

# Understanding light and medium commercial vehicle movements in urban corridors

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## 1 Introduction

This paper highlights the findings of a two year research project, *Light/medium commercial vehicle use in four urban centres* (O'Fallon and Sullivan, forthcoming) focusing on light to medium commercial vehicles operating within urban areas, rather than long haul (inter-regional) heavy freight vehicles. Light to medium commercial vehicles may be delivering or collecting goods or carrying out a servicing activity (e.g. installation of equipment, maintenance, cleaning, etc) to the organisation<sup>1</sup> they are visiting. Both types of trips are considered of "fundamental importance to the functioning of the urban area" (Wigan et al, 2002).

Our study is exploratory in parts, primarily because very little information is available in published reports and papers regarding light to medium commercial vehicle trip patterns in urban areas. We found only two examples of related research in Australasia, one based in Sydney (Wigan et al, 2002; and Peachman and Mu, 2000) that described a 1999 attempt in Sydney to come to some understanding of the movements of "light commercial or goods vehicles" using more quantitative survey methods, which found it very difficult to gather data by such means. The survey was not able to explore or report on the drivers behind the trip activity rates or what policy tools might impact on them. A later exploratory study in Auckland, New Zealand (Sankaran et al, 2004 and Sankaran et al, 2005) investigated the micro-level impact of traffic congestion from a supply-chain perspective through interviews with "knowledgeable informants" from a total of eight organisations including manufacturers, distributors, logistics and transport service providers.

We identified four main purposes of this project:

1. to qualitatively clarify the nature, as well as the "drivers" (e.g. just-in-time, consumer preference, inventory), of urban-based light and medium commercial vehicle movements.
2. to the extent feasible within a case study approach, categorise the types of movements and usage of transport services by organisational purpose (i.e. food outlet, retail, services, etc).
3. based on key informant interviews, comment on the impact different policy tools might have on such movements.
4. provide the foundation for modelling of such movements (e.g., for forecasting).

This project is very much about the evolving transport environment and has been aimed towards future users.

## 2 Method

We adopted methods from a well-recognised text for case-studies (Yin, 2003).

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<sup>1</sup> An "organisation" in the context of this project includes any retail or service business (i.e. legal services, shops, banks, marketing companies, architects, etc), local or central government agency / department, service organisation (i.e. library, information services, etc), that has a shop front or office at or above street level in the identified urban corridor.

## **2.1 Hypothesis**

Adopting Yin's (2003) approach required us to formulate our hypothesis as a precursor to defining the case study protocol. Our hypothesis for this research project was:

“The demand for (or use of) and the provision of transport services within an urban corridor varies depending on:

- The physical characteristics of the corridor (e.g. level of traffic volume [as it relates to congestion], location within the urban area)
- The density, composition and nature of the organisations located within the corridor (e.g. organisational type / structure, level of transport service required, available floor space / storage)
- The effect of the organisation – customer relationship (e.g. customer service standards, customer expectations) between the transport user and its clients; between the transport provider and the transport user;
- The regulatory environment (e.g. local policies such as curfews etc., through to vehicle licensing and operation regulation characteristics).”

From this hypothesis, we derived three propositions, which are essentially a series of specific statements based on the hypothesis that we hoped to prove (or disprove) in the course of our case studies.

## **2.2 Selecting case studies**

Deciding on a multiple case study approach, we established two “contexts” for our case studies, namely Auckland Region and Wellington Region, and selected four case study corridors:

- two in the heart of the Central Business District of a major city (Queen Street, Central Auckland, and Lambton Quay, Central Wellington); and
- two in the main business area of a secondary city (Central Takapuna, North Shore City, and Central Lower Hutt).

We adopted a “maximum variation sampling” approach within the four case studies, attempting to have a wide range of organisational types included in each corridor – a challenging task given that we were only able to undertake about a dozen interviews in each one. Across the case studies, we engaged in some “stratified purposeful sampling” ensuring that, for the purposes of replication, each case study included at least one:

- Independently-owned café / restaurant
- Clothing / footwear retail shop that is part of a national chain
- Government agency (either local or central)
- Personal service (e.g. doctor, dentist, hairdresser, bank)
- Business / support service (e.g. lawyer, building manager, human resources firm)
- Other retail shop.

We conducted face-to-face interviews with “key informants” from organisations located within each corridor. Approximately 50 such organisations (e.g. around 11-12 per corridor) were interviewed about their demand for all types of commercial transport services. We structured our data collection table such that we could take into account services or goods deliveries by light to medium commercial vehicles (LMCVs); heavy commercial vehicles (HCVs); and foot or cycle couriers. Although, we were primarily interested in LMCV movements, we asked about various types of trips (receiving stock;

sending documents; rubbish pick up; maintenance; etc), their frequency (daily, weekly, fortnightly, monthly, irregularly) and then sought to record the type of vehicle involved.

Given the extensive use of couriers in all four corridors, we also interviewed one “regular” (non-urgent) courier (providing scheduled pick up and delivery each day, generally with overnight or 3-4 hour delivery windows) and one “urgent” courier (generally providing pick up and delivery in 1 hour or less), both of whom operate in Wellington Region. We were able to supplement our Wellington-based information with that gathered by Sankaran et al (2004 and 2005) in their Auckland-based research.

## **2.3 Reporting**

We prepared a separate report for each corridor, providing contextual information about the corridor and our specific “target area”, including the mix of business types and sizes located within the corridor, as well as a general description of each organisation interviewed. We then discussed their use of / demand for commercial transport services, specifically considering physical and other characteristics (such as density, congestion levels, effect of special types of goods) of the corridor and their effect on demand. We explored their reaction to possible transport-related policies, including pedestrianisation / restricting commercial vehicle access and increasing transport costs.

We conducted four types of cross-case analysis, comparing commercial vehicle movements across context, that is between the two “heart” corridors of Lambton Quay and Queen Street and the two secondary city central areas of Central Takapuna and Central Lower Hutt; and within context, comparing Queen Street with Central Takapuna and Lambton Quay with Central Lower Hutt.

Furthermore, we considered the characteristics of the businesses themselves and how these might affect the demand for / use of commercial transport services.

We also reported on how urgent and non-urgent courier companies, as the most predominant transport operators in all four case studies, organized their services, addressed customer expectations; handled congestion and traffic and parking difficulties. Their comments on various policies were noted.

Finally, we reflected on what our observations and finding meant with respect to our hypothesis and its associated propositions.

## **3 Cross case analysis**

### **3.1 Within the same context**

In this section, we first compare the two case study corridors within the Wellington Region (Lambton Quay, Central Wellington and Central Lower Hutt) and then the two corridors within the Auckland Region (Queen Street, Central Auckland and Takapuna, North Shore City).

#### **3.1.1 Central Wellington (Lambton Quay) versus Central Lower Hutt**

Although Lambton Quay, Wellington City has a much higher density of buildings per square metre of land space than does Central Lower Hutt City, there is not much difference in the total number of businesses in the two target areas (357 in Lambton Quay and 293 in Central Lower Hutt). The mix of businesses is remarkably similar: proportionally, Lambton Quay has

somewhat more retailing (34.7% compared with 27.3% in Lower Hutt); while the Lower Hutt corridor has more health and community services (11.3% compared with 5.3% in Lambton Quay). Central Lower Hutt corridor has a slightly greater proportion of micro-businesses ( $\leq 5$  employees) than does Lambton Quay (62.5% compared with 56.6%).

The corridors are quite different in terms of their structure. In the Lower Hutt, most businesses had some off-street access in the form of a “back lane”, while in Lambton Quay, many businesses rely on the Quay itself for commercial vehicle access. In both corridors, parking was considered to be a greater issue than congestion, perhaps reflecting that we were speaking with transport *users* rather than *operators* who actually have to deal with the traffic. In the Lower Hutt, delays in deliveries were more likely attributed to problems with the motorway between Wellington and the Hutt than within the corridor itself.

While parking was considered an issue, the focus was different, insofar as Lower Hutt respondents were more concerned about whether or not their **customers** could park near to their premises (thus having easy access). In Lambton Quay, the parking issue was more focused on whether or not **commercial vehicles** could find a place to stop to make their delivery or pick up or to make a maintenance call, as well as whether or not sales representatives could park in order to come in and display new products and take orders for re-stocking. The differences could reflect the fact that many more retail customers arrive on foot, often via passenger transport, to businesses on Lambton Quay, as compared with Lower Hutt, where they are more likely to arrive by car.

Concerns about access to and quantities of loading zones were commonly raised by Lambton Quay respondents than those in Lower Hutt. Perhaps, this reflects the fact that Lower Hutt organisations had better off-street access than their Lambton Quay counterparts.

We found that both corridors had a high number of hand-deliveries, made by “walking” the item across the road to its destination. Lower Hutt businesses used far fewer urgent couriers than did Lambton Quay respondents. There are no cycle couriers in Lower Hutt.

While the mix of organisations we interviewed, in terms of goods- and services-orientation was quite similar in both corridors (around 40% goods and 60% services), there were some notable differences in terms of the size of operation: 10 of 13 businesses interviewed in Lower Hutt had 1-5 employees, while in Lambton Quay only 3 of 12 organisations were this small.

Given this, it is perhaps not surprising to find that the Lower Hutt organisations we interviewed had far fewer commercial vehicle (including couriers and LMCVs) visits than did Lambton Quay respondents: 6 of 13 Lower Hutt organisations had less than 10 visits per week, while none of the Lambton Quay organisations fell into this category. Rather, 6 of 12 Lambton Quay organisations had more than 40 commercial vehicle visits per week, compared with only one organisation in the Hutt.

Courier vehicles featured dominantly in the overall number of visits in either corridor: very few respondents had extensive visits from other LMCVs, other than the cafes in either corridor; the florist in Lower Hutt; and the bank, communication services and department store in Lambton Quay. The latter two had their own marked vehicle or fleet that undertook most of the trips, whether incoming or outgoing.

### 3.1.2 Central Auckland (Queen Street) versus Takapuna

Queen Street, Auckland City is clearly a more intense environment with a much greater density of pedestrians and correspondingly higher retail lease rates than Takapuna, North

Shore City. The sheer busy-ness of Queen Street does not allow for the large number of angle parks present on Hurstmere Road.

Greater pressure was also reflected in greater intensity and concern about loading zones, the smaller amount of parking available directly on Queen Street other than loading zones/bus stops/taxi stands, and the extent to which businesses reported being fined for illegal activities such as improper use of loading zones.

The density of Queen Street is much higher than central Takapuna, as reflected in the overall number of businesses in each corridor: there were 532 in the APN InfoMedia database for the section of Queen Street we studied, compared with 216 in central Takapuna. This is despite the fact that the Takapuna corridor covers a much greater distance / land area than was involved in Queen Street. The mix of organisations was quite similar in both corridors in terms of retail, food services, finance and insurance, property and business services and so on, the exceptions being that Queen Street has a slightly higher proportion of personal and other services (including travel agencies, hair stylists, etc), and “manufacturing” businesses, as classified using Australia – New Zealand Standard Industrial Classification codes.

In terms of our interviews, the split between goods- and services-related organisations was slightly different in the two corridors, wherein we interviewed 4 goods businesses (retail shops) and 8 service-oriented organisations in Queen Street and 6 of each in the Takapuna corridor. Surprisingly, perhaps, 8 of the 12 organisations we interviewed in Queen Street had ≤5 employees, while only 5 of 12 in the Takapuna corridor did.

Six of the businesses interviewed in Takapuna had 10 or fewer commercial vehicle visits (including courier and other LMCVs) per week, compared with three in Queen Street, despite the greater presence of smaller businesses in the Queen Street interviews. Two businesses in each corridor had more than 40 commercial vehicle visits per week. Courier vehicle visit rates were very similar in both corridors: in both cases, two had no courier vehicle visits in any given week, and six organisations had 10 or fewer courier visits per week.

It is possible that a shortage of “showroom” and “backroom” storage in Central Business District retail shops would necessitate more visits through “just-in-time” replenishment of stock. However, this would be difficult to verify, as many of the respondents could not provide either estimates or exact measures of the floor space leased by their business.

Key informants in both corridors mentioned difficulties with access as well as with late deliveries. In the case of Takapuna, access issues and the lateness of deliveries was generally attributed to stock being warehoused in locations south of the Auckland Harbour Bridge, meaning that the bridge had to be traversed in order to obtain it. Similarly, goods or materials that had to be sent across the bridge (e.g. the bank’s daily business is processed in a regional office in Auckland City) were subject to delays. Difficulties with traffic on the bridge meant that some businesses received stock at the time it suited the transport operator, rather than when it would be most convenient for them. Two of the organisations interviewed had begun to make their own deliveries because they could not rely on couriers to make the deliveries in the timeframe required.

Lateness of deliveries in Queen Street had led two businesses to establish their own distribution centres, such that they could receive all stock there and consolidate it in order to minimise the number of commercial vehicle trips to Queen Street itself.

### **3.2 Across different contexts**

In this section we first compare the two “heart” corridors (central CBD of Auckland City and Wellington City). Then we examine the similarities and differences between the two main street corridors in Lower Hutt and Takapuna.

### 3.2.1 Lambton Quay, Central Wellington versus Queen Street, Central Auckland

Discussions with Queen Street retailers were coloured by concerns that Queen Street was now a weak retail destination, as well as concerns about parking. Lambton Quay retailers were distinctly positive in comparison, although concerns about parking were still quite common. The positive outlook is reflected in retail lease rates per square metre being slightly higher in Lambton Quay than Queen Street, despite the former’s serving a much smaller population.

One Lambton Quay retailer had only recently moved from managing a shop on Queen Street, giving them a good insight into the two corridors. They described Queen Street as a “ghost town”, stating that people preferred to shop in St. Lukes or Botany where they could be assured of a car park and not have to cross any roads. Lambton Quay, by contrast is a friendlier street to walk down, with much less traffic and no boy racers to “hurtle down the street.” However, they thought that Queen Street had much better connections with the waterfront, compared with Lambton Quay, which is cut off from the harbour.

Queen Street is geographically quite different being much broader (four lanes, whereas Lambton Quay is reduced to one lane in parts). Queen Street carries a broader range of traffic, less dominated by buses than Lambton Quay. In addition, Queen Street has normal cross streets forming a grid pattern whereas Lambton Quay has only one true cross street at the end extending up to The Terrace. However, the use of back lanes and side streets as well as parking on the foot path is probably less marked in Queen St because of the greater number of loading zones and parks on the broad main street itself.

There were a number of free car park spaces (even though many were limited to 15 minutes) on Queen Street. By comparison, what parking is available on Lambton Quay is metered.

Both streets had sufficient density to warrant the presence of urgent couriers, including cycle couriers. Neither Lower Hutt or Takapuna had cycle couriers, and the use of urgent couriers was far less frequent. It was far more common to be told about hand-deliveries being “walked” by businesses to their customers in Lambton Quay than in Queen Street, perhaps reflecting differences in the physical size and layout of the two streets.

The density of the two corridors allowed transport operators to implement efficiencies, such as making one stop to service several businesses (water delivery truck and couriers) and to have several “regular” courier visits per day.

In both corridors, parking issues and loading zones received far more attention / concern than congestion, albeit it with an important difference: parking concerns emanated with regard to patrons rather than couriers in Queen Street, as compared with Lambton Quay where concern about the ability of commercial vehicles to stop or park was expressed. This could reflect the fact that congestion is somewhat ‘invisible’ to transport users. It is the transport operators, particularly couriers that must cope with the traffic demands. On the other hand, respondents (at street level) could readily see parking spaces and loading zones being occupied. The unevenness of policing of loading zones (e.g. allowing taxis to use loading zones inappropriately, while ticketing unmarked vehicles where the owner was clearly unloading goods into a shop) was a source of frustration for organisations in both corridors.

In both corridors, we found that organisations located in the higher levels of buildings were not as aware as those at street level of whether the courier they used arrived by bicycle or in a motorised vehicle, or about parking or congestion issues. This could present some difficulty in estimating the number of LMCV visits to such organisations.

In terms of light and medium commercial vehicle movements, we noted some substantial differences in the volume of visits between Lambton Quay and Queen Street. Six of the 12 businesses we spoke to on Lambton Quay had more than 40 LMCV visits per week compared with only two businesses achieving this volume on Queen Street. On Queen Street, there were 3 organisations with less than ten LMCV visits per week; on Lambton Quay there were none in this position.

These differences are not something that could be put down simply to different types of organisations being interviewed. For example, the Queen Street department store reported 110 courier and LMCV visits per week while the Lambton Quay department store had 275 plus an unspecified number of company van visits. The government organisation on Lambton Quay had around 40 LMCV and courier visits per week, while the one on Queen Street had less than 25. There was not a huge variation in staff numbers between the two. The communications service and florist on Lambton Quay had far more vehicle movements than did any other private sector operation on Queen Street or Lambton Quay.

While these variations are not representative of the entire corridor, they are enough to suggest that it is difficult to make 'hard and fast' assumptions about the number of visits associated with a particular type of business or corridor.

### 3.2.2 Central Lower Hutt versus Takapuna, North Shore City

Central Lower Hutt and Central Takapuna are quite similar in their overall appearance: both have predominantly low rise buildings (often single storey, with most less than five storeys); neither have any foot or cycle couriers; both have angle parking for customers on the "main" street; and many organisations interviewed walked to pick up and drop off their daily post. Unlike Lower Hutt where almost everyone did, very few organisations in Takapuna had off-street or back lane access to their site. There is a reasonably similar mix of organisation types and sizes in the two corridors. However, our interviews had a disproportionate number of small businesses ( $\leq 5$  employees) represented in Lower Hutt compared with Takapuna – 9 of 13 organisations were that small in Lower Hutt compared to only 5 of 12 in Takapuna.

Nonetheless, the total number of commercial vehicle visits (including courier vehicles and other LMCVs) in the two areas was very similar. Approximately one-half of the businesses had 10 or fewer per week. Only one or two in each corridor had more than 40 visits, including the government organisations visited in both locations and an independent restaurant. Eight organisations in each case had 10 or fewer courier vehicle visits.

Respondents in both corridors complained about the lack of parking, largely with respect to customer access, although in Takapuna, respondents also complained about loading zones (e.g. the bank complained about the lack of such, while others criticised their proximity, which interfered with their business operation). This probably reflects the fact that fewer Takapuna organisations have off-street access to their buildings, unlike Lower Hutt. Some businesses in Takapuna complained about the on-street parking restrictions which prevented their staff from parking close to their workplace. One organisation had decided to relocate outside of central Takapuna in order to be able to provide their staff with car parks.

Timeliness of deliveries was a far greater issue for Takapuna than Lower Hutt, although traffic on the motorway near the Hutt does sometimes disrupt commercial vehicle activity. In Takapuna, the delays were sufficiently severe that two organisations had decided to manage their own deliveries in private vehicles.

## 4 Verifying our hypothesis

Our hypothesis proposed that various factors, including the characteristics of the corridor and the organisations contained therein, affect the demand for and provision of transport services within an urban corridor. The following sections address each aspect of our hypothesis in turn.

### 4.1 The effect of individual organisations on demand for transport services

Many retail organisations operate with a 24-hour, next day service standard and customers generally expect that this will be the case. However, we did find that a few Auckland-based businesses have tried to reduce these expectations, generally because of issues to do with traffic between the distribution centre and the retail outlet.

Given the extensive use of couriers for the delivery of goods generally, and the fact that non-urgent couriers operate on set routes with established pick up / delivery times, it is difficult to ascertain how many *extra* trips these service standards would engender. A crude means of estimation is that if the frequency of service were to be increased from twice-daily to thrice-daily, then the number of trips of non-urgent couriers to a given corridor would increase by 50%.

However, during the course of our interviewing, we developed a strong sense that the service standards were offered simply because it was feasible to do so, given the advances in technology in recent years (e.g. ordering stock used to require sending orders in the post and waiting for shipment; now it is an ‘instant’ email, involving computerised inventories in the distribution centre, and shipping out almost immediately). Competition ensures that the standards continue to be offered at least in the short- to medium-term.

We did not find any evidence of transport being used as a form of “mobile” storage. A few retailers noted that they no longer maintained large inventories on-site, but the reasons for this varied: for example, two retailers found rapidly changing technology meant that some stock would quickly become obsolete, making it too high a risk to maintain high inventory levels; another reported that they now need to have a much greater variability in stock, such that they maintain smaller volumes of a greater range and re-order more regularly.

Two fashion retailers specifically noted that they had changed how they hold stock, reducing their holdings and re-ordering as they run out of “sizes”. The respondents stated that this was better for their shop’s cash flow, and appeared to be how the suppliers wished to operate.

#### 4.1.1 Goods- versus services-oriented organisations

We interviewed respondents from 20 “goods” organisations (i.e. retail shops) and 29 “services” organisations (hair stylists, dentists, lawyers, consultants, government agencies, etc. – including also restaurants and cafes which, while providing a “good” in the form of food, are also providing a service / experience). Only 10 of the organisations we interviewed had more than 20 employees – and 8 of the 10 were services-oriented.

With respect to the use of couriers, services-oriented businesses were far more likely to have 10 or fewer courier vehicle visits (excluding cycles) per week – 19 of 29 services were in this category, compared with 7 of 20 goods-related businesses. Retail operations were more likely to have more than 30 courier visits per week.

However, when considering the minimum number of commercial vehicle visits (including couriers, LMCVs, and HCVs) per week, there was no notable difference between goods or services organisations, as a group, in their demand for transport services. However, when we considered characteristics within these groups, there were some discernable differences.

#### *Independent v. chain / franchise operation*

We identified a tendency for food places (restaurants / cafes /bakery) operating as part of a chain or a franchise to have fewer commercial vehicle visits per week than their independent counterparts. As this was based on a small sample (six businesses in total), it requires further investigation.

Also, comparing the two department stores we visited, it appears that the chain store has far fewer commercial vehicle visits per week than the independent department store. Again, this result cannot be generalised, but could be explored further.

Because of the small samples involved (six businesses in the case of food places and two department stores), we cannot confidently generalise the result across the corridor(s). However, we can make an analytical generalisation<sup>2</sup>, stating that chain-outlets are likely to enjoy shipment-consolidation by receiving combined shipments from their distribution centres rather than directly from suppliers (at least for some product-types, such as non-perishables).

#### *Perishable v. non-perishable supplies*

Where the supplies required by a business are perishable (e.g. foodstuffs, flowers, and computer / technology parts), they are much more likely to have 10+ commercial vehicle visits per week than are other service-oriented or non-perishable retail organisations (e.g. clothing, shoes, etc). For example, of 15 organisations interviewed which counted 10 or fewer commercial vehicle visits per week, only one (a bakery) was a business involving perishable supplies. Nearly one-half (5) of the 11 organisations requiring perishable supplies had 35+ commercial vehicle visits per week. This compares with much smaller proportions of service-oriented organisations and non-perishable goods retailers (only 2 of 21 interviewed and 4 of 17 interviewed, respectively).

In addition, some food, banking (money and other securities), and the flowers require special care when being transported, e.g. refrigeration, secure vehicles and/or special “stands”. “Ordinary” courier vehicles are not suitable and the florists in particular complained of a lack of specially-fitted out couriers.

#### *Seasonal variation of supplies*

Clothing and shoe shops, in particular, have a distinctive changeover from “autumn/winter” stock to “spring/summer” stock. It appears that during the time of this transition, twice yearly for a period of up to two months that they may receive up to twice as many deliveries weekly compared with other times. The volume of each delivery may be larger as well, with some respondents noting that instead of one carton, they might receive six or more. One shoe shop we spoke with did not have an increase in deliveries but managed by increasing the volume of each delivery.

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<sup>2</sup> An analytical generalisation is where research results are generalised from one case study, by means of a suitable theory, to other cases (Yin, 2003).

The two department stores did not report a similar changeability, possibly because load variations could be contained within the LMCVs servicing their businesses.

Some retailers (notably gifts, clothing, booksellers) also reported increased numbers of deliveries occurring in the 6-8 week period leading up to Christmas.

By contrast, only one service organisation reported significant variation in its use of couriers, which reflected times that they were preparing to release major public documents.

#### 4.1.2 Number of staff employed

The number of staff employed does have some relationship with the overall number of commercial vehicle visits per week, when considering the extremes in the numbers of visits (i.e. 10 or fewer per week or more than 40). For example, 12 of 26 organisations employing 5 or fewer staff had  $\leq 10$  visits per week, while only 3 of 13 employing 6-19 people had as few commercial vehicle visits. None of the 10 businesses employing 20+ staff had  $\leq 10$  visits per week. Rather, 6 of the 10 largest organisations had 30+ visits per week, while only three of the smallest 26 organisations had as many visits. Of the “medium”-sized organisations (6-19 employees), 6 of 13 had 30+ commercial vehicle visits per week.

Removing the “extremes” to consider organisations receiving between 11 and 30 visits per week (even creating different clusters), it is impossible to distinguish any effects of staff size from our sample. It is also difficult to explain how staff size could impact on the number of trips for either service businesses or those that retail goods. Among service businesses, staff size may be a proxy for business turnover but business turnover probably has stronger implications for the sizes of consignments than the number of trips.

#### 4.1.3 Floor space

Many of our respondents were unable to provide even an estimate of their available floor space, making it difficult to establish whether or not there is a correlation between floor space and the number of commercial vehicle visits.

At first glance, it appears there may be some relationship between floor space and commercial vehicle visits. Five of the largest businesses (the bank head office, the two department stores, and two government administrations), all occupying at least a few thousand square metres, had very high numbers of commercial vehicle visits, including the use of their own vehicle fleet – ranging from more than 100 up to nearly 300 visits per week.

However, we found evidence to suggest that there is no theoretical basis for arguing that the difference in floor-space drives the difference in the number of trips. For example, one large service organisation covering three floors of a high rise on Lambton Quay and employing around 100 staff, had severely reduced its commercial vehicle visits (to around 25 per week), as a result of re-structuring its operations. Furthermore, six organisations based in relatively small sites (ranging from 100 m<sup>2</sup> to 350 m<sup>2</sup>) also had a reasonably large number of visits, due to the services / goods they were providing: the two florists, the chemist, office supplies shop, a restaurant / café, and communications service all had between 45 and 60 commercial vehicle visits per week, although one organisation had well over 100. Even the two department stores had a huge difference in their numbers of commercial vehicle visits per week: one department store had nearly three times the number of the other.

## **4.2 The effect of the corridor as a whole on demand / management of transport services**

There are several factors we considered in verifying aspect of our hypothesis as discussed below.

### 4.2.1 Density and effect on vehicle type

We found that the overall demand for transport services within a corridor is strongly affected by the density of organisations within the corridor itself: fewer businesses in an area generally mean fewer commercial vehicle visits in total. Eleven of 25 organisations interviewed in the secondary cities had 10 or fewer commercial vehicle visits compared with only two of 24 organisations interviewed in the heart corridors. Seven organisations (of 24) interviewed in the heart corridors had 40+ courier vehicle visits per week, compared with three of 25 in the other two corridors. Non-urgent courier vehicles delivered most, if not all (usually as part of a regularly scheduled visit to that site), of the stock to many businesses we interviewed.

It is not readily apparent to us why these differences occur: in terms of our sample, the mix of organisations (goods / services; ANZSIC classification; number of employees) is very similar in the two corridor types.

One possible explanation for the differences could be that, in secondary cities, floor-space and/or storage-space is not as constrained, as a result of which “just-in-time” replenishment is not strongly mandated. A related explanation is that since retail space is more expensive in Lambton Quay and Queen Street, stores in such corridors need to realise a considerably higher turnover per square metre to breakeven, which means faster stock turns – and more frequent replenishment in smaller quantities.

As noted earlier, the density of the “heart” corridors permits the use of foot / cycle couriers.

In addition, both the urgent and non-urgent courier companies noted that there is a significant difference between the two “main street” corridors (Lower Hutt and Takapuna) in terms of their far lesser demand for urgent couriers compared with Queen Street and Lambton Quay.

We found that the much of the increase in courier vehicle use can be attributed to two factors:

- General growth in the economy for the last several years), resulting in greater demand for goods and services (manifested, in part, through higher stock turnover)
- An increasing propensity for suppliers to “contract out” their delivery operations to private transport operators, primarily couriers, as being a more economical way of operating their business. Prior to this, many suppliers owned and operated their own vehicles to deliver goods to businesses.

Very few organisations suggested that they had changed their use of transport services over the past five years at least.

### 4.2.2 Physical characteristics of the corridor

While off-street or side street access, which occurs far more extensively in the Lower Hutt and Queen Street corridors than the other two corridors, makes access for commercial vehicles much easier, it is not clear that it changes the behaviour of organisations within the corridors in terms of their demand or management of transport services.

#### 4.2.3 Congestion

Concern about congestion and its effects was far more pronounced in the two Auckland corridors than in the Wellington ones. In the two “main street” corridors, most delivery problems were associated with a transport link external to their corridor: in the case of Takapuna, it is the Auckland Harbour Bridge, while for Central Lower Hutt, it is the stretch of state highway between Wellington City and Lower Hutt City.

In response to repeated delays in deliveries, two businesses had set up their own distribution centres and three had begun to do their own local deliveries, usually in a private vehicle.

According to the Wellington-based courier companies we spoke to, and the Auckland one profiled by Sankaran et al (2005), courier company responses to increasing delays are to decrease the size of the routes and/or establish new “hubs” as well as increase the number of courier vehicles operating, rather than to minimise traffic.

#### 4.2.4 Re-location

We found only one business that was re-locating due to transport-related issues, and that was because of a lack of free on-street parking near their worksite, rather than any service issue. While some respondents stated that they could comfortably re-locate out of their current corridor location, most felt that their current site was either important to the success of their business or that transport was not an issue significant enough to warrant change.

#### 4.2.5 Effect of possible transport-related policies on the corridor

Predictably, we received a hugely varied reaction to the policies investigated (pedestrianisation / restriction of commercial vehicle access; doubling transport costs, e.g. through a cordon charge, fuel costs, etc). A few businesses felt that they would be forced to close down in the face of significantly increased transport costs; others thought they could pass the costs on; while for others still, transport costs are not transparent (e.g. they are included in the “free delivery” of stock), so they did not have an immediate issue with the idea of transport cost increases.

A few respondents recommended further study of the pedestrianisation proposal, as they identified examples of where it had been tried, without success, and the streets were later converted back to “regular” streets. In Takapuna and Lower Hutt, there was a more pronounced concern with how pedestrianisation would affect their clientele who are used to parking directly outside the place they wish to visit. In Queen Street and Lambton Quay, there was greater concern about commercial vehicle access, particularly for couriers.

### **4.3 Factors affecting transport supply within a corridor**

It is important to note that our discussion about transport operators is limited to couriers, as we did not interview any other transport providers. We found that a variety of factors affect the supply of transport services within a corridor, including:

#### 4.3.1 Density and mix of organisations

Higher densities permit the use of non-motorised transport modes (hand deliveries by walking and cycle couriers).

While the corridors we studied all had a very similar mix of organisation types, it is worth noting that generally speaking service-oriented organisations differed from goods ones in terms of overall visit numbers and in use of couriers. The size of the organisation, in terms of staff numbers, also has an influence on transport use. It appears, too, that there is another factor affecting transport use, which we suggest might be business income or stock turnover rates.

#### 4.3.2 Service standards

Transport service operator standards vary according to traffic conditions. Both the urgent and non-urgent courier companies we interviewed identified different delivery timeframes used for Auckland and Wellington, reflecting the greater congestion in Auckland.

Operators also face stiff competition from other companies and will only reluctantly adjust their standards.

#### 4.3.3 Congestion

As indicated, there are different delivery /pick up timeframes operating between Auckland and Wellington. Some transport users noted that these were regularly not met, resulting in the need for them to begin to make their own deliveries to clients. This is true for two Takapuna businesses and one on Queen Street.

In order to continue to meet these timeframes, courier companies will adjust their routes, visitation rates, and courier vehicle numbers before even considering changing the service standard.

#### 4.3.4 Effect of possible transport-related policies

Given that couriers own their own vehicle and are independent contractors to the courier company, any transport cost increases or the implementation of pedestrianised areas will reduce their income and/or viability.

The courier company would have to consider changing service standards to match the increased travel time required in pedestrianised areas, for example by lengthening the delivery timeframe or by lessening the number of visits to the area each day. Given the predominance of couriers for delivery of stock, the companies may also have to negotiate with the businesses concerned to gain after-hours access to the site in order deliver the stock and to fit in with the street closures.

### 4.4 Implications for quantitative questionnaire and modelling

In terms of the systematic data collection required to more **quantitatively** express or model the LMCV movements in an urban corridor, we have the following observations:

1. Need to distinguish between commercial vehicle **trips** to the corridor, **stops** within the corridor (to service one or more clients), and **visits** to each client. We adopted the following typology:
  - **trips** are made to and from the corridor
  - **stops** refer to the number of times the vehicle actually stops in the corridor.
  - **visits** are to individual businesses within the corridor

The number of stops cannot exceed the number of visits. For example, on one trip to a corridor (after which the vehicle returns to its depot), a courier vehicle may be stopped outside of one high rise building and visit several clients within the building; then the vehicle may be moved and stopped again outside a different building while the driver visits several other clients within that building.

We were told that not only courier vehicles have these distinctive types of movements. Beverage and water delivery company vehicles often exhibit similar behaviour.

2. The **characteristics** of organisations in the corridor will have a distinctive influence on the volume of commercial vehicle trips and visits within the corridor. With further quantitative research, it may be possible to generate a classification of different businesses and their 'commercial vehicle attraction rate'.
3. Distinction between "goods" or "services" visits is likely to be difficult: courier visits may be either as a supplier (e.g. to deliver stock or to transfer stock between locations) or service (e.g. to pick up outgoing packages for clients of the business).
4. Similarly, distinguishing between "incoming" and "outgoing" goods trips or visits may be difficult for some businesses, as one such visit, say by a regularly scheduled courier, may result in the delivery of incoming item(s) and the pickup of outgoing item(s).
5. Distinguishing vehicle types involved in visits or trips to an organisation appears to be quite readily achieved.
6. There is a danger of under-estimating service-related visits, particularly for maintenance and repairs. Generally, we found that there were not a huge number of these on a weekly or even monthly basis, unless there was a significant reliance on technology.
7. In areas of intense land development (e.g. a lot of high rise buildings), some vehicle movements will not be counted by the tenants, as they are the responsibility of the building manager. In quantifying LMCV movements, it will be important to include building managers in any surveying.
8. Many respondents did not know the floor area and could not even approximate it. Collecting this information via a quantitative survey form may be misleading.
9. "Private" vehicles were not widely used among the 49 organisations we interviewed for either delivery of goods or services: 35 of these could not recall any private vehicle use when asked, while seven others indicated that such use was limited to five or fewer trips per week.
10. "Heavy commercial" vehicle visits were even less common than private vehicle movements: 45 of 49 respondents did not identify any HCV trips or visits to their organisation. This probably reflected the fact that where an organisation was located in a building that had a building manager, the organisation itself was often not responsible for its own rubbish and recycling collection, which will undoubtedly occur on a regular, even daily, basis *for the entire building*.
11. Exploratory / qualitative research may be useful to develop some understanding about shopping malls, as they may have very different delivery patterns given that greater centralised control and timetabling is possible.

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