure investment priorities and policy options for the management of freight and commercial vehicle travel. The attitudes are measured in terms of a five-point scale, with the scale point descriptors being (1) "very bad idea," (2) "bad idea," (3) "neither good nor bad idea," (4) "good idea" and (5) "very good idea."

In analysing these data, we face three interrelated problems common to attitude surveys: First, attitudes can only be measured on scales that are ordinal, not cardinal. That is, favor or disfavor is monotonically related to the scale value, but it should not be presumed that the intervals between adjacent scale points are equal. For instance, there is no reason to believe that the difference between "very good idea" and "good idea" is the same as the difference between "good idea" and "neither good nor bad idea," because the former interval measures the difference between two degrees of a formed positive attitude, and the latter interval measures the difference between a positive attitude and an indifferent attitude. Consequently, linear statistical analyses applied to the raw data (such as product-moment correlations, linear regression, and principal components factor analysis) will not necessarily yield accurate conclusions about relationships in the data because such methods assume equal intervals on the measurement scales.

Second, our objective is to evaluate a fairly large number of infrastructure investment priorities and policy options, so respondents were asked many attitudinal questions.

Respondents are likely to judge many of the investment priorities and policy options as being similarly good or bad ideas, and they may not have formed attitudes towards many of the initiatives. Thus, we can expect high levels of association among groups of attitudes. One of our goals was to summarize these associations by identifying patterns in attitudes. Because the attitude scales are ordinal, associations need to be measured without simply using product-moment correlations calculated from the raw data.

Third, we wish to determine how similarities in attitudes are related to the industry type represented by each respondent. Respondents from the same industry, or from a group of industries, are expected to have similar attitudes, because perceptions of the benefits and costs of infrastructure projects and policy options will be unevenly distributed across industry types. Thus, the patterns in attitude interrelationships will be a function of industry type, so the method used for determining these patterns must account for attitudes as a function of industry type. The mapping between attitudes and industry type is the foundation for the marketing of policy.

The objective is to find the best explanation of patterns in attitudes as a function of industry type. If the variables were linear (interval-scale), this would be referred to in multivariate statistical analysis as a canonical correlation analysis (CCA) problem. In CCA, there are two sets of one or more variables, and the objective is to find a linear combination of the variables in each set so that the correlation between the linear combinations is as high as possible. The linear combinations are defined by optimal variable weights. In the present case, we have one set of explanatory variables (industry types) and one set of dependent variables (attitudes), so CCA can be viewed as an extension of regression to more than one dependent variable. Depending on the number of variables in each set and their scale types, further linear combinations (called canonical variates) can be found that have maximum correlations subject to the conditions that all canonical variates are mutually orthogonal or independent. Because analysts are usually in search of parsimony, and practical reasons associated with interpreting the results, the number of canonical variates is usually limited to two or three. CCA is, however, generalisable to more than two sets of variables.

Here we have a nonlinear CCA problem with an explanatory variable matrix defined by a single nominal (industry type) variable and a dependent variable matrix defined by a series of ordinal attitude scales. The linear combination on the explanatory variable side is undefined, because we have no metric to quantify the categories of each nominal variable. The linear combination of the variables on the dependent side is also undefined, because the categories of each variable can be re-scaled by any nonlinear function that preserves monotonicity. Thus, we need to optimally scale or quantify the variables while simultaneously solving the traditional linear CCA problem of finding weights for each explanatory variable.

An elegant solution to the nonlinear CCA problem was first proposed by researchers at the Department of Data Theory of Leiden University in the Netherlands. The Leiden team (publishing under the *nom-de-plume* "Albert Gifi") developed a method for conducting canonical correlation analysis with variables of mixed scale types: nominal, ordinal, and interval. The method was operationalised in a program called CANALS

(Canonical Analysis by Alternating Least Squares), which was later extended to generalised canonical analysis with more than two sets of variables. The generalised nonlinear canonical analysis program, called OVERALS, is available in the SPSS CATEGORIES program suite (SPSS, 1990).

The Leiden method for nonlinear CCA is described in De Leeuw (1984), Van der Burg (1988) and (most extensively in) Gifi (1990). The method simultaneously determines both (1) optimal re-scalings of the nominal and ordinal variables and (2) explanatory variable weights, such that the linear combination of the weighted re-scaled variables in one set has the maximum possible correlation with the linear combination of weighted re-scaled variables in the second set. Both the variable weights and optimal category scores are determined by minimizing a loss function derived from the concept of "meet" in lattice theory.

When computing the optimal category scores in nonlinear CCA, nominal variables, such as industry type in the present application, can be treated as having either multiple or single optimal scaling. That is, the category scores can be different for each canonical variate (multiple), or the same for all variates (single). Multiple scaling always improves the fit between the two sets of variables, and the program partitions meet loss so that the analyst can assess the reduction in fit due to the use of single scaling for any nominal variable. Ordinal and interval-scaled variables, such as our ordinal attitude scales, can have only a single optimal scaling. We choose to treat industry type as a multiple nominal variable, because we are looking for the best possible explanation of differences in attitudes.

A nonlinear CCA solution involves, for each canonical variate, weights for all the variables, optimal category scores for all ordinal and nominal variables, and a canonical correlation. Graphical representations are very important in interpreting this plethora of results. In fact, several authors have argued that graphical representations are even crucial in understanding the results of linear multivariate methods, particularly linear CCA, because patterns in the data can best be detected by the eye (Cailliez and Pagès, 1976; Ter Braak, 1990).

Interpreting the CCA solution in mapping attitudes and industry stakeholders

In the present application, we are concerned with how attitudes towards the different infrastructure investment priorities and policy options are interrelated and how these interrelated attitudes are a function of industry type. To interpret the results of a nonlinear CCA solution for our data with p canonical variates, it is useful to generate a p-dimensional plot of the weights of the optimally scaled attitude variables and the weights of the nominal industry-type variable quantified for each canonical variate. Because we have only one nominal variable on the explanatory-variables side of the problem, the axis of this p-dimensional plot can coincide with the weights of this nominal variable on the canonical variates, because the vector of weights will be orthogonal and the p-dimensional space can be arbitrarily rotated. The upper bound on p, the number of canonical variates, is the minimum of the number of attitude variables and the number of industry types (categories of the nominal variable). Analysts generally aim for a two-dimensional canonical solution ($p = 2$) due to the obvious convenience of two-dimensional plots (Gifi, 1990); solutions in higher dimensions generally require multiple pair-wise plots. Optimal dimensionality of a CCA solution is determined by comparing canonical correlations and by further criteria detailed in Gittins (1985). Such plots are commonly referred to as plots of component loadings.

The square of length of the vector from the origin of the component loadings plot to the coordinates of a given variable indicates how much of the dependent variable was explained by all canonical variates in total, and the square of the projections of the vector on the axes reveal how much of the explanation was due to each canonical variate. For any two variables, the inner product of the two vectors is a close approximation of the correlation between the two optimally scaled variables (Ter Braak, 1990). (An inner product is defined as the product of the lengths of the corresponding vectors and the cosine of the angle between them. Correlation is positive if the angle between two vectors is sharp, negative if the angle is obtuse, and zero if the angle is perpendicular.) Thus, in the present application, the inner product of the vectors for two dependent variables on the component loadings plots indicates the degree of correlation between attitudes towards two different policy initiatives. The inner product of the vector of a dependent variable and the vector of the quantification of the explanatory variable on a given canonical variate gives the correlation between the attitude toward a policy initiative and one quantification of the industry type variable. Each of the quantifications of the explanatory variable aligns with one of the coordinate axes.

A second plot or series of category score plots provides the remainder of the information we need to interpret a nonlinear CCA solution in the present application. Multiple treatment of the industry type variable results in different category scores on each canonical variate for this nominal explanatory variable, so a plot of the category scores in the space of the canonical variates allows us to visualise which industry or industries are associated with high or low values of each canonical variate. By comparing the component loadings and category scores plots we can then relate industries directly to attitudes towards policy initiatives.

Results

The empirical investigation has divided the infrastructure investment priorities and policy options (hereafter referred to as policy initiatives) into four classes - existing road infrastructure, new road infrastructure, other proposed infrastructure, and broad-based policy initiatives. A total of twenty initiatives, listed in Table 2, were evaluated. The location of specific initiatives is summarised in the footnote to Table 2. The optimal scaling method was implemented separately in each of the four classes of policy initiatives. We report the findings herein for the first two classes of initiatives.

Table 2 Proposed policy initiatives tested in the survey

Note: The set of initiatives were defined by the Roads and Traffic Authority of NSW.

Policy Initiatives (Scale: 1=very bad idea, ... 5=very good idea)
Existing Road Infrastructure Initiatives:
parking restrictions on major roads from 6am - 9pm
B-double access to local road network
freight vehicles allowed on bus lanes during peak periods
freight vehicle only lanes
roundabouts with wider lanes
New Road Infrastructure Initiatives:
an orbital road around the Sydney CBD about 30 km out
an orbital road around the Sydney CBD about 40 km out
extension of the M5 east to Port Botany and Kingsford Smith Airport
Eastern Distributor
Other Proposed Infrastructure:
railheads and inland ports
location of Sydney's third airport at Badgery Creek
location of Sydney's third airport at Holdsworthy
proposed rail interchange terminal at Chullora
proposed rail interchange terminal at Bathurst
current rail interchange terminal at Blaney
common user terminal at Port Botany
Policy Changes:
plan transport for 24-hr. needs of people and freight rather than peak period demand
regulatory changes to allow collection and distribution centres to be open 24 hrs.
improved education of car drivers to improve attitudes towards trucks
priority to intermodal linkages, especially rail

Notes: The M5 East Extension is a major freeway in the South West connecting into the M5 - a private tolled road. Badgery Creek and Holdsworthy (near Liverpool) are locations in Sydney's West. Chullora is near Enfield approximately 10 km from the Sydney CBD; Blaney and Bathurst are over the Blue Mountains at least 2 hours from Sydney CBD.

Road infrastructure initiatives

The responses to the five potential road infrastructure initiatives are graphed in the bar charts of Figures 2 through 6. Roundabouts with wider lanes receive the greatest overall support, with 79% of the respondents telling us that this was either a good or very good idea, with almost a majority (49%) thinking that this was a very good idea (Figure 6). In contrast, only 48% of the respondents thought that B-double access to the local road network was either a good or very good idea, while 32% thought that B-double access was in fact a bad or very bad idea (Figure 3).

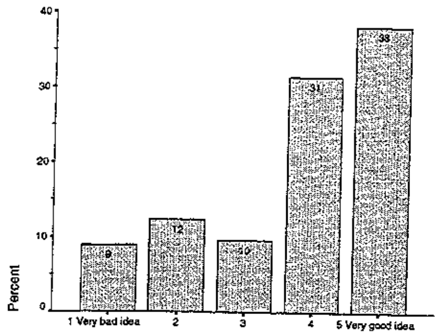


Figure 2 Evaluation of "Parking restrictions on major roads from 6am-9pm"

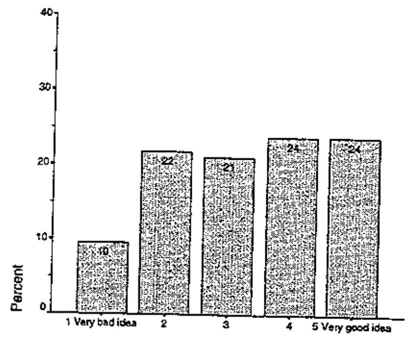


Figure 3 Evaluation of "B-double access to local road network"

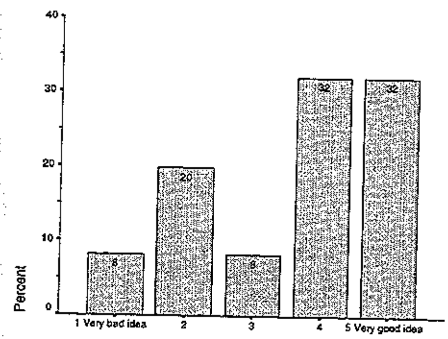


Figure 4 Evaluation of "Freight vehicles allowed on bus lanes during peak periods"

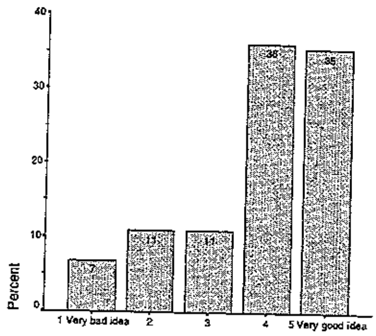


Figure 5 Evaluation of "Freight vehicle only lanes"

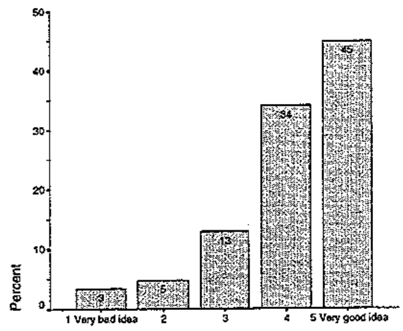


Figure 6 Evaluation of "Roundabouts with wider lanes"

Most (70%) of the respondents thought that daytime parking restrictions on major roads was a good or very good idea, while 20% thought that is was either a bad or very bad idea (Figure 2). The remaining two road infrastructure changes, freight vehicles on bus lanes during peak periods and freight vehicle only lanes, received support of about 65%. However, a substantial minority of respondents (28%) felt that freight vehicles on bus lanes was a bad or very bad idea. Relatively few respondents (only 9%) had no opinion.

We conducted a non-linear CCA to determine differences in attitudes towards the potential road infrastructure changes among the five categories of business sectors. The two-dimensional nonlinear generalized canonical analysis yielded canonical correlations of 0.394 for the first dimension and 0.280 for the second. A three-dimensional solution was rejected, as the canonical correlation for the third dimension drops to 0.198. The first canonical dimension explains 70% of the variance of its object scores, while the second dimension explains approximately 64% of the variance in its object scores. These statistics indicate that a two-dimensional canonical solution provides fairly strong relationships between the two sets of variables, the optimally scaled ordinal attitude scales on one hand and the quantified five-category business sector variable on the other (Gittins, 1985). (A comparative analysis conducted with the five attitude scales treated as numerical (linear), rather than ordinal, scales yielded canonical correlations of only 0.252 and 0.206. This improvement in canonical correlations demonstrates that treating the attitudinal scales as ordinal substantially improves the explanation of differences in attitudes among the five business sectors.)

The key results from the CCA are graphed in Figures 7 and 8. Figure 7 reveals that attitudes towards the five potential operational changes align along two dimensions through the origin. The first dimension passes between "freight vehicle-only lanes" and "roundabouts with wider lanes" in its negative domain and close to "freight vehicles on bus lanes during peak periods" in its positive domain. This shows that optimally scaled attitudes towards freight vehicle-only lanes and roundabouts with wider lanes are strongly positively correlated, and attitudes towards both are strongly negatively correlated with optimally scaled attitudes towards freight vehicles on bus lanes during peak periods.

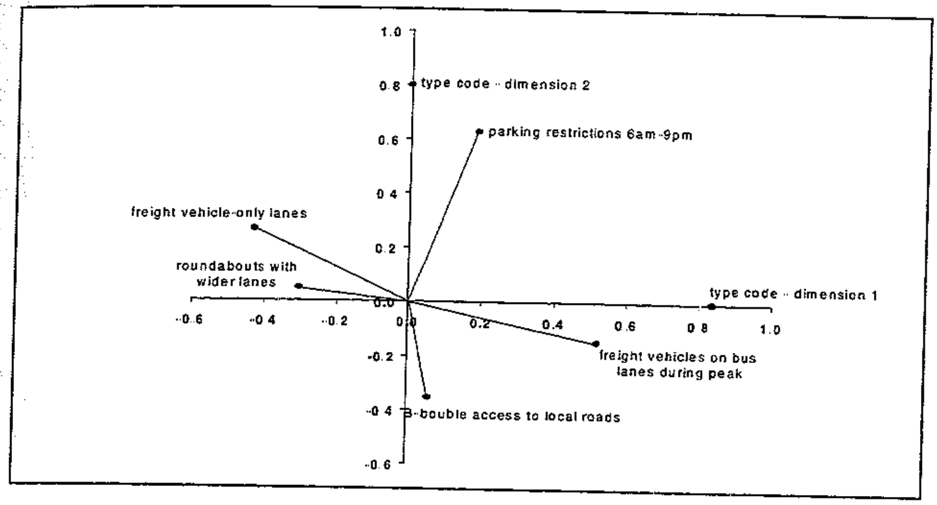


Figure 7 Non-linear canonical analysis of attitudes towards road infrastructure initiatives versus business sector: Component loadings for the optimally quantified attitude scales

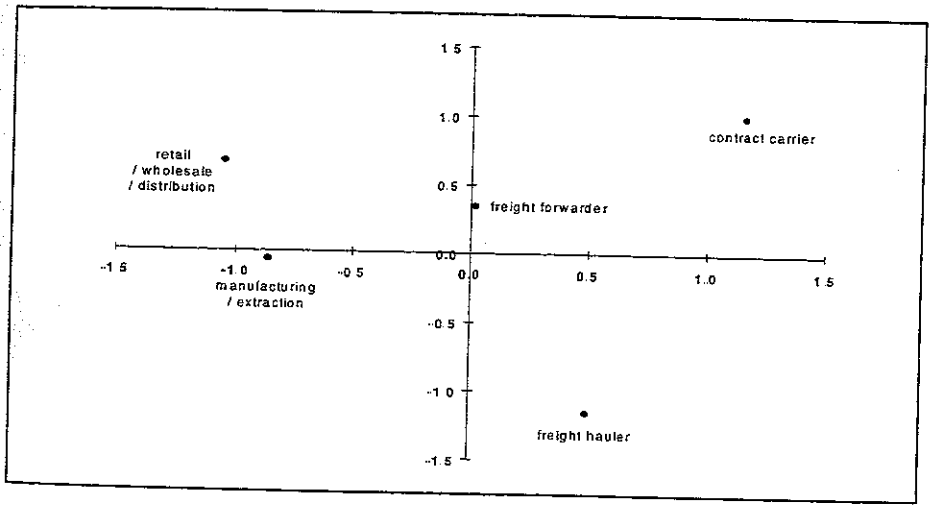


Figure 8 Non-linear canonical analysis of attitudes towards road infrastructure initiatives versus business sector: Category scores for the business sector variable

Referring to Figure 8, the first dimension separates contract carriers from retail, wholesale and distribution firms and, to a lesser degree, manufacturing and extraction companies. Thus, contract carriers are more in favor of operating freight vehicles on bus lanes during peak periods, while freight vehicle only lanes and, to a lesser degree, roundabouts with wider lanes are favored by retail, wholesale, distribution, manufacturing and extraction firms.

The second dimension is closely aligned with a dimension that distinguishes two negatively correlated policy initiatives: daytime parking restrictions, on the positive side of the dimension, and B-double access to local roads on the negative side (Figure 7). Freight hauliers, as indicated by their negative category score on the second dimension, tend to be more in favor of B-double access, while contract carriers, and to a lesser extent, retail, wholesale and distribution firms, prefer daytime parking restrictions (Figure 8). This in intuitively plausible given the dominant amount of urban goods movement on arterial roads by contract carriers.

Of the five categories of firms, freight forwarders exhibit the least strong opinions about these five road infrastructure initiatives, as indicated by the position of this category near the origin of the category scores plot in Figure 8.

These results for the road infrastructure initiatives are summarised in Table 3. Support for parking restrictions on major roads between 6am-9pm is negatively correlated with support for B-double access to the local road network. This suggests strong positive support for parking restrictions and relatively strong negative support for B-double access to the local road network. Compared to other industry classes, contract carriers are more in favour of parking restrictions and less in favour of B-double access to local roads. An opposing view is that of freight hauliers, who have strong support for B-double access to the local road networks. Freight forwards lean toward parking restrictions, but not as strongly as contract carriers.

Support for freight vehicle only lanes is positively correlated with support for roundabouts with wider lanes, and both are negatively correlated with allowing freight vehicles on bus lanes during peak periods. Greatest support is among retail, wholesale, and distribution firms, and among manufacturing and extraction firms. The weakest support is among contract carriers. Contract carriers prefer instead the policy of allowing freight vehicles on bus lanes during peak periods. Retail, wholesale, distribution, manufacturing, and extraction firms are less in favour of allowing freight vehicles on bus lanes

New road infrastructure

Respondents were also presented with four potential new road infrastructures. The evaluations of these policies are graphed in the bar charts of Figures 9 through 12. Most respondents (71%) think that extension of the M5 east is a very good idea, and over 90% think it is either a good or very good idea (Figure 11). There are more diverse opinions about the other three new road infrastructure initiatives, and opinion is fairly even split about the merits of an orbital road around Sydney about 40 km out from the CBD.

Table 3 Summary of results of non-linear canonical analysis of attitudes towards road infrastructure initiatives versus business sector most prominent results underlined)

Policy	Strongest support	Weakest support
parking restrictions on major roads from 6am - 9pm	contract carriers retail/wholesale/distribution freight forwarders	freight hauliers
B-double access to local road network	freight hauliers	contract carriers
freight vehicles allowed on bus lanes during peak periods	contract carriers	retail/wholesale/distribution manufacturing/extraction
freight vehicle only lanes	retail/wholesale/distribution manufacturing/extraction	contract carriers
roundabouts with wider lanes	retail/wholesale/distribution manufacturing/extraction	contract carriers

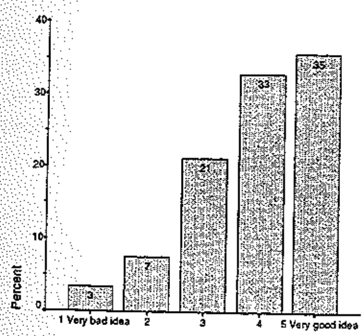


Figure 9 Evaluation of "An orbital road around the Sydney CBD about 30 km out"

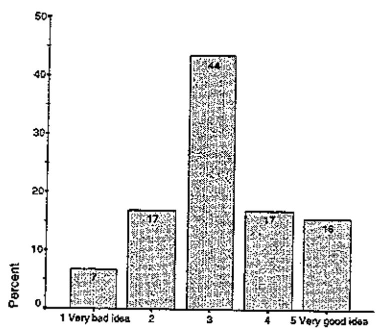


Figure 10 Evaluation of " An orbital road around the Sydney CBD about 40 km out"

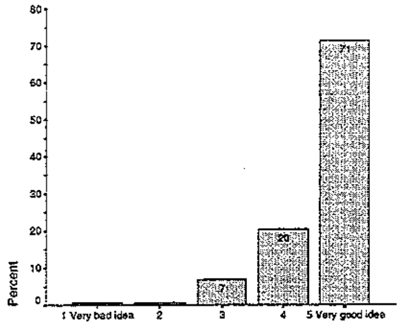


Figure 11 Evaluation of "Extension of the M5 east to Port Botany and Kingsford Smith Airport"

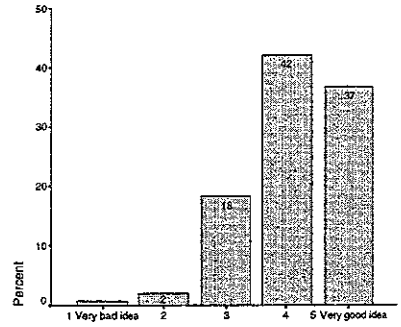


Figure 12 Evaluation of "Eastern Distributor"

The results of the non-linear CCA linking business sector and attitudes towards four potential new road infrastructure policies are graphed in Figures 13 and 14. A two-dimensional solution was again chosen, in this case with canonical correlations of 0.358 for the first dimension and 0.262 for the second. In a three-dimensional solution the canonical correlations are 0.348, 0.290, and 0.144, showing a substantial drop-off in explanatory power for the third orthogonal dimension. (A comparative analysis conducted with the four attitude scales treated as numerical yielded canonical correlations of only 0.334 and 0.192. The performance of the first dimension is similar, but the second dimension is much more effective in explaining attitude differences when the scales are treated as ordinal rather than numerical.)

The nonlinear CCA reveals that there is one dimension of policy support, skewed to the axes of the canonical variates, that has extension of the M5 east and an orbital road around Sydney 30 km out at opposite poles (Figure 13). An orthogonal dimension measure aligns with support for an eastern distributor. The pattern on the category scores plot (Figure 14) contrasts contract carriers against retail, wholesale, and distribution firms, and freight forwarders against manufacturing and extraction firms. As in the previous case of road infrastructure initiatives, freight hauliers represented the segment with the least conspicuous pattern of attitudes.

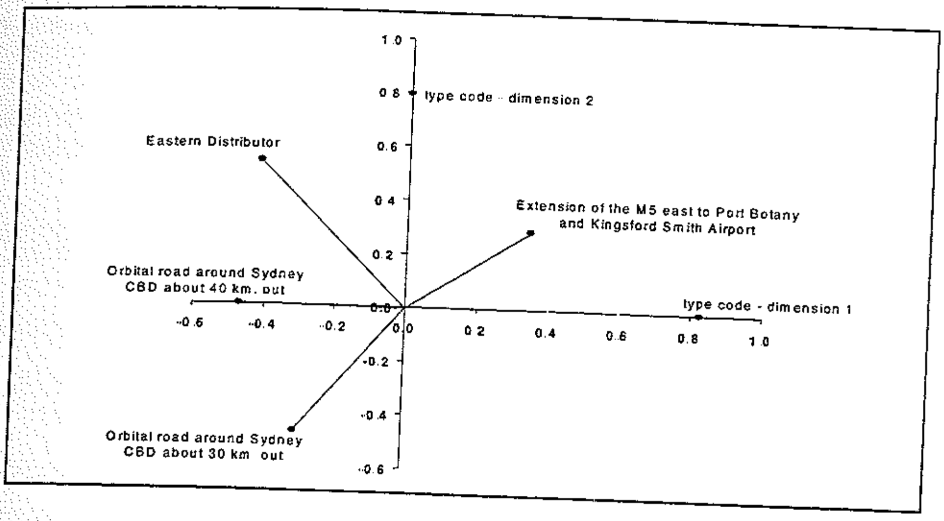


Figure 13 **Non-linear canonical analysis of attitudes towards new road infrastructure versus business sector: Component loadings for the optimally quantified attitude scales**

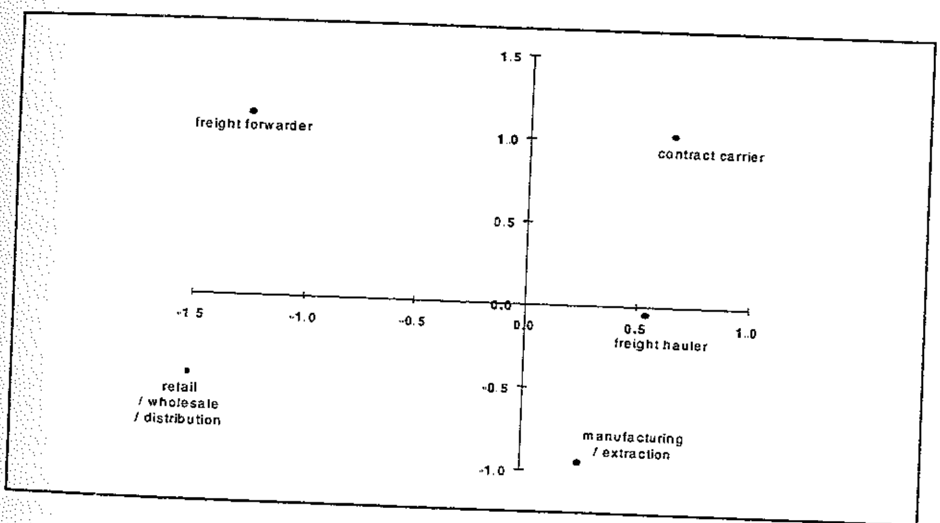


Figure 14 **Non-linear canonical analysis of attitudes towards new road infrastructure versus business sector: Category scores for the business sector variable**

An interpretation of the key results plotted in Figures 13 and 14 is listed in Table 4. Once again, contract carriers and the retail, wholesale and distribution sector are at opposite ends of support for and against three of the new infrastructure policies, specifically the two orbital roads and the extension of the M5 Motorway east to Port Botany and the Kingsford Smith Airport. However these two industry types do not have outstanding views on a new Eastern Distributor Route. Freight forwarders support an Eastern distributor, while the manufacturing and extraction sectors are least in favour of this new road infrastructure.

Table 4 Summary of results of non-linear canonical analysis of attitudes towards new road infrastructure versus business sector (most prominent results underlined)

Policy	*Strongest support*	*Weakest support*
an orbital road around the Sydney CBD about 30 km out	retail/wholesale/distribution manufacturing/extraction	contract carriers
an orbital road around the Sydney CBD about 40 km out	retail/wholesale/distribution freight forwarders	contract carriers freight hauliers
extension of the M5 east to Port Botany and K.S. Airport	contract carriers freight hauliers	retail/wholesale/distribution
Eastern Distributor	freight forwarders	manufacturing/extraction

Summary and Conclusions

The NSW government is increasingly recognising that it has not paid enough attention to the urban transport infrastructure needs of the freight sector. Typically, freight vehicles are given a pre-determined allocation of road capacity in a passenger-based travel model system and then essentially ignored. In addition the public sector in NSW has rarely involved the major freight and logistics players in the early phases of the planning process; rather opportunities are provided to comment ex post on infrastructure options via an Environmental Impact Assessment public hearing.

In this research we analysed attitudes towards alternative policy initiatives of senior management responsible for logistics, operations, warehousing and transport in 147 companies in five sectors: (1) contract carriers, (2) freight forwarders, (3) freight hauliers, (4) manufacturing and extraction, and (5) retail, wholesale, and distribution. The method we used, nonlinear canonical correlation analysis, succeeded in identifying clear patterns in attitudes that revealed how support for various policies varied across industry sectors

The approach reinforces the importance of establishing a mapping between the views on specific potential policy and strategic issues and the stakeholder domain from which various degrees of support and opposition might evolve. Government agencies can use this information in positioning specific strategies and developing marketing plans to ensure that stakeholder support is maximised. Such a formula is likely to be attractive to the political process.

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