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THE TRAVEL DEMAND MANAGEMENT PROGRAM FOR THE LONDON 2012 OLYMPIC GAMES – IMPACTS AND LESSONS

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THE TRAVEL DEMAND MANAGEMENT PROGRAM FOR THE LONDON 2012 OLYMPIC GAMES – IMPACTS AND LESSONS

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ABSTRACT

This paper summarises the findings of an independent review of the performance of the travel demand management program (TDM) implemented in London as part of the 2012 Summer Olympic Games. The games were one of the largest in history with over 20M additional trips expected in a city which is already considered to be extremely congested. It included a requirement to operate a large (109 mile) network of Olympic Lanes involving removing a lane of traffic exclusively for Olympic Family priority vehicles. The TDM program developed to manage this demand was the largest in history costing £30M. Combined with a large public transport development program it aimed to emphasise public transport use for visitors and to encourage reductions in base load travel to increase capacity for games related travel.

The London 2012 TDM program was highly effective. Around 20M (+30%) additional trips on public transport resulted while road travel reduced by 10%-30%. A weekday change in resident travel habits of 36% is reported including a 20% travel reduction and a 13% change in travel (retiming 6%, reroute 4% and remode 3%). Significantly the general reporting of travel during the games period is highly positive. The business travel data collated as part of this research generally corroborates these findings. A 30% employee attendance reduction is reported in employer sites and business surveys show a strong preference for commute trip reduction and retiming.

Keywords: Special Event Transport, Travel Demand Management, Olympic Transport, Public Transport, London

INTRODUCTION

The London 2012 Summer Olympic Games (SOG) was one of the largest in history and presented London with the biggest travel demand challenge ever experienced in a western world "mega city". Some 20M additional visitor trips were expected in a city which is already considered to be widely congested (Springett 2012). In addition a dedicated transport system for the Olympic Family (athletes, media and officials) of some 55,000 people (also the largest in history) required removal of some 109 miles of roadspace for the Olympic Route Network in some of the city's most congested locations (London 2012 2011; Springett 2012)

Research and practice demonstrates that Travel Demand Management is an essential requirement for managing travel demand challenges in congested cities facing increased travel demand of this scale (Currie and Delbosc 2011; Currie and Shalaby 2011). In congested high demand contexts TDM acts "to reduce the number of vehicles using the road system while providing a wide variety of mobility options to those who wish to travel" (Comsis Corporation 1994). In the Olympic context critical strategies involve influencing the mode and time of travel and in particular, acting to reduce 'base load' travel demand to enable greater capacity to cater for special event travel (Currie and Delbosc 2011). For the London 2012 Games there was a requirement to reduce the base load on both the road network and the public transport system.

For the London 2012 Olympic Games, the TDM program was the largest ever developed for a specific event. Costing some £30M (Sumner 2012) it included TDM planning for businesses representing over 611,000 employees, new web tools for trip planning of over 63M trips and some 107M travel advice emails.

The paper presents an independent review of the TDM program adopted for the 2012 Summer Olympic Games[1]. The paper outlines the official strategy adopted including a review of less widely acknowledged features of the 'big scare' and how this effect was manifest during London 2012. It then reviews the impacts demonstrated on the scale of travel in London using a synthesis of reports during the games, an assembly of available official statistics and a series of independent business monitoring studies undertaken by the researchers during the games.

The paper commences with a review of the Research Context, including a short review of the research literature on TDM and large special events, an outline of the London 2012 games and its TDM program and a discussion of 'the big scare' and how it is thought to have been apparent during the games. TDM impact data is then summarised including a summary of pre-games/games time reports, a summary of available official data and a summary of the impact of business surveys undertaken as part of the research. The paper concludes with a discussion of key lessons learned for futures games and for managing congestion in cities generally.

[1] The focus of this research is on the Olympic games rather than the Paralympics.

RESEARCH CONTEXT

Research Literature

The SOG lasts for only 16 days and hence does not require longer term land use based TDM measures however aspects of some of these are developed in 'legacy projects' projects developed for the games which have longer term benefits for the city (Kassens-Noor 2012). Major elements of the TDM programs for the games involve a range of measures including:

A. Travel capacity creation measures – to reduce demand using a wide range of measures such as timing major events at weekends or public holidays, car restrictions or employee vacation encouragement.
B. Travel behaviour change (or marketing) measures - that aim to reduce travel or change travel mode to a more efficient means, such as public transport or higher-occupancy vehicles. Travel warnings, advice and planning travel with business are examples of these.
C. Traffic efficiency measures – to improve traffic flow/delays such as adjusting traffic signal settings to maximise capacity and parking bans and tow truck use
D. Traffic bans – to remove or exclude traffic
E. Public transport emphasis measures – which aim to encourage higher-capacity and more efficient modes to carry large volumes of travellers such as rail transit.

(Currie and Delbosc 2011)

As Table 1 illustrates, in previous games, the travel behaviour change measures incorporated in these programs have proven highly successful in reducing 'base load' travel demand and thus acting to increase the available capacity to handle additional Olympic generated travel.

Table I – Summary of Estimated of Base Load Demand Reduction – Olympic Games

Location/Year	System Wide Impact
Beijing 2008	• Traffic volumes fell by 21% and average speed increased 27% • Total urban VKT dropped 32% & speed increase 25km/h to 37km/h
Athens 2004	• 30% reduction in traffic levels on main roads
Salt Lake City 2002	• Downtown traffic down 30% to 40% from normal levels
Sydney 2000	• Road traffic volumes reduced by 10%-20% of normal weekday levels • Sydney general traffic decreased by 20%; 15%-20% daily traffic reduction
Atlanta 1996	• Weekday total 24 h traffic counts decreased by 2.8%.
Barcelona 1992	• 15%–20% reduction in congestion
Los Angeles 1984	• 4% background reduction on highways

Source: (Currie and Delbosc 2011)

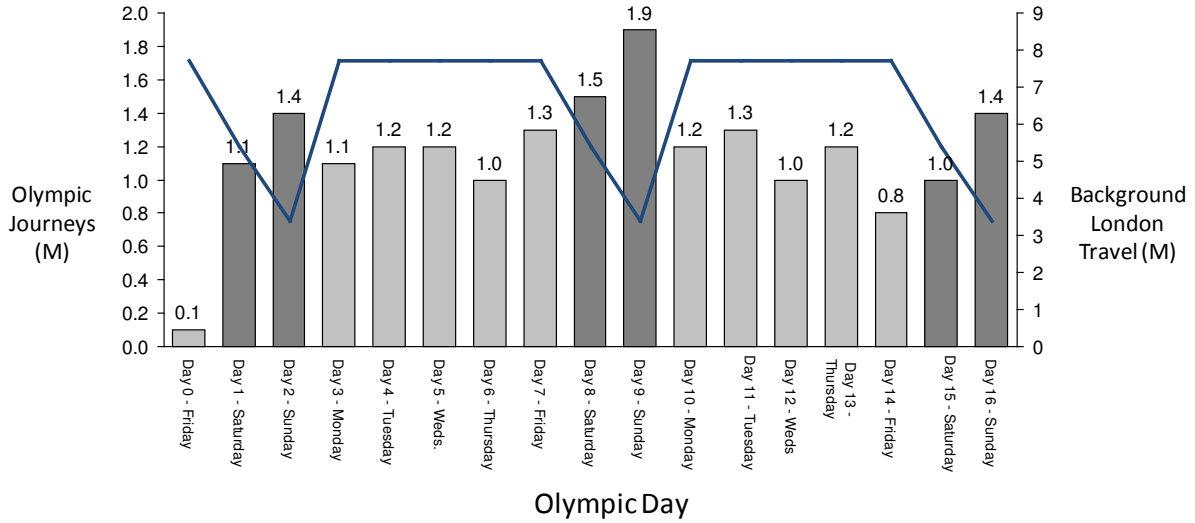
Overall this demonstrates that despite significant additional Olympics related travel, TDM programs in previous games have acted to reduce not increase road traffic levels. These have been particularly successful in the games held since 1996 with broad estimates of traffic reduction of between 20% and 30%.

London 2012 and the TDM Program

The London 2012 games was one of the largest in history by many measures:

- Some 7.4M ticket sales are quoted (Transport for London 2012a). This compares to 8.7M in Atlanta, 6.7M Sydney and 6.5M Beijing.
- The size of the Olympic Family for London 2012 has been quoted at 55,000 (Springett 2012) and also 77,000 (Bates et al. 2012). The next largest are 50,000 Beijing, 46,000 Athens and 39,500 Barcelona (Currie and Shalaby 2011).

Figure 1 shows the expected travel demand forecast by day of the games by London 2012 planners.



Note: Includes all trips on London Underground, Docklands Light Railway, Croydon Tramlink and London Buses within London . All National Rail trips within London as well as to and from London and the rest of the UK are included in the above background demand figures
Source: ODA/TfL Data Request

Figure 1 – Public Transport Demand – Background and Olympic Related – London 2012

Background public transport travel demand is typically broadly 7.7M per weekday falling to 3.4m on Sunday. Olympic related demands are highest on weekends where the larger events are deliberately scheduled to ensure transport capacity is available. Weekday Olympic travel was estimated at between 0.8 and 1.3M. The largest total expected demand is Day 7 and Day 11 with around 9M public transport trips including both background and Olympic demand. Overall during the Olympics some 20M additional public transport trips were expected in the modelling.

The TDM program associated with the games employed measures in each of the categories A to E (see above) however a considerable range of new and innovate approaches were also adopted. Figure 2 illustrates the measures adopted in both the overall transport strategy and the games TDM program in particular.

As with all games, expansion of urban public transport was a major part of the conventional transport plan. This included some £15B investment program, with strong legacy benefits,

on projects including the new Javelin high speed train, London Underground and Dockland Light Railway enhancements (Kershaw 2012)[2].

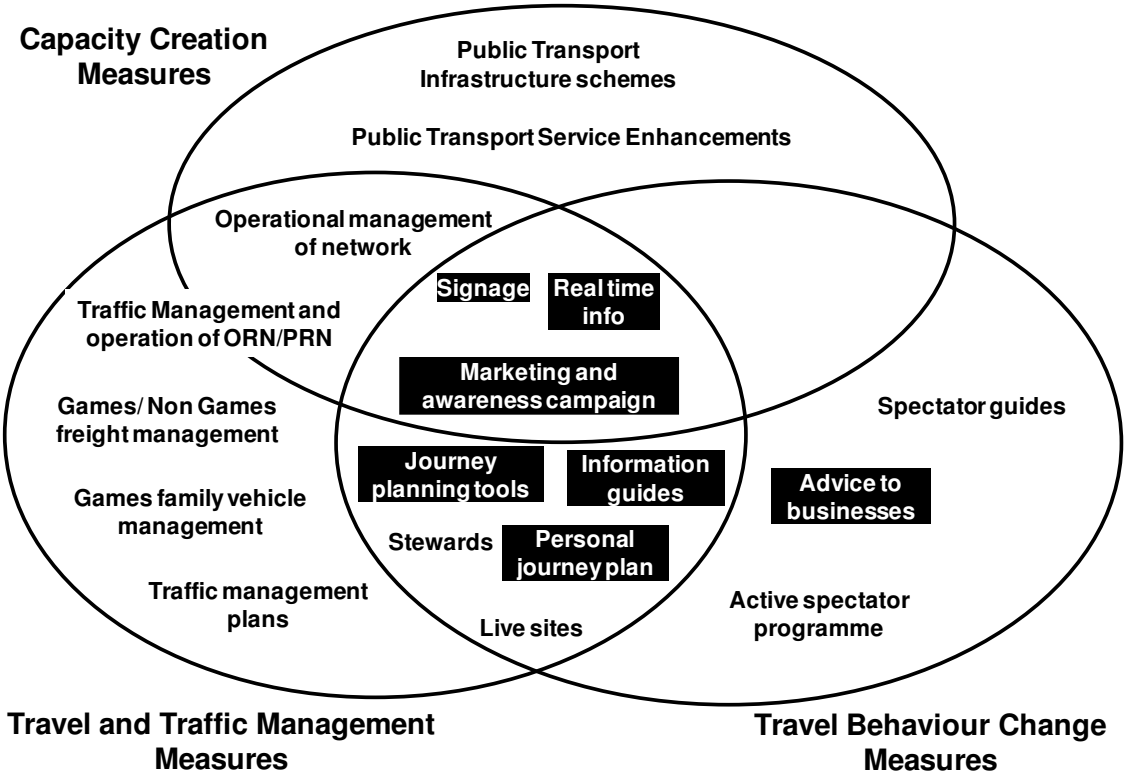


Figure 2 – Transport Strategy Measures Including TDM Measures (Highlighted) – London 2012

Note: Developed from ideas presented in Springett (2012)

Central to the TDM program was an innovative marketing and awareness campaign using advanced web tools and visualisation methods to explain predicted likely games congestion on a day by day basis and to communicate this to potential travellers. The 'Keep Ahead of the Games' website actively sought participation from residents to help them understand how the games would affect travel and encouraged changing behaviour "to reduce their overall need to travel or re-time, re-route or revise their mode of travel", (Springett 2012). Promotion using a range of media advertising reinforced this message assisted by widespread and intense media coverage with a consistent message that travel during the games were going to be very difficult.

One of the largest 'advice to business' campaigns was also undertaken as part of the games TDM program. This included widespread web based and post out advertising to businesses informing them about the games (42,000 packages of information were mailed to London businesses and over a million business newsletters were sent), numerous workshops and public presentations to business groups (21,786 businesses attended presentations) and a large program of individual travel planning activities for targeted

[2] Note: £6.5B investment is quoted for Transport for London for transport improvements Transport for London (2012a). London 2012 Games Transport - Performance, Funding and Legacy. London, UK, Transport for London,. A House of Commons review states that a long term £17B was allocated by ODA for the games Butcher, L. (2012). London Olympic 2012: transport. London, Uk, Library of the House of Commons, UK..

businesses. The latter covered larger businesses (representing 611,000 employees) Some 20,000 smaller and medium sized employers were visited by TDM representatives at games hotspots (Springett 2012).

The 'Big Scare' and London 2012

The 'Big Scare' refers to the process of constructively influencing travel behaviour choices by reinforcing natural apprehensions which local residents have about the 'chaos' which the games might create for travel and business (Currie 1998; Currie and Delbosc 2011). Figure 3 illustrates the concept.

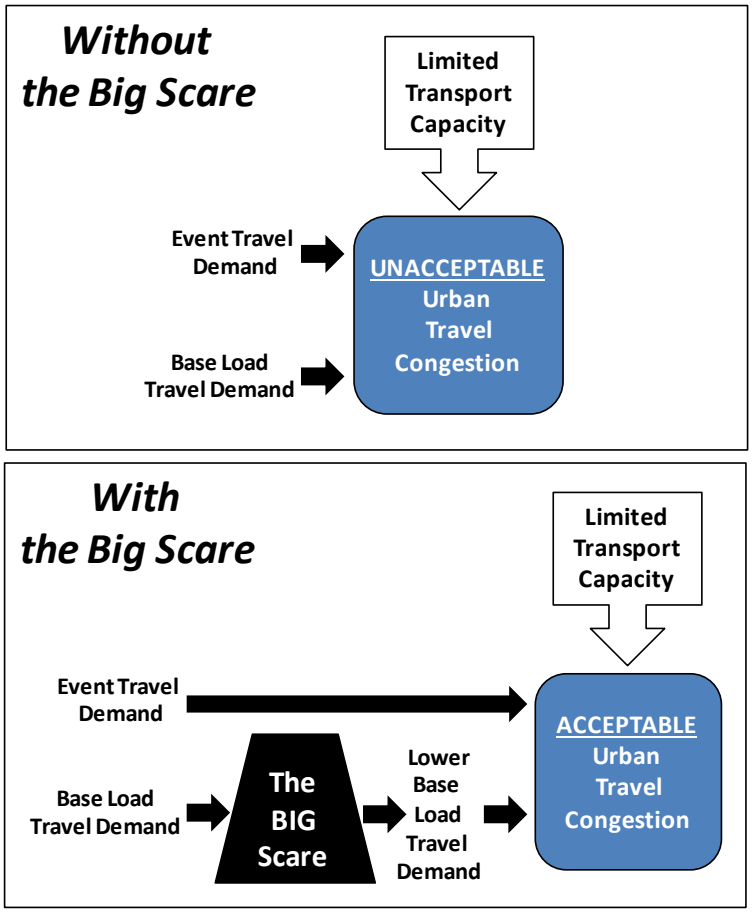


Figure 3 – Concept of the 'Big Scare' impact on Event Transport Congestion

The central outcome of the big scare is people avoiding travel in busy areas/time and even residents leaving the city to avoid problems. This results in acceptable or manageable levels of urban travel congestion. A significant part of the big scare is the role the media plays. The games is essentially a world media event, paid for/sponsored by major international media agencies. Pre-games a very large share of the worlds media is sent to host cities with the objective to identify stories to broadcast. Because the games are not running, it is common for the media to focus on planning and transport as news subjects. These stories tend to focus on negative issues because they are considered 'news worthy'. Typically they emphasise stories of expected 'chaos' in the pre-games period.

The London 2012 authorities were very aware of the 'big scare' concept in developing plans for the games however were understandably reluctant to acknowledge any pro-active approaches adopted to create and manage the 'big scare' effect. It is therefore impossible to understand exactly how, and even if, active 'big scare' tactics were employed. Discussion on these approaches thus involves a degree of conjecture. What is certain is that the TDM program actively promoted 'hot spots' of intensive expected congestion on both the road and public transport network and educated business and the public about the transport challenges which would be faced. Press alerts and media commentary by London 2012 authorities all actively reinforced these messages which were willingly passed on and emphasised by a media industry eager for stories to tell.

Interviews conducted with London businesses undertaken as part of this research identified parts of the TfL Business engagement program that could be regarded as contributing the "big scare'. Businesses reported considerable confusion as to the length of time that the road restrictions would be in place, with some referring to a possible 100 days of disruption. A representative of a wholesale trader in London stated ;

> "The fact that the roads are going to be restricted for 100 days, it would have a devastating effect. It will be a very very sad day if the outcome of the Olympics was to do something that two world wars could not do; close the market"

This confusion resulted in businesses actively contacting TfL for advice. If this misinformation was not intentional it had the effect of engaging business in TfL's TDM measures. Once the true length of restrictions were understood businesses became more compliant;

> 'When it [the ORN] was relaxed down to 2 days before and two days after the Olympics everyone breathed a sigh of relief , it is not a problem we can cope with it"
>
> (Manager Road Haulage company)

What is unclear is whether wider apprehensions about the impact of the games were actively managed. A central cause of public comment and anxiety pre-games was the uncertainty sounding the Olympic Route Network (ORN – reserving a road lane for use by Olympic Family vehicles). The network included 'Core Routes', 'Venue Specific', 'Training Specific' and 'Alternative' routes (London 2012 2011). There was a fair degree of variation in the timing of both what dates routes were operational and also what times of day they would be in operation. London 2012 was the first time that temporary variable message signing was used to indicate when routes were running and when they were not (see Figure 4). The outcome was a great deal of uncertainty about which roads would be available for general travel and if indeed travel was possible. Certainly pre-games, much media attention (see later) focussed on traffic congestion caused by traffic avoiding olympic lanes that were not yet closed to general traffic and the disruption road closures would cause. It is also true that highly media worthy protests by the on-road transport industry (mainly taxis) were in response to the ORN and its scale. It is also true that during the games only a small share of the ORN was actually in operation[3]. It is pure speculation to suggest this confusion was

[3] BBC report (8th August) a claim from Garrett Emerson, CEO of TfL Surface Transport that only 25% of Olympic Lanes were in operation. Other media support comments that much of the ORN was not needed due to lower than expected road travel demand. Post games TfL report an average games 60% availability of the ORN.

actively designed as part of a 'big scare' program. However it is certain that the confusion that resulted acted to increase anxiety and influenced travel demand to reduce road travel.

Variable messaging and variable rules for Olympic Route Network operations increased confusion about road travel – this almost certainly increased anxiety about travel by road during the games

How are motorists supposed to deal with this Olympic Lane Configuration? A bus lane (right) is not open for traffic use and the Olympic lane will also be closed at selected times. Does it imply the road is closed? This road received much media coverage and acted to increase anxiety about road travel more generally

Figure 4 – Confusing London Olympic Route Network Operations – Did this increase resident anxiety and was it a deliberate 'big scare' strategy?

TDM IMPACT

Pre-Games/Games Reporting

Table 3 presents a summary of major selected press/media reporting pre-games and during games time. Pre-games media was focussed around reporting of 'transport chaos'. The closure of the M4 due to unexpected roadworks was a highlight, resulting traffic congestion in central London and its reporting was common. There was also much reporting of confusion

amongst motorists regarding the opening times of Olympic Lanes. As shown in Figure 4, this reached national television media with live coverage of some resulting road delays. Very 'media worthy' protests were made by the London taxi industry regarding olympic lanes (Figure 5). These acted to enhance an already common view that 'chaos' is likely.

Live national Skye TV reports of traffic congestion caused by Olympic lanes despite these not not being open yet.

Taxi drivers close Tower Bridge in protest

TV News Broadcast

Figure 5 – Selected 'Chaos' Based Images from the Pre-Games Media

Pre-games reporting contrasts with a consistent message of generally very good transport system performance during the games. Day 3, the first commuting Monday of the games is full of media reports of good transport outcomes. Some commuters 'complain' of arriving to work too early and there is one 'tweet' from a commuter noting how quiet London is during the games and requesting "Can we host the Olympic Games more often please?". Indeed the reduction in activity proves alarming for business interests in London. From day 1 reports of below average visitation are made with a common 'mantra' of the media being the 'London Ghost Town' label. By the second working day of the games there are press reports that the ORN is being made available for wider use because traffic volumes are down (see later). Concerns by business interests on lack of trade are reported to result in removal of warning messages by the Mayor Boris Johnson on the public transport address systems about transport (however this is denied in reports by authorities. Transport advocacy groups give good 'report cards' about transport performance of authorities and transport. To quote the 'Independent' newspaper (28-08-2012) in its review of the games performance "the overriding story has been one of surprised Londoners and spectators finding their way around with remarkable ease".

Table 2 – Major Media Reports – Pre- Games and Games Time

Pre-Games		Games Time	
12-7	• M4 Road cracks closes Londons busiest road – opens after a week of closure	Day 0 27-07	• Olympic Transport to/from Opening Ceremony works well
13-07	• Rail union ballots members about a strike during the game	Day 1 Saturday	• Research Group Experian say customer footfall in central London shops down 10% sat
16-07	• M4 32 Mile tailbacks due to 'Games Lanes' opening today as a major accident also occurred – Highways agency says it was only a crash and delays were minor. TfL says traffic in London is 10% down. • Some 'games lanes' thought to be causing delays (A4) though not opened yet (fully operational by 25th). Drivers don't understand rules. • Reports of athlete buses (USA and Australia team) getting lost	Day 2 29-07 Sunday	• Londoners warned of big delays on first weekday/Monday – London bridge on Monday eve closed for many commuter trains e.g. Sussex train
		Day 3 30-07 Monday	• Many reports of PT working very smoothly; trains buses very quiet; tube/trains fantastic – some commuters complain they get to work too early • Tweet – "Is it just me or is public transport actually quieter than normal? Can we host the Olympic Games more often please" • Many Olympic lanes reopened to general traffic because of low Games Transport use; Officials say they are using PT
17-07	• Over 200 Taxi cabs block traffic to stage protest in Parliament Square about not being allowed to drive in Games Lanes. • Brent Transport Action Group calls on TfL to ensure needs of disabled people are catered for during the games		
		Day 4 31-07	• Experian figures on retail footfall (Monday/Tuesday – East London -9.6% West End -4.53%
18-07	• London bus workers accept an offer not to strike. Extra pay for Olympic work. • Opening ceremony to be shortened due to possible problems if it runs late • 13,000 traffic lights have been reprogrammed to increase traffic flow. Complaints in Wandsworth that this causing traffic queues.	Day 5 1-08 Weds	• "London Ghost Town" reports - Tourist trade/ retailers report lack of trade - Tour Operators Assoc. says visitors down 50% - major tourist venue visits down 30%-35% - • "the negative publicity around public transport has been very effective, but probably too effective" (Capital retailers) • Experian report store visits fell on last year Day 0 -10.4% Day 1 -11.6% • Mayor removes travel warning messages from tube trains • 1.5m workers stay at home to stop London seizing up
19-07	• Blown fuses and signalling problems near London Bridge delay rail into city from South. • East Midlands train drivers to stage 3 day strike during games (Aug 6-8th)		
20-07	• Reports resident 'getaway' begins – 482K leave Heathrow & 50K Channel Tunnel in next 2 days • Ramadan to cause chaos during games – 250K live around Olympic park where there are 100 mosques , 3K Olympians are Muslim – road congestion to result • Taxis and cyclists complain about not being to use Olympic (zil) lanes	Day 6 Thursday	• More stories of decline in visits/trade – Cabbie says trade -25% others -20-40%
		Day 7 3-08 Friday	• Transport busy but working; Javelin wait time queue of 30/60 mins reported • Reports of London Ghost Town – Trade associations claim tourist attractions -30% on last year Restaurants/cabs -40% • Roads unexpectedly roomy
23-07	• Faults causes tube DLR delays • Numerous traffic delays reported as work continues to put in Olympic lanes • Unions (RMT) say they will strike over lack of Olympic bonus	Day 8 4-08 Saturday	• Commuter Group 'Travelwatch' give capital transport operators 'vote of confidence' for games transport. "transport operators have excelled themselves" – many other positive transport working stories
24-07	• Opening ceremony rehearsal has many delays • Foreign athletes complain about long travel times on Olympic lanes to outlying venues • Long delays at St Pancras 6-7 min trip turns into 50 min on Javelin train.	Day 9 5-08 Sunday	• Week in review story says "Transport for London can take a bow" • More concerns on low trade in London; reports footfall -20% in West End • Reports of rush hour starting much earlier
25-07	• Confusion surrounds games lanes; people not using them but they are empty • Cable cars break down; travellers left sweltering (affects dozens i.e. not many) • Olympic road restrictions begin in full. Queues and delays reported around lanes. • Taxi drivers protest by filling Tower Bridge with taxis; driver leaps off into Thames as a protest	Day 10	• Few transport reports
		Day 11	• Many reports transport working well
		Day 12	• Many reports transport working well • Olympic athletes reported using public transport and not Olympic lanes
		Day 13	• General press reports highly positive on travel impacts
26-07	• Funeral directors say horse drawn hearses may protest Olympic lanes by travelling in them • Fed of small business says Olympic Lanes bad for business and ask for compensation	Day 14/15	• Positive Press reports, record highs in public transport usage claimed
		Day 16	• Independent review of all games outcomes including transport very positive

Official Monitoring Data

Table 3 presents a summary of reported transport outcomes during the games with specific reference to public transport ridership and road travel demand[4].

Table 3 – Reported Games Times Transport Outcomes – TfL

Day	Public Transport	Roads	Day	Public Transport	Roads
0		Traffic -15% on last year	10	More record Tube ridership reports	
2		Traffic -30% on last year			
3	Tube +7.5% DLR +65% 490K – record ridership		11	LUL carrys 4.5M trips; highest in history	
4	Tube +4%	Traffic -20% on last year	12	Emirates Air Line (cable car over the Thames) has taken 500K riders in its first 6 weeks since opening.	Only 25% of ORN is currently active Only 300 ORN fines issued in first 8 days; 98% compliance (congestion charge has 3,000 fines day)
5	Record LUL ridership 4.25M vs 3.7M last year (+15%)				
6	Record LUL ridership 4.31M vs 3.8M last year (+13%)		13	4.52M carried on LUL today same as record made Thursday	
7	LUL ridership 4.4M +20% higher than last year London Overground +27% on same week last year	Only 40% of games lanes in operation	14	Over first 12 days of games LUL carried 47M up 30% from 11.05M same period last year. Last Sunday Tube up 77% on last year (note earlier said it was 22%)	
8	Busiest Saturday ever – LUL 3.74M journeys up 11% on previous records achieved last weekend				
9	Sun Tube busiest weekend ever – 3.2 journeys up 22% on previous records		15	over first 13 days LUL carries 51.47M up 12.29M last year (+31.4%)	
			16	TfL says 60M LUL trips, up 30% on normal levels – DLR 6 M trips, up 100% - Overground 6M trips up 47%	

Note: Weekend Days are Shaded. Data from TfL press releases, back dated to days when ridership reports relate to LUL=London Underground Limited, TfL=Transport for London

The general picture presented in one of record high increases in public transport usage and a decline in road traffic demand. Overall (day 16), TfL reports London Underground travel is up 30% whilst the overground rail service is up 47%. Dockland Light Railway, a much smaller rail service than the others, carried double its usual number of passengers. Road traffic data is more patchy; reports are from earlier days in the games and suggest road traffic level decline of between 15% and 30%.

The post games reviews of transport performance quote the following final outcomes in terms of travel demand:

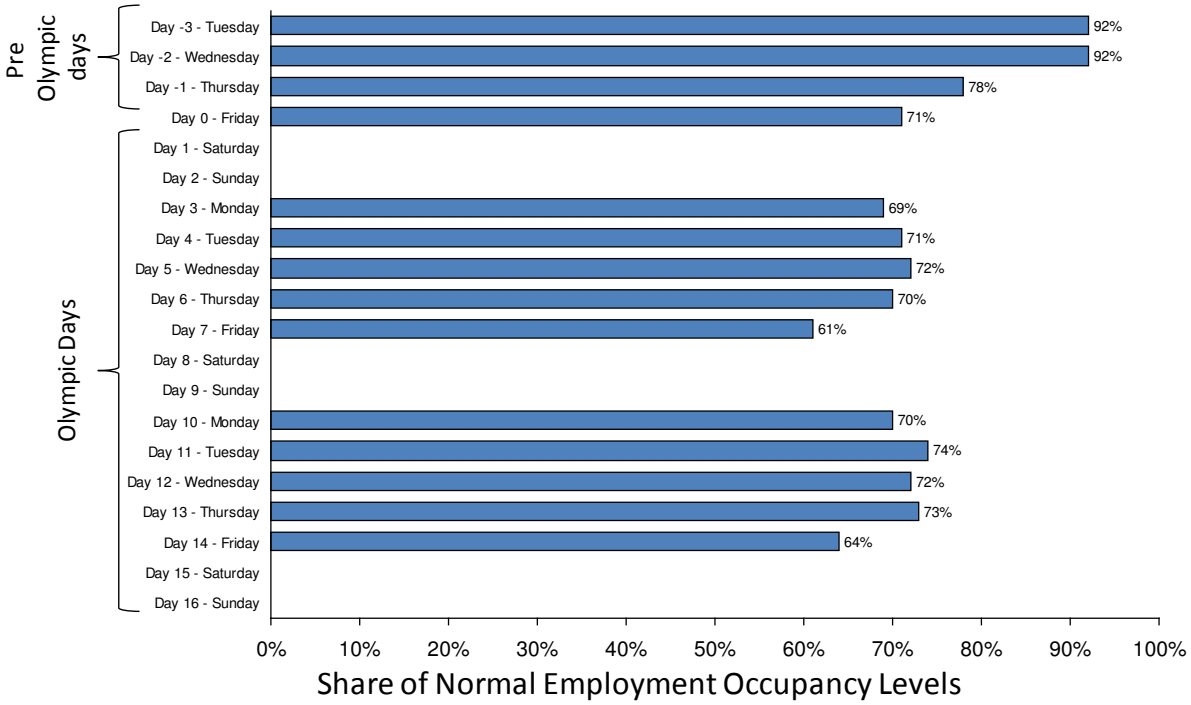
- Surveys undertaken during the games (The "Journey Maker" Surveys) established that:
  - 36% changed travel behaviour each weekday
  - 20% "reduced" travel and 13% changed travel. The latter included "retimed"; 6% "rerouted"; 4% and "re:mode" or changed mode; 3% (Transport for London 2012b)

- Tube journeys totalled 62M (up 35%), Rail overground totalled 6.4M journeys (up 26%), London Buses 92M and DLR 6.9M (up 100%).
- Central and Inner London Traffic flows were down 16.3% in the a.m. peak, 9.4% p.m. peak. Records for serious and severe traffic disruption were down 20%
- Games family vehicles are reported to have achieved an average 30% reduced travel time compared to normal day travel speeds
- An estimated 60% of Olympic Route Network roads remained open to all traffic during the games. (Transport for London 2012a)
- Regarding success factors TFL noted the following:

> *"One of the key reasons the transport network operated so smoothly during the London 2012 Games was that businesses and many Londoners followed the advice of TfL, London 2012 and transport partners to change the way they travelled during the Games, thereby avoiding the busiest times and places."*
>
> (Transport for London 2012b, p18)

Impact on Business Research

During 2012 the authors conducted a series of consultations with the London business community to explore their attitudes to the games. This included collation of data on staff attendance rates at major employment sites and a survey of both larger and smaller employers to understand plans and outcomes of the games on employee and customer access.



Note: Major office based employers – Canary Wharf Area
Source: Business Consultations

Figure 6 – Major Employment Site Attendance During the Games

Figure 6 illustrates office employee occupancy levels pre and during games time for major selected employers in the Canary Wharf area. Interestingly pre-games, occupancy levels were already 8-22% below normal weekday levels. During games time however, employee office site attendance was 27%-30% below normal levels. Discussions with the employers involved identified an active promotion of 'work at home' strategies, a policy of discouraging guest visits as well encouraging vacation during games time. These were consistent with the London 2012 TDM program of individual consultations which were adopted in all the sites concerned. Limited data on visitor numbers at employee sites was also available, however site visitors is a very small relative to employee occupancy. This show larger reductions during games time for site visitors (compared to the previous year). There were around the 80% range for Canary Wharf and around 30% for the City of London.

To examine the games impact on employment (commuter) travel and also travel of business customers, a series of web based travel surveys were undertaken as part of the research to establish pre-games intentions and post-games outcomes. The web based survey was promoted through a series of business associations. A major sampling aim was to cover smaller business and well as larger groups. Table 4 shows the resulting sample size based on the employee sizes of the businesses covered.

Table 4 – Pre-Post Games Business Impact Survey – Sampling

Business Size	Pre-Games	Post-Games	Total
Smaller (<250 employees)	153	257	410
Larger (250 employees and larger	11,998	1,125	13,123
Total	12,151	1,382	13,532

Note: based on mid range estimates of size of employees, these were sampled by category of size to ensure privacy of respondents. No employers were sampled both pre and post games.

Overall employers sampled represent some 13,500 employees mostly surveyed during the pre-games period.

Analysis establish little differences in pre-games and post games outcomes from the survey which explored:

- Approaches to learning about travel during the games
- Planning approaches, if any adopted
- How the games affected business activity
- Activities to plan for employee access
- Activities to plan for customer access
- Overall views of the games.

Analysis did however find some significant differences between responses in smaller and larger businesses.

Some 80% of business surveyed stated they had been contacted by games authorities and informed about the games. All of the larger enterprises said they had been contacted and

assisted in developing plans whilst only 57% of smaller enterprises believed that this was the case. Larger businesses also emphasised the use of business associations as a means of understanding how the games would impact on them. Some 78% of business overall said they had a formal plan for the games with no real difference as a result by business size.

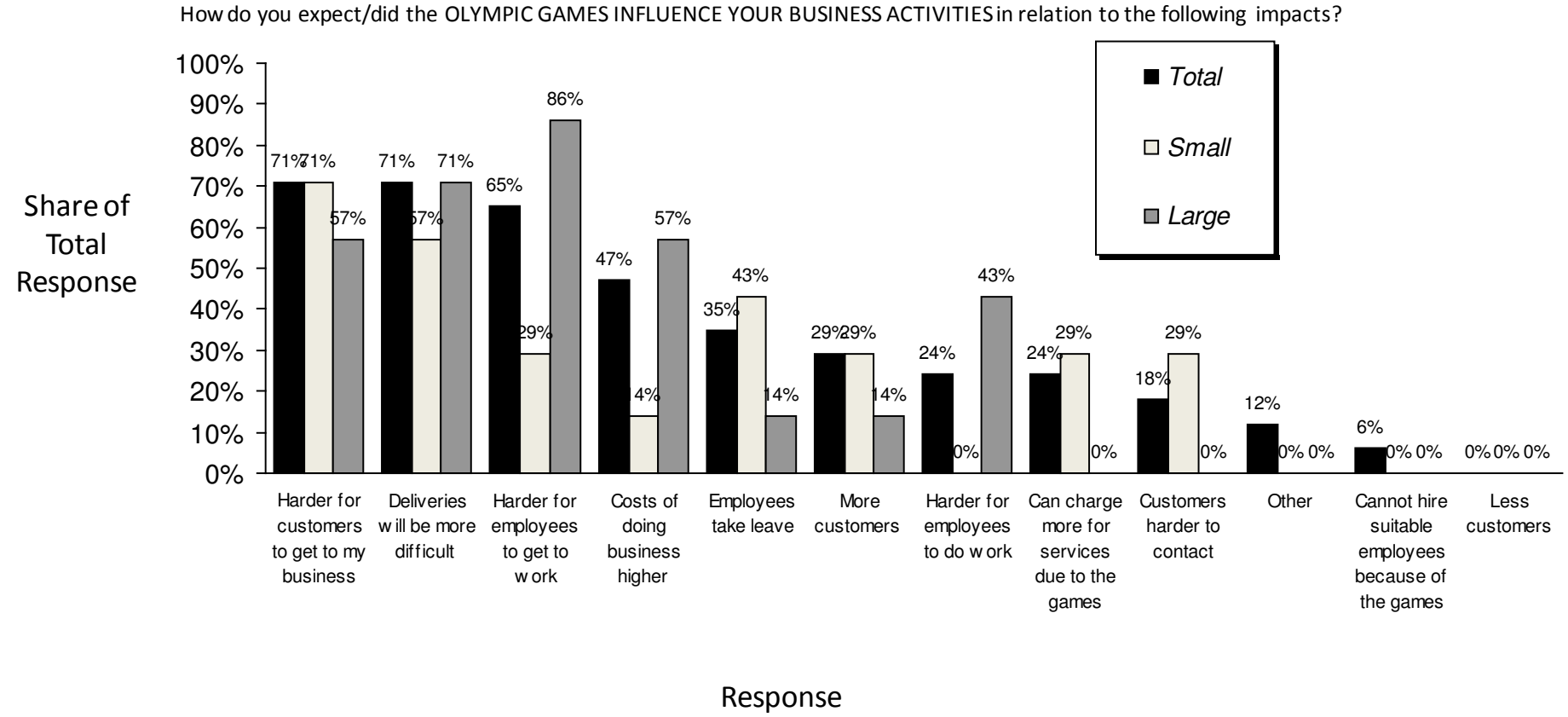
Figure 7 shows the response for how the games affected businesses. The largest overall concern of business was customer access and deliveries however, larger businesses were particularly concerned about employee access. Smaller businesses were more concerned than large businesses that employees taking leave could affect their business and also that customers might be harder to contact.

Overall some 41% of business surveyed believed/found business impacts of the games to be neutral, 29% thought it would be negative whilst 24% positive. Larger business considered impacts to be neutral whilst smaller businesses were more evenly divided (about a third said impacts would be positive, neutral or negative).

Figure 8 shows the activities undertaken to plan for employee access during the games. Retiming commute trips and working from home were the most common responses however smaller businesses did not tend to encourage employees to work from home. Larger businesses, who were more directly engaged by the travel planning teams as part of the TDM program, also tended to encourage trips by different modes, routes and also the retiming of deliveries. General reductions in business trips as part of work was also more common. Smaller businesses tended to ask staff to take leave compared to larger enterprises. They also encouraged the use of alternative modes of travel for business journeys and a share had actually closed down their business as a response to the impacts of th21111e games.

Figure 9 shows the activities undertaken by business in terms of managing customer access. On average, half of the businesses surveyed were not planning or did not undertake any activities to address concerns of customer access. Some 57% of larger business in particular did not have any plans for customer access. In general, smaller businesses undertook more activities to ensure customer access than larger businesses. Delaying customer access until post-games times and suggesting customers access their business by alternative modes of transport were common strategies for smaller businesses.

The survey also asked respondents if they thought the games were good for London. Some 86% agreed/strongly agreed (100% of larger business). Some smaller businesses didn't know. Asked if transport infrastructure for the games would have 'legacy' benefits, 38% said neither yes or no while 32% agreed and 23% disagreed. Smaller businesses were generally more neutral on the issue (50%) than larger business (29%).



Source: London Business Games Impact Surveys

Figure 7 – How will/did the games affect business activities

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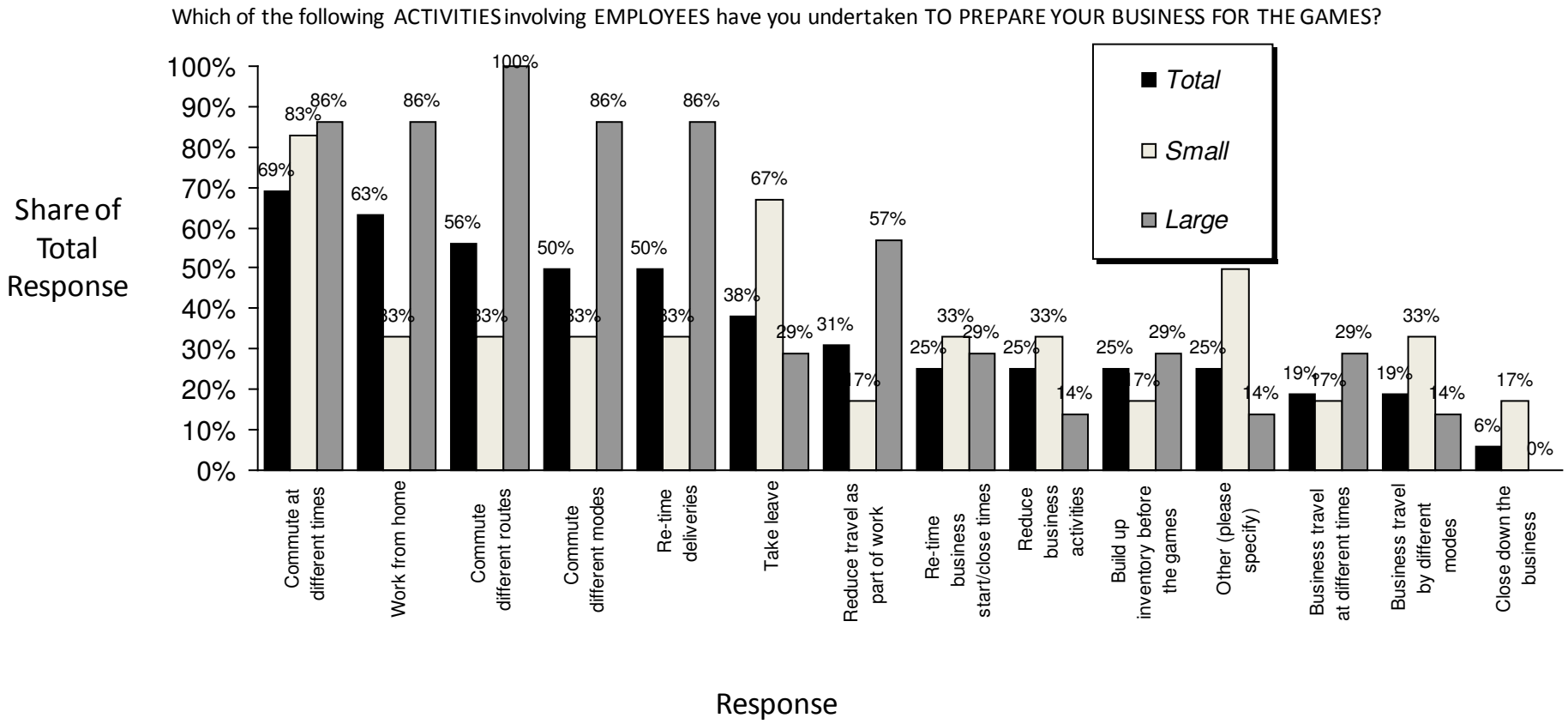
DISCUSSION AND CONCLUSIONS

The paper is an independent review of the TDM program adopted for the 2012 Summer Olympic Games. The expected size of games was very large with over 20M additional trips expected in a city which is already considered to be congested. In addition, as part of its contract with the International Olympic Committee to hold the games, London committed to operating a large (109 miles) network of Olympic Lanes, which involved removing a lane of traffic for Olympic Family priority vehicles. The TDM program developed to manage this demand was the largest in history and cost some £30M. Combined with a large public transport development program it aimed to emphasise public transport use for visitors to the Games and to encourage reductions in base load travel, both on the road and public transport network to increase capacity for games related travel.

Overall the available outcome data points to a highly successful TDM program. Games authority data is currently patchy but suggests around 20M (+30%) additional trips on public transport and reduced road travel in the 10%-30% range. The TDM team data suggest a weekday 36% change in resident travel habits including a 20% travel reduction and a 13% trips adjustment (6% retiming, 4% reroute and 3% remode). Significantly the general reporting of the games period is highly positive.

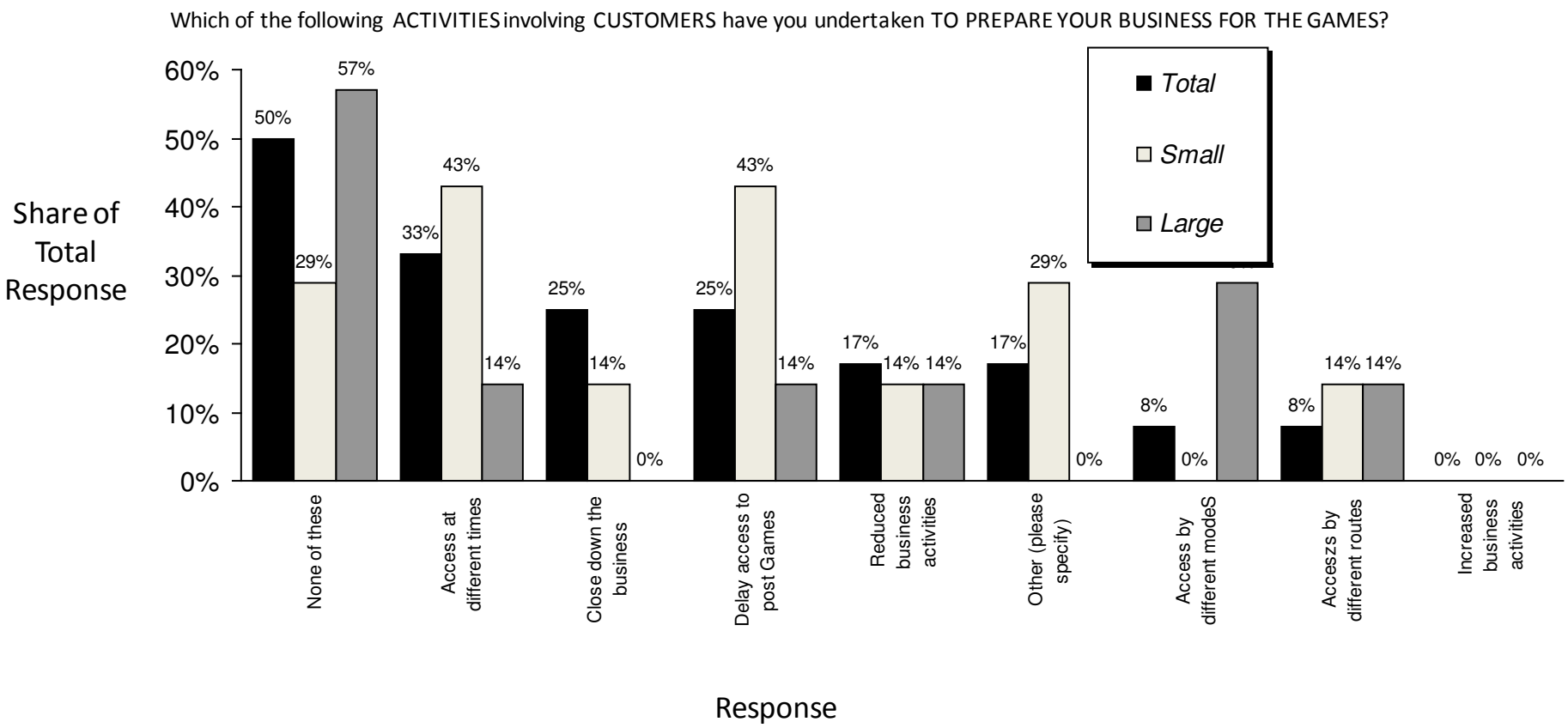
The business travel data collated as part of this research generally corroborates these findings however a 30% employee attendance reduction was found suggesting a higher impact on trip reduction for commuters. Overall the available data is consistent with the 20%-30% levels of trip reduction demonstrated in other recent games.

The major lesson learned from this research is that Travel Demand Management can be highly effective at reducing base load travel freeing up transport capacity to carry significant additional demands. This is an important lesson because it has implications for congested cities facing significant growth pressures as well as for host cities managing event travel for 16 days of the games. In the context of the £15B invested in transport infrastructure for the games, the £30M cost of the TDM program seems good value for money relative to its achievements. Certainly the designers and managers of the program have demonstrated considerable innovation (and flare) in the program. The use of transport modelling detailing the impact of TDM on reducing congestion to actively inform travellers decisions, including real time information, is likely to find its way into day to day travel in cities worldwide.



Source: London Business Games Impact Surveys

Figure 8 – Plans for Employee Access



Source: London Business Games Impact Surveys

Figure 9 – Plans for Customer Access

The scale and flexible management of the London 2012 Olympic Route Network was also an innovative, first ever used, feature of the 2012 games. This paper has questioned whether this might not have been a pro-active means of management of the 'big scare' effect. This is pure speculation and the truth of this may never be known. What is clear however is that its scale and the way it was managed acted to increase anxiety about road travel during the games and it most certainly acted to increase the 'big scare ' effect. So is this an appropriate innovation for future games travel? To some extent the use of Olympic lanes is now a mandatory part of a host city Olympic contract. It is the use of variable message signs enabling flexible use of the lanes which must be explored further. On balance it makes good sense for authorities to retain flexibility in managing an event with so many uncertainties. By operating a flexible policy, authorities retained an ability to maintain an effective Olympic Family transport system even if road travel demand was not reduced. The confusion generated by flexible use of the network may be seen as regrettable, in causing delays, but also as fortuitous, in reducing road travel by either encouraging travel by other modes or reducing total travel demand. Flexible use of lanes may also be seen as a means of matching user needs to the situations that develop. From this perspective it seems like retaining flexibility is important in matching needs to capacity and in retaining some resilience in transport system integrity in situations of uncertainty. There is however some scope to remove confusion by more clearly communicating Olympic Lane availability to users. More uniform commencement dates and uniform start and finish times may assist in this regard.

Are there any wider, non Olympic, lessons from the London 2012 experience for managing future congestion in international cities facing significant growth? The power of behaviour change as a tool to reduce travel demand seems particularly relevant. However can an effect demonstrated over 16 days be extended indefinitely? The answer to this is unclear. However the Olympic experience sets a benchmark for potential reductions which can be generated in travel. It also acts to demonstrate how pro-active planning can act to manage travel in cities The requirement for restrictions/reductions in road traffic, the benefits of spreading demand as a result of retiming public transport and increases in public transport travel in general should be a lesson for all congested cities facing urban growth into the future.

REFERENCES

Bates, I., C. Cuckson, N. Brownbridge and A. Thellmann (2012). Games Family Demand Modelling For London 2012 Olympic & Paralympic Games. European Transport Conference. Glasgow, UK.

Butcher, L. (2012). London Olympic 2012: transport. London, Uk, Library of the House of Commons, UK.

Comsis Corporation (1994). Overview of Travel Demand Management Measures, USAA DOT-T-($-11.

Currie, G. (1998). The planning and performance of mass transit operating strategies for major events - The Atlanta Olympic Games and the 1996 Melbourne Formula 1 Grand Prix. Australian Institute of Traffic Planning and Management (AITPM) Conference 1998. Melbourne.

Currie, G. and A. Delbosc (2011). "Assessing Travel Demand Management for the Summer Olympic Games." Transportation Research Record Journal of the Transportation Research Board Washington DC **2245**: pp 36-48.

Currie, G. and A. Shalaby (2011). "Synthesis of Transport Planning Approaches for the World's Largest Events." Transport Reviews **Volume 32, Issue 1, 2012** pp 113-136.

Kassens-Noor, E. (2012). Planning Olympic Legacies - Transport dreams and urban realities. Abingdon, Oxon and New York, Routledge.

Kershaw, S. (2012). "Delivering London 2012: Transport programme assurance." Proceedings of the Institution of Civil Engineers - Transport **Volume 165, Issue TR4**: pp 241-248.

London 2012 (2011). Preparing Your Business for the Games. L. Games. London, UK.

Springett, C. (2012). London 2012 Travel Demand Management European Transport Conference. Glasgow, UK.

Sumner, H. (2012). "Delivering London 2012:Transport legacy." Proceedings of the Institution of Civil Engineers - Transport **Volume 165, Issue TR4**: pp 267-275.

Transport for London (2012a). London 2012 Games Transport - Performance, Funding and Legacy. London, UK, Transport for London,.

Transport for London (2012b). Written submission to the London Assembly Transport Committees review of the Operation of London's transport system during the 2012 Games and the transport legacy. London, UK, The London Assembly - Transport Committee.

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