# BENEFITS OF MOBILE TELEPHONES FOR CONSTRUCTION CONTRACTORS IN THE UNITED KINGDOM

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Mobile telephones have been widely used for communication purposes over the last ten to fifteen years. The construction industry is increasingly using mobile telephones in the day to day execution of construction projects. To date, there is little information in the public domain about the contribution mobile telephones make to project performance. This paper presents findings from research undertaken to quantify the benefits of mobile telephones to construction contractors in the United Kingdom. The research employed a case study research strategy. The case was a large construction contractor (annual turnover in excess of £350m) whose portfolio of work was divided into four main sectors: utility services, highway services, rail services and infrastructure services. Data about mobile telephone call events were carefully collected from inside informants using a survey sheet. The data comprised of three dependent variables: duration of telephone call, cost implications and time implications; and two independent variables: sector and source/destination of call. The data were analysed following standard analysis of variance procedures. The results showed that even though there were variations from sector to sector and source/destination to source/destination, it could generally be said that mobile telephones were of great benefit to the construction contractor (for example the estimated cost saving associated with mobile telephones was over £4,000 per person per week). Although this study was based on one contractor, it is argued that the results provide a good insight into the benefits of mobile telephones for construction contractors in the United Kingdom.

Keywords: communication, contractor, mobile telephone, performance.

## **INTRODUCTION**

The UK has seen tremendous growth of the mobile telephone industry over the last ten to fifteen years leading to increased availability and use of portable mobile telephones in every day life. In 1995 there were 4.5 million mobile telephones in the United Kingdom; in 2000 this had increased to 25 million. With better network coverage, cheaper rental costs, advancing technology and better usability, the mobile telephone industry in 2005 had in the region of 50 million mobile telephones and 40,000 base stations in operation in the United Kingdom (NRPB 2004). The issuing of mobile telephones to employees in the construction industry has become common over the last few years and this has added another cost to the annual budget of every construction company.

The advancement of mobile telephone technology seems to have influenced changes in management styles too. Management styles have changed as reliability on the mobile telephone has affected some of the basic management skills that once involved better planning and more face-to-face communication between stakeholders.

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Increasingly less time is allowed for planning at the start of construction projects and decisions are being made reactively, for example, less thought is being put into material requirements as quantities can be easily changed by one phone call. Some have said that the mobile telephone has removed individual's power of decision making in that it is easier now to ring one's manager than thinking for oneself (personal communication, April 27, 2006).

In light of the above, it is worthwhile addressing the question: How does the use of the mobile telephones affect the implementation of a construction contract? Standard forms of construction contracts have provision for communications to be made for example the ICE Form of Contract Clause 2 (8) (a) requires written instructions to be given by the Engineer or anyone who has been given delegated duties (ICE 1999). Clause 2 (8) (b) (ICE 1999) allows for oral instructions to be given but demands that such oral instructions to be confirmed in writing as soon as possible. Increasingly, oral instructions are now made by mobile telephone to the contractor who in turn can immediately instruct the sub-contractor to carry out the required task. This process can take a matter of minutes from conception to action while no piece of paper has been exchanged between the contracted parties. This practice tends to go on day after day and the oral instruction is rarely confirmed in writing. This practice can cause extensive problems when the contractor claims for extra money, extension of time or something goes wrong with the new design as there is no paperwork in place as suggested by the contract. This also means that there are no contemporary records kept to refer to for back up information or when dissecting the contract at completion for lessons learnt for future use.

The extent to which mobile telephones are used in the construction industry can be illustrated by the information from the construction company used as a case study in this research. In the interest of anonymity, the company will be referred to as Construction Contractor A (CCA). CCA is a public limited company with an annual turnover in excess of £350m and an average profit margin of 3%. In July 2006, CCA employed 3,200 staff directly and had, in circulation, in the region of 3000 mobile telephones which accounted for an annual bill estimated at £1.2m per year (personal communication, July 24, 2006). This suggests that the company has to complete roughly £40 million worth of work to cover the cost of mobile telephones alone. This equates to about 11% of the company's overall turnover for the year.

## **Research problem**

Some of CCA's senior managers were adamant that the expenditure on mobile telephones in the organization had reached a critical level (personal communication, July 24, 2006). They were pretty sure too that CCA is not alone in this. They believed that many other organizations were facing similar issues. While there may be courses of action to reduce the bill, it was felt that any such reduction should not diminish the need to quantify the benefits that accrue from the use of mobile telephones. Therefore, at least as far as CCA was concerned, it was necessary to quantify the benefits in order to establish whether the cost of mobile telephones was justified. It was felt that this could be done by obtaining and analysing data about mobile telephone call events over a period of time. The main variables considered were: duration, cost implications, time implications, source/destination and company sector involved.

# **RESEARCH DESIGN**

Kervin (1992) provides an excellent framework within which research issues can be addressed. In this framework, research design involves selection of cases, variables and data sources. This framework was employed to develop a plan for gathering data. A summary of this exercise is provided in Tables 1, 2 and 3 below.

Aspect		Choice	Justification
Selection	Unit of	Event - the event was a	Event characteristics would provide data relating
of cases	analysis	telephone call made or	to things like: what the mobile telephones were
		received by the	being used for, to whom the calls were made and
		participants during the	duration of calls – all these were important
		study period.	variable that would enable the quantification of
			benefits to be made.
	Basic	Non-experimental	The nature of the research problem did not
	design		necessitate an experimental design;
			There were no manipulable independent
			variables; and
			There was no comparison group.
	Specific	Four sub-samples were	CCA's relevant business was divided into four
	design	drawn for the study.	sectors: Highway Services, Infrastructure
			Services, Rail Services and Utility Services. It
			was felt that it was worthwhile to design the
			research in such a way that any differences
		TT1 ( )	between the sectors would be identified.
		The study was cross-	I he nature of the problem did not necessitate a
	C		repeated-measure design.
	Sample	A sample was drawn.	The population of events (mobile telephone calls
	design		made/received during the construction project)
		The non-probability	It was not possible to draw a probability sample
		sample was drawn	It was not possible to traw a probability sample.
		A large sample, from	It was important that the sample was as
		diverse sectors and	n was important that the sample was as
		individuals within CCA	representative as possible
		was drawn	

 Table 1: Selection of cases

	Table	2:	Selection	of	variables
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Aspect	Choice	Justification
Selection of variables	Company sector	These are important features of the
	Source/destination	mobile telephone call events that would
	Reason	enable the researcher to quantify the
	Direction	benefits of mobile telephones for the
	Duration	construction contractor.
	Cost implication	
	Time implication	

Aspect	Choice	Justification
Selection of data sources	Inside informants – these were professionals in supervisory/managerial positions within the sectors of CCA who were involved in the day-to-day implementation of projects.	With the unit of analysis being the mobile telephone call event, the people best placed to provide the data about the events were those involved directly in the events.

Table 3: Selection of data sources

## DATA COLLECTION

As indicated in Table 3 above, data about mobile telephone call events were obtained from people who were involved in the calls. The data were collected during a period of three normal and convenient working weeks – each participant would log event details occurring in one complete workday.

Random samples of 25 supervisors/managers from each of the four sectors were drawn. Contact details (e-mail address and mobile telephone number) were obtained from CCA's internal directory. Each individual was assigned a day (Monday, Tuesday, Wednesday, Thursday or Friday) on which they were required to log all their mobile telephone call details. Each individual was asked to identify a convenient day over the three week period (i.e. if one was allocated a Monday, they could choose any one of the three Mondays and log details of mobile telephone calls on this chosen Monday, and so on). This procedure ensured that the resulting data set could be considered to cover the equivalent of a typical working week (Monday – Friday) with minimum inconvenience to the respondents. Because the time period was quite short compared to typical project durations, there was no staff movement (from project to project) which helped to obtain consistent data. At the end of this day-allocation exercise, there were 20 people (5 from each sector) expected to log call details on each day. Figure 1 below summarizes the results of the day-allocation exercise. Figure 1 shows that the targeted participants comprised of a wide variety of supervisory or management professions on a typical construction site.

Each of the targeted individuals was contacted, requested to participate in the survey and provided with the survey form and survey instructions. It was important that the participants were clear and confident that they knew exactly what information was required of them. In order to reach this level of understanding, a Survey Explanation Sheet (SES) was sent to each participant. The SES illustrated what information was appropriate and the type of information that would have been inappropriate or unwanted and unnecessary for the purposes of the research. All this communication occurred via e-mail. It was considered necessary to track the progress of the communication, so delivery and read receipts were requested when the e-mails were sent.

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24 25Foreman Contract ManagerThursday Friday49Agent Works ManagerThursday FridayRail ServicesInfrastructure ServicesNumberJob TitleSurvey DayNumberJob TitleSurvey Day51AgentMonday76Senior AgentMonday52AgentTuesday77Senior AgentTuesday53AgentWednesday78Framework ManagerWednesday54AgentThursday79Project ManagerThursday55AgentFriday80Senior EngineerFriday56General ForemanMonday81ManagerMonday57AgentTuesday82Project ManagerTuesday58General ForemanWednesday83Senior EngineerThursday59AgentTuursday84Project ManagerThursday60Contracts ManagerFriday85Project ManagerThursday61General ForemanMonday86Senior General ForemanMonday62AgentTuesday87Contracts ManagerTuesday63ManagerWednesday98Project ManagerThursday64General ForemanThursday99Sub-AgentMonday65Senior SupervisorFriday93Works ManagerWednesday66AgentMonday91Sub-AgentMonday67Site Manag	23	Senior Supervisor Senior General	Wednesday	48	Project Manager	Wednesday
25     Contract Manager     Friday     50     Works Manager     Friday       Rail Services     Infrastructure Services     Infrastructure Services       Number     Job Title     Survey Day     Number     Job Title     Survey Day       51     Agent     Monday     76     Senior Agent     Monday       52     Agent     Tuesday     77     Senior Agent     Tuesday       53     Agent     Tuesday     78     Framework Manager     Wednesday       54     Agent     Thursday     79     Project Manager     Truusday       55     Agent     Tuesday     80     Senior Engineer     Friday       56     General Foreman     Monday     81     Manager     Tuesday       58     General Foreman     Wednesday     83     Senior General Foreman     Wednesday       59     Agent     Tuesday     84     Project Manager     Thursday       61     General Foreman     Monday     86     Senior General Foreman     Monday       62     Agent     Tuesday     87     Contracts Manager     Tuesday       63     Manager     Tuesday     88     Foreman     Monday       64     General Foreman     Monday     90     Se	24	Foreman	Thursday	49	Agent	Thursday
IntrastructionNumberJob TitleSurvey DayNumberJob TitleSurvey DayS1AgentMonday76Senior AgentMondayS2AgentTuesday77Senior AgentMeedayS3AgentWednesday78Framework ManagerHuesdayS4AgentTurusday79Project ManagerThurusdayS5AgentFriday80Senior EngineerFridayS6General ForemanMonday81ManagerTuesdayS6General ForemanWednesday81ManagerTuesdayS6General ForemanWednesday84Project ManagerTuesdayS6General ForemanWednesday86Senior General ForemanWednesdayS6AgentTurusday86Senior General ForemanMondayS6General ForemanMonday86Senior General ForemanMondayS6AgentTuesday88ForemanMondayS6Senior SupervisorFriday90Senior General ForemanFindayS6Senior SupervisorFriday90Sub-AgentMondayS6Senior SupervisorFinday90Sub-AgentMondayS6Senior SupervisorFinday90Sub-AgentMondayS6Senior SupervisorFinday90Sub-AgentMondayS6Senior SupervisorFinday90Sub-	25	Contract Manager	Friday	50	Works Manager	Friday
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52AgentTuesday77Serior AgentTuesday53AgentWednesday78Framework ManagerWednesday54AgentThursday78Framework ManagerThursday55AgentFriday78Framework ManagerThursday56General ForemanMonday81ManagerMonday57AgentTuesday83Senior EngineerTuesday58General ForemanWednesday83Senior General ForemanWednesday59AgentTursday84Project ManagerTursday60Contracts ManagerFriday85Project ManagerFriday61General ForemanMonday86Senior General ForemanMonday62AgentTuesday86Senior General ForemanMonday63ManagerTuesday89Project ManagerTursday64General ForemanMonday89Senior General ForemanFinday65Senior SupervisorFirday90Senior General ForemanFinday66AgentMonday91Sub-AgentMonday67Site ManagerTuesday93Works ManagerWednesday68EngineerWednesday94AgentTursday69AgentTursday95Project ManagerTursday70ForemanFriday95Project ManagerTuesday71Senior Age		JOD TILLE	Survey Day	Number	JOD THE	Survey Day
53AgentWednesday78Framework ManagerWednesday54AgentThursday79Project ManagerThursday55AgentFriday79Project ManagerFriday56General ForemanMonday81ManagerMonday57AgentTuesday82Project ManagerTuesday58General ForemanWednesday83Senior General ForemanWednesday59AgentTursday84Project ManagerThursday60Contracts ManagerFriday85Project ManagerFriday61General ForemanMonday86Senior General ForemanMonday62AgentTuesday87Contracts ManagerTuesday63ManagerMursday88ForemanWednesday64General ForemanThursday90Senior General ForemanFriday65Senior SupervisorFriday91Sub-AgentMonday66AgentMonday91Sub-AgentMonday67Site ManagerTuusday93Works ManagerWednesday68EngineerWednesday93Works ManagerFriday70ForemanFiday96AgentMonday71Senior AgentMonday96AgentMonday72Senior AgentTuesday96AgentMonday73Senior AgentMonday96	51	Agent	Monday	76	Senior Agent	Monday
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55AgentFridayB0Senior EngineerFriday66General ForemanMondayB1ManagerMonday57AgentTuesdayB2Project ManagerTuesday58General ForemanWednesdayB3Senior General ForemanWednesday59AgentThursdayB4Project ManagerFriday60Contracts ManagerFridayB6Senior General ForemanMonday61General ForemanMondayB6Senior General ForemanMonday62AgentTuesdayB7Contracts ManagerFriday63ManagerTuesdayB8ForemanWednesday64General ForemanTursdayB9Project ManagerTuursday65Senior SupervisorFriday90Senior General ForemanHunday66AgentMonday91Sub-AgentMonday67Site ManagerTuesday93Works ManagerWednesday68EngineerWednesday94AgentTursday70ForemanFriday97SupervisorTuesday71Senior AgentTuesday97SupervisorTuesday72Senior AgentTuesday97SupervisorTuesday73Senior AgentTuesday97SupervisorTuesday74ManagerTuesday90Op ManagerMonday74ManagerTuesday	51 52 53	Agent Agent Agent	Survey Day Monday Tuesday Wednesday	76 77 78	Senior Agent Senior Agent Framework Manager	Monday Tuesday Wednesday
56     General Foreman     Monday     81     Manager     Monday       57     Agent     Tuesday     82     Project Manager     Tuesday       58     General Foreman     Wednesday     83     Senior General Foreman     Wednesday       59     Agent     Tuusday     84     Project Manager     Trusday       60     Contracts Manager     Friday     85     Project Manager     Friday       61     General Foreman     Monday     86     Senior General Foreman     Monday       62     Agent     Tuesday     86     Senior General Foreman     Monday       63     Manager     Wednesday     88     Foreman     Wednesday       64     General Foreman     Tursday     90     Senior General Foreman     Floady       65     Senior Supervisor     Friday     90     Senior General Foreman     Floady       66     Agent     Monday     91     Sub-Agent     Monday       67     Stei Manager     Tuesday     92     Project Manager     Tuesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       70     Foreman     Tursday     94     Agent     Turusday       71     Senior Agent <td>51 52 53 54</td> <td>Agent Agent Agent Agent Agent</td> <td>Survey Day Monday Tuesday Wednesday Thursday</td> <td>76 77 78 79</td> <td>Senior Agent Senior Agent Framework Manager Project Manager</td> <td>Monday Tuesday Wednesday Thursday</td>	51 52 53 54	Agent Agent Agent Agent Agent	Survey Day Monday Tuesday Wednesday Thursday	76 77 78 79	Senior Agent Senior Agent Framework Manager Project Manager	Monday Tuesday Wednesday Thursday
57AgentTuesday82Project ManagerTuesday58General ForemanWednesday83Senior General ForemanWednesday59AgentThursday84Project ManagerThursday60Contracts ManagerFriday85Project ManagerFriday61General ForemanMonday86Senior General ForemanMonday62AgentTuesday87Contracts ManagerTuesday63ManagerWednesday88ForemanWednesday64General ForemanThursday90Senior General ForemanFriday65Senior SupervisorFriday91Sub-AgentMonday66AgentMonday91Sub-AgentMonday67Site ManagerTuesday92Project ManagerWednesday68EngineerWednesday93Works ManagerWednesday69AgentThursday94AgentThursday71Senior AgentMonday96AgentMonday72Senior AgentWednesday93Contract Co-cordinatorTuesday73Senior AgentTuesday97SupervisorTuesday74ManagerTuesday99Ops ManagerTursday75Project EngineerFriday100Senior EngineerFriday	51 52 53 54 55	Agent Agent Agent Agent Agent	Suney Day Monday Tuesday Wednesday Thursday Friday	76 77 78 79 80	Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework	Monday Tuesday Wednesday Thursday Friday
58     General Foreman     Wednesday     83     Senior General Foreman     Wednesday       59     Agent     Thursday     84     Project Manager     Thursday       60     Contracts Manager     Friday     85     Project Manager     Friday       61     General Foreman     Monday     86     Senior General Foreman     Monday       62     Agent     Tuesday     87     Contracts Manager     Tuesday       63     Manager     Wednesday     88     Foreman     Wednesday       64     General Foreman     Thursday     90     Senior General Foreman     Finday       65     Senior Supervisor     Friday     91     Sub-Agent     Monday       66     Agent     Monday     91     Sub-Agent     Monday       67     Site Manager     Tuesday     93     Works Manager     Wednesday       68     Engineer     Wednesday     94     Agent     Thursday       69     Agent     Thursday     95     Project Manager     Fiday       70     Foreman     Fiday     94     Agent     Thursday       71     Senior Agent     Monday     95     Agent     Monday       72     Senior Agent     Monday	51 52 53 54 55 56	Agent Agent Agent Agent Agent Agent General Foreman	Survey Day Monday Tuesday Wednesday Thursday Friday Monday	76 77 78 79 80 81	Senior Agent Senior Agent Framework Manager Project Manager Area Framework Manager	Monday Tuesday Wednesday Thursday Friday Monday
59AgentThursday84Project ManagerThursday60Contracts ManagerFriday85Project ManagerFriday61General ForemanMonday86Senior General ForemanMonday62AgentTuesday87Contracts ManagerTuesday63ManagerWednesday88ForemanWednesday64General ForemanThursday89Project ManagerThursday65Senior SupervisorFriday90Senior General ForemanFriday66AgentMonday91Sub-AgentMonday67Sitie ManagerTuesday92Project ManagerTuesday68EngineerWednesday93Works ManagerWednesday68EngineerWednesday93Works ManagerWednesday68EngineerWednesday94AgentThursday69AgentThursday94AgentThursday70ForemanFriday96AgentMonday71Senior AgentMonday96AgentMonday72Senior AgentTuesday97SupervisorTuesday73Senior AgentWednesday98Contract Co-coordinatoWednesday74ManagerTuusday99Ops ManagerTursday75Project EngineerFriday100Senior EngineerFriday	51 52 53 54 55 56 57	Agent Agent Agent Agent Agent General Foreman Agent	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday	76 77 78 79 80 81 82	Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager	Monday Tuesday Wednesday Thursday Friday Monday Tuesday
60     Contracts Manager     Friday     85     Project Manager     Friday       61     General Foreman     Monday     86     Senior General Foreman     Monday       62     Agent     Tuesday     87     Contracts Manager     Tuesday       63     Manager     Wednesday     88     Foreman     Wednesday       64     General Foreman     Thursday     89     Project Manager     Thursday       65     Senior Supervisor     Friday     90     Senior General Foreman     Friday       66     Agent     Monday     91     Sub-Agent     Monday       67     Site Manager     Tuesday     92     Project Manager     Tuesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       68     Engineer     Wednesday     94     Agent     Thursday       69     Agent     Thursday     94     Agent     Thursday       70     Foreman     Friday     96     Agent     Monday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Wednesday     98     Contract Co-cordinator     Wednesday       73     Senior Agent     Tuesday <td< td=""><td>51 52 53 54 55 56 57 58</td><td>Agent Agent Agent Agent Agent General Foreman Agent General Foreman</td><td>Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday</td><td>76 77 78 79 80 81 82 83</td><td>Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman</td><td>Monday Tuesday W ednesday Thursday Friday Monday Tuesday W ednesday</td></td<>	51 52 53 54 55 56 57 58	Agent Agent Agent Agent Agent General Foreman Agent General Foreman	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday	76 77 78 79 80 81 82 83	Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman	Monday Tuesday W ednesday Thursday Friday Monday Tuesday W ednesday
61     General Foreman     Monday     86     Senior General Foreman     Monday       62     Agent     Tuesday     87     Contracts Manager     Tuesday       63     Manager     Wednesday     88     Foreman     Wednesday       64     General Foreman     Trusday     89     Project Manager     Thursday       65     Senior Supervisor     Firday     90     Senior General Foreman     Firday       66     Agent     Monday     91     Sub-Agent     Monday       67     Site Manager     Tuesday     93     Works Manager     Tuesday       68     Engineer     Wednesday     94     Agent     Trusday       70     Foreman     Firday     95     Project Manager     Firday       71     Senior Agent     Tuursday     95     Agent     Monday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-cordinator     Wednesday       74     Manager     Tuursday     99     Ops Manager     Tuesday       75     Project Engineer     Firday     100     Senior Engineer     Firday	51 52 53 54 55 56 57 58 59	Agent Agent Agent Agent Agent General Foreman Agent General Foreman Agent	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday	76 77 78 79 80 81 82 83 84	Soo nide Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday
62     Agent District Works     Tuesday     87     Contracts Manager     Tuesday       63     Manager     Wednesday     88     Foreman     Wednesday       64     General Foreman     Thursday     89     Project Manager     Tuesday       65     Senior Supervisor     Friday     90     Senior General Foreman     Friday       66     Agent     Monday     91     Sub-Agent     Monday       67     Srite Manager     Tuesday     92     Project Manager     Wednesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       68     Engineer     Wednesday     94     Agent     Thursday       68     Engineer     Wednesday     95     Project Manager     Friday       70     Foreman     Friday     96     Agent     Monday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Wednesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinato     Wednesday       74     Manager     Tuusday     99     Ops Manager     Tursday       75     Project Engineer     Friday <td>51 52 53 54 55 56 57 58 59 60</td> <td>Agent Agent Agent Agent General Foreman Agent General Foreman Agent Contracts Manager</td> <td>Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday</td> <td>76 77 79 80 81 82 83 84 85</td> <td>Sour inte Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager</td> <td>Monday Tuesday Wednesday Thursday Friday Monday Tuesday Thursday Thursday Friday</td>	51 52 53 54 55 56 57 58 59 60	Agent Agent Agent Agent General Foreman Agent General Foreman Agent Contracts Manager	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday	76 77 79 80 81 82 83 84 85	Sour inte Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Thursday Thursday Friday
Bis         Disk         Wednesday         88         Foreman         Wednesday           64         General Foreman         Thursday         89         Project Manager         Thursday           65         Senior Supervisor         Friday         90         Senior General Foreman         Friday           66         Agent         Monday         91         Sub-Agent         Monday           67         Srite Manager         Tuesday         92         Project Manager         Tuesday           68         Engineer         Wednesday         93         Works Manager         Wednesday           68         Engineer         Wednesday         94         Agent         Thursday           69         Agent         Thursday         94         Agent         Thursday           70         Foreman         Friday         96         Agent         Monday           71         Senior Agent         Monday         96         Agent         Monday           72         Senior Agent         Wednesday         97         Supervisor         Tuesday           73         Senior Agent         Wednesday         98         Contract Co-coordinator         Wednesday           Senior Project <td>51 52 53 54 55 56 57 58 59 60 61</td> <td>Agent Agent Agent Agent Agent General Foreman Agent General Foreman Agent Contracts Manager General Foreman</td> <td>Survey Day Monday Tuesday Wednesday Thursday Friday Monday Wednesday Thursday Friday Monday</td> <td>80 76 77 78 79 80 81 82 83 83 84 85 86</td> <td>Sob nite Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman</td> <td>Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday</td>	51 52 53 54 55 56 57 58 59 60 61	Agent Agent Agent Agent Agent General Foreman Agent General Foreman Agent Contracts Manager General Foreman	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Wednesday Thursday Friday Monday	80 76 77 78 79 80 81 82 83 83 84 85 86	Sob nite Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday
64     General Foreman     Thursday     89     Project Manager     Thursday       65     Senior Supervisor     Friday     90     Senior General Foreman     Friday       66     Agent     Monday     91     Sub-Agent     Monday       67     Site Manager     Tuesday     92     Project Manager     Tuesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       69     Agent     Thursday     94     Agent     Thursday       70     Foreman     Friday     95     Project Manager     Friday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62	Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent Dictrict Worke	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday	80 76 77 78 79 80 81 83 84 85 86 86 86 87	Sob nite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Project Manager Senior General Foreman Contracts Manager	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Friday Friday Monday Tuesday
65     Senior Supervisor     Friday     90     Senior General Foreman     Friday       66     Agent     Monday     91     Sub-Agent     Monday       67     Site Manager     Tuesday     92     Project Manager     Tuesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       69     Agent     Thursday     95     Project Manager     Friday       70     Foreman     Friday     96     Agent     Thursday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Monday     96     Agent     Monday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63	Job nite Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday Friday Monday Tuesday Wednesday Wednesday	81 82 83 84 85 86 87 88	Soo nide Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Project Manager Senior General Foreman Contracts Manager Foreman	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Friday Monday Thursday Friday Wednesday Wednesday
66         Agent         Monday         91         Sub-Agent         Monday           67         Site Manager         Tuesday         92         Project Manager         Tuesday           68         Engineer         Wednesday         93         Works Manager         Wednesday           68         Engineer         Wednesday         93         Works Manager         Wednesday           69         Agent         Thursday         94         Agent         Thursday           70         Foreman         Friday         95         Project Manager         Friday           71         Senior Agent         Monday         96         Agent         Monday           72         Senior Agent         Tuesday         97         Supervisor         Tuesday           73         Senior Agent         Wednesday         98         Contract Co-coordinator         Wednesday           74         Manager         Thursday         99         Ops Manager         Thursday           75         Project Engineer         Friday         100         Senior Engineer         Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64	Agent Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager Generan Foreman	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Friday Honday Tuesday Wednesday Useday Wednesday	76 77 79 80 81 82 83 84 85 86 87 88 86 87 88 89	Sou nite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager	Monday Tuesday Wednesday Friday Friday Wednesday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Tuesday
67     Site Manager Environmental     Tuesday     92     Project Manager     Tuesday       68     Engineer     Wednesday     93     Works Manager     Wednesday       69     Agent     Thursday     94     Agent     Thursday       70     Foreman     Friday     95     Project Manager     Friday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65	Job nite Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday	80 76 77 79 80 81 82 83 84 85 86 85 86 87 88 89 90	Sub rite Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman	Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Unesday Wednesday Thursday Friday
Environmental         Environmental         Filtering	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66	Job Inte Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman District Works Manager General Foreman Senior Supervisor Agent	Survey Day Monday Tuesday Wednesday Thursday Friday Wodnesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday	80 76 77 78 80 81 82 83 84 85 86 85 86 87 88 89 90 90	Sour inte Senior Agent Senior Agent Framework Manager Project Manager Area Framework Manager Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Contracts Manager Serior General Foreman Senior General Foreman Senior General Foreman Senior General Foreman	Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Monday
Foreman     Friday     94     Agent     Thursday       70     Foreman     Friday     95     Project Manager     Friday       71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67	Job Inte Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Stie Manager	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Thursday	80 76 77 78 79 80 81 82 83 84 85 86 86 87 88 88 89 90 91 91 92	Sou nite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Proiet Manager	Monday Tuesday Wednesday Friday Friday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Thursday Friday Monday Thursday
Top         Forman         Friday         SF         Project Manager         Friday           70         Foreman         Friday         95         Project Manager         Friday           71         Senior Agent         Monday         96         Agent         Monday           72         Senior Agent         Tuesday         97         Supervisor         Tuesday           73         Senior Agent         Wednesday         98         Contract Co-coordinator         Wednesday           74         Manager         Thursday         99         Ops Manager         Thursday           75         Project Engineer         Friday         100         Senior Engineer         Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68	Job Title Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Stenior Supervisor Agent Stin Manager Environmental Environmental	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Friday Monday Thursday Friday Wednesdav	80 76 77 78 79 80 81 83 84 85 86 87 88 88 89 90 91 91 92 93	Soo nide Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Project Manager Senior General Foreman Contracts Manager Foreman Froigent Manager Senior General Foreman Sub-Agent Project Manager Works Manager	Monday Tuesday Wednesday Friday Friday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Friday Monday Tuesday Wednesday
71     Senior Agent     Monday     96     Agent     Monday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69	Jub Inte Agent Agent Agent Agent General Foreman Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Ste Manager Environmental Environmental Environmental	Survey Day Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Tuesday Wednesday Thursday	88 89 90 81 82 83 84 85 86 87 88 89 90 91 92 93 92 93 94	Sub rite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Works Manager Monger Anent	Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Tuesday Wednesday Thursday
r 1     Senior Agent     Moliday     so     Agent     Molday       72     Senior Agent     Tuesday     97     Supervisor     Tuesday       73     Senior Agent     Wednesday     98     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70	Jub Inte Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Environmental Engineer Engineer Agent Everemon	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Wednesday Thursday Truesday Wednesday Thursday Friday Monday Thursday Friday Wednesday Wednesday Wednesday	80 76 77 78 79 80 81 82 83 84 85 86 87 88 86 87 88 90 91 92 93 94	Sou nice Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Works Manager Agent Project Manager	Monday Tuesday Wednesday Friday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Konday Tuesday
7.2         Series of Agent         Tuesday         97         Supervoir         Tuesday           73         Senior Agent         Wednesday         98         Contract Co-coordinator         Wednesday           74         Manager         Thursday         99         Ops Manager         Thursday           75         Project Engineer         Friday         100         Senior Engineer         Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71	Job Intel Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Site Manager Environmental Enviro	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Monday Tuesday	80 76 77 78 79 80 81 82 83 84 85 86 87 88 88 89 90 91 92 93 94 95 50 50	Sou nite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Project Manager Senior General Foreman Contracts Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Works Manager Agent Project Manager	Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday
r 5     Senior Project     99     Contract Co-coordinator     Wednesday       74     Manager     Thursday     99     Ops Manager     Thursday       75     Project Engineer     Friday     100     Senior Engineer     Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72	Job Inte Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Ste Manager Environmental Engineer Agent Foreman Senior Agent	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Friday Monday Thursday	88 89 90 91 92 93 94 95 96	Sub nite Senior Agent Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Project Manager Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Vortes Manager Vortes Manager Vortes Manager Project Manager Agent Project Manager Agent Project Manager Project	Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wodnesday Thursday Friday Wednesday Thursday Friday Monday Tuesday
r 4 manager Thursday 99 Ops Manager Thursday 75 Project Engineer Friday 100 Senior Engineer Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 20	Job Inte Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Stite Manager Environmental Engineer Agent Foreman Senior Agent Senior Agent Senior Agent	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday	80 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 91 92 93 94 95 96 97 70	Sub rite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Morks Manager Agent Project Manager Agent Super Manager Agent Super Manager Agent Super Manager Agent Super Manager	Monday Tuesday Wednesday Friday Friday Wednesday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday
15 Project Engineer Friday 100 Senior Engineer Friday	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74	Job Inte Agent Agent Agent Agent Agent General Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Stite Manager Environmental Engineer Agent Foreman Senior Agent Senior Agent Senior Agent Senior Agent Senior Agent Senior Agent	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Friday Monday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Thursday Friday Monday Tuesday Wednesday	80 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 91 92 93 94 95 93 94 95	Sou nice Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Senior General Foreman Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Morks Manager Agent Supervisor Contract Co-coordinator	Monday Tuesday Wednesday Friday Friday Wednesday Tuesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Tuesday Wednesday Thursday Friday Monday Tuesday Tuesday
	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75	Job Inte Agent Agent Agent Agent Agent Ceneral Foreman Agent Contracts Manager General Foreman Agent District Works Manager General Foreman Senior Supervisor Agent Site Manager Environmental Engineer Agent Foreman Senior Agent Senior Agent	Survey Day Monday Tuesday Wednesday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Konday Thursday Friday	76 77 78 79 80 81 82 83 84 85 86 87 88 88 89 90 91 92 93 94 95 96 97 99 99	Sub rite Senior Agent Framework Manager Project Manager Senior Engineer Area Framework Manager Project Manager Project Manager Project Manager Senior General Foreman Contracts Manager Foreman Project Manager Senior General Foreman Sub-Agent Project Manager Works Manager Agent Supervisor Contract Co-coordinator Ops Manager	Monday Tuesday Wednesday Friday Monday Tuesday Friday Wednesday Thursday Friday Monday Tuesday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Wednesday Thursday Friday Monday Tuesday

Figure 1: Results of day- allocation exercise

# DATA ANALYSIS

Of the original 100 respondents targeted, 74 returned their survey forms and all together 415 (200 in-coming and 215 out-going) telephone call events were recorded. Tables 4, 5, 6, 7, 8 and 9 below provide a summary of the data received.

Table 4: Data from the rail sector

Day	No. of respond-	No. of	No. of calls	Total Duration	So De	Source/ ( Destination*				Cost imp	olications	Time implications		
	ents	calls recd	made	of calls (mins)	1	2	3	4	5	Money saved (£)	Money lost (£)	Time saved (hrs)	Time lost (hrs)	
Mon	2	5	4	30	3	5			1	10000		38		
Tues	3	10	8	29	5	9	1	2	1		1500		9	
Wed	3	3	5	43	3	5				5500			18	
Thu	4	7	9	82	3	8		2	3					
Frid	3	3	4	54		4			3	200	1250		9	
Total	15	28	30	238	1 4	3 1	1	4	8	15700	2750	38	36	

												Time	
				Total	Source/Destination*		Cost implications		implications				
		Number	Number	Duration						Money	Money	Time	Time
	Number of	of calls	of calls	of calls						saved	lost	saved	lost
Day	respondents	received	Made	(minutes)	1	2	3	4	5	(£)	(£)	(hrs)	(hrs)
Mon	3	12	9	108	5	15			1	36500	7400		
Tues	4	17	29	211	18	20	7	1		18300	3000	45	11
Wed	5	16	15	198	7	18	3		3	133250	1680	132	27
Thu	5	11	18	118	4	19	1		5	45440	2519.2	181	9
Fri	3	11	4	61	5	6			4			12	9
Total	20	67	75	696	39	78	11	1	13	233490	14599	370	56

#### Table 5: Data from the utilities sector

#### **Table 6:** Data from the highways sector

										Cost		Time	
				Total	Sou	Source/Destination*			implicat	implications		implications	
		Number	Number	Duration						Money	Money	Time	Time
	Number of	of calls	of calls	of calls						saved	lost	saved	lost
Day	respondents	received	Made	(minutes)	1	2	3	4	5	(£)	(£)	(hrs)	(hrs)
Mon	5	11	14	113	7	8	3		7	3900		10	7
Tues	4	9	7	57	2	12	2			25000	2000		7
Wed	4	6	6	46	1	11				38000	200		5
Thu	3	6	3	25	5	4						18	
Fri	3	13	7	113.5	3	15			2	1275	400		2.75
Total	19	45	37	354.5	18	50	5	0	9	68175	2600	28	21.8

#### Table 7: Data from the infrastructure sector

												Time	
				Total	Source/Destination*			Cost imp	olications	implica	ations		
		Number	Number	Duration						Money	Money	Time	Time
	Number of	of calls	of calls	of calls						saved	lost	saved	lost
Day	respondents	received	Made	(minutes)	1	2	3	4	5	(£)	(£)	(hrs)	(hrs)
Mon	4	8	12	107	1	11	3		5	6000	1336	35	
Tues	5	21	29	253	5	33	4	4	4	31250	11244	293	10
Wed	4	11	16	165	7	10	9		1	58500	59100	132	261
Thu	4	13	11	132	2	16	1	1	4	32400		192	45
Fri	3	7	5	69	3	4	3		2		5000	127	45
Total	20	60	73	726	18	74	20	5	16	128150	76680	779	361

Total 20 60 73 726 18 74 20 5 16 128150 76680 779 \*1 = client; 2 = staff: head office, project office or subcontractors; 3 = supplier; 4 = designer; and 5 = other.

**Table 8:** Descriptive statistics (categorized by sector)

	Mean duration of calls	Mean of money saved (£)	Mean of money lost (£)	Mean of time saved	Mean of time lost (hours)
Sector	(minutes)			(hours)	
Rail (N=58)	4.10	270.69	47.41	0.66	0.62
Utilities (N=142)	4.90	1644.30	102.81	2.61	0.40
Highways (N=82)	4.32	831.40	31.71	0.34	0.27
Infrastructure (N=133)	5.46	963.53	576.54	5.86	2.71
Total (N=415)	4.85	1073.53	232.84	2.93	1.14

Source/destinati	Mean duration	Mean of money	Mean of	Mean of time	Mean of time
on of call	of calls(minutes)	saved (£)	money lost (£)	saved (hours)	lost (hours)
Client (N=89)	5.61	1297.47	201.12	2.88	1.00
Staff (N=233)	4.48	1074.85	84.90	2.56	1.31
Supplier (N=37)	4.32	1186.49	1533.24	3.00	0.81
Designer (N=10)	9.00	2900.00	0.00	3.20	4.50
Other (N=46)	4.82	145.65	48.20	4.70	0.13
Total (N=415)	4.85	1073.53	232.84	2.93	1.14

**Table 9:** Descriptive statistics (categorized by source/destination)

It was important to establish whether the data (for each variable) were parametric or non-parametric. On carrying out the standard normality test (Coleman and Pulford 2006; and Norusis 2005), it was established that the data were non-parametric. Therefore, any tests to determine whether there were differences between groups would have to be non-parametric tests (Coleman and Pulford 2006; and Kinnear and Gray 2006).

To determine if there were differences between the four sectors, a series of Kruskal Wallis tests (Coleman and Pulford 2006; and Kinnear and Gray 2006) were run. The results showed that there were no differences between the sectors as far as 'money saved', 'money lost' and 'time lost'. However there were differences between the sectors as far as 'duration of call' and 'time saved' were concerned. Using the Mann-Whitney U test (Coleman and Pulford 2006; and Kinnear and Gray 2006), it was established that the differences existed as follows:

- For 'duration of call', the pairs of sectors that were different were: rail and infrastructure; and highways and infrastructure.
- For 'time saved', the pairs of sectors that were different were: rail and infrastructure; and highways and infrastructure.

To determine if there were differences between the source/destination categories, a procedure similar to that described in the preceding paragraph was implemented. The results showed that there were no differences between the source/destination categories as far as 'duration of call', 'time saved' and 'time lost' were concerned. However, there were differences between the sectors as far as 'money saved' and 'money lost' were concerned. Using the Mann-Whitney U test (Coleman and Pulford 2006; and Kinnear and Gray 2006), it was established that the differences existed as follows:

- For 'money saved', the pairs of sectors that were different were: designer and staff; and designer and other.
- For 'money lost', the pairs of sectors that were different were: supplier and client and; and supplier and staff.

# DISCUSSION

## **Duration of calls**

The average duration across all sectors was 4.85 minutes. While calls to and from the rail, highways and utilities sectors had similar average durations, the duration of calls to and from the rail and highways sectors were significantly shorter than those to and from the infrastructure sector. From the authors' experience (Parcell 2006), the differences may be explained as follows. Rail, highways and utilities schemes involve intensive upfront planning which leads to a good state of readiness and minimizes the

need to communicate whilst on site. For example, the rail sector on the whole has very strict health and safety rules and strict procedures to be followed so there is a huge amount of pre-planning prior to even the smallest of jobs. There is generally very little a manager can do on the day of the job in the rail sector if something has not been planned properly unlike in the infrastructure sector where making a few phone calls can often get over issues and allow the work on site to continue. If a problem arises on a railway scheme, the work generally stops and requires preplanning for another day. Another possible explanation for the higher durations in the infrastructure sector may be obtained by scrutinizing the direction of the calls. The infrastructure sector has a higher ratio of calls to staff (which include subcontractors, head office, direct employees) and also to suppliers - this suggests that changes were being made while on site and this may have been necessary because of a lower level of planning.

When the duration of calls was analysed for differences between the five source/destination groups, no significant differences were identified. This suggests that calls to and from any of the source/destination categories have, generally, similar durations.

## **Cost implications**

As can be seen from Tables 4, 5, 6 and 7, cost implications were investigated in terms of 'money saved' and 'money lost'. Respondents were asked to provide an estimate of what they felt were consequences of each call in terms of money lost and/or money saved.

The average estimated amount of 'money saved' per call was £1073.65. When 'money saved' was analysed for differences between the four sectors, no significant differences were identified. This suggests that the estimated 'money saved' was independent of the sector - all sectors benefit equally from the use of mobile telephones. When 'money saved' was analysed for differences between the five source/destination groups, significant differences were identified between staff and other; and staff and designer. The difference can be explained as follows. The category for 'other' could include anyone other than the identified four categories such as a statutory undertaker like Transco for example. From the survey sheets, it was clear that savings tended to be from external participants like land owners for instance. The designer has far more control over the project than any external participant and therefore can make decisions that would make radical cost savings hence the results obtained. The data results also suggest higher cost savings from calls to and from the designer than from calls to and from staff. This difference can be explained as follows. The designer has far more control over the project with regards to cost saving, although the staff can make decisions on certain criteria, if it is a major change to the original design then the designer has the final say.

The average estimated amount of 'money lost' was  $\pm 232.84$ . When 'money lost' was analysed for differences between the four sectors, no significant differences were identified. This suggests that the estimated 'money lost' was independent of the sector – all sectors benefit equally from the use of mobile telephones. When 'money lost' was analysed for differences between the five source/destination groups, significant differences were identified between supplier and other, supplier and staff and supplier and client. This difference can be explained as follows. It can be seen from Table 9 above that the estimated money lost was far higher when the calls were to or from the supplier. The survey sheets showed that the majority of the calls were

to, rather than from, the supplier. It may therefore be that they were calls to cancel supplies (and because of rigid terms of sale could not achieve significant cost reductions) or enquire about delays in delivery (which would be confirmed and lead to productivity losses).

When the 'money lost' and 'money saved' are taken together, the average is a net average saving of  $\pounds$  (1073.65 – 232.84) =  $\pounds$  840.81. When this figure is used to compute the cost saving per respondent, it can be seen that the average net cost saving per respondent per week is:  $\pounds$  ((840.81 × 415)  $\div$ 74) =  $\pounds$ 4715.35 per respondent per week. It is the authors' contention that this figure shows the tremendous cost saving that mobile telephones provide to CCA.

## **Time implications**

As can be seen from Tables 4, 5, 6 and 7, time implications were investigated in terms of 'time saved' and 'time lost'. Respondents were asked to provide an estimate of what they felt were consequences of each call in terms of time lost and/or time saved.

The average 'time lost' was 1.14 hours. When 'time lost' was analysed for differences between the four sectors, no significant differences were identified. A similar result was obtained when the analysis was done for differences between the source/destination categories. This suggests that the estimated 'time lost' was independent of the sector and source/destination – all groups suffer equally from the use of mobile telephones.

The average 'time saved' was 2.93 hours. When 'time saved' was analysed for differences between the four sectors, no significant differences were identified. This suggests that the estimated 'time saved' was independent of the sector – all sectors benefit equally from the use of mobile telephones. When 'time saved' was analysed for differences between the four sectors, significant differences were identified between the rail sector and the infrastructure sector as well as between the highways sector and the infrastructure sector. The explanation for these differences is similar to that provided to explain difference in average durations among the sectors. The differences come about because of more emphasis on pre-planning works in the rail and highways sector with very little room to adjust programmes of work due to the licenses and approvals required as opposed to the infrastructure sector which is more flexible and therefore presents opportunities for saving time.

## CONCLUSIONS

The aim of this study was to try to quantify the benefits of mobile telephones in the construction industry. In the case study, it was established that the mobile telephone bill stands at £1.2m. The monetary saving was estimated at over £4000 per person per week. It only takes about 300 people to use mobile telephones over a period of one week (or its equivalent) on normal/typical construction projects to recoup the annual mobile telephone bill. Given the 3000 strong workforce of CCA with mobile telephones, this point of equilibrium is not difficult to achieve. In all probability, it will indeed be exceeded. Furthermore, mobile telephones provided a net time saving across all the telephone events considered. Therefore, for CCA, mobile telephones are of real benefit.

Although this work was undertaken using the case study of CCA, experience (Parcell 2006) suggests that similar issues are faced by other medium to large construction

contractors throughout the UK. The results can therefore, provide useful insight into the industry as a whole.

# LESSONS FOR CCA AND THE CONSTRUCTION INDUSTRY IN GENERAL

So what lessons should CCA and the rest of the construction industry learn from this piece of work? In the authors' opinion, this work has shown that mobile telephones provide significant benefits for CCA. The results suggest that, typically, mobile telephones provide cost savings of more than £4000 per person per week. Not withstanding any criticisms about the research design and methods used, this value can be taken as a good estimate of the net monetary benefit.

The data has also shown that in general the four sectors in which CCA's work is organized perform very similarly to one another. Therefore, for CCA; there should be no differences between the sectors when allocating the mobile telephone budget as equal benefit seems to be the case.

From the data and analysis results, advance planning seems to provide the greatest positive impact on both time and cost. It is therefore suggested that improving project planning will reduce the duration and cost of mobile telephone calls.

This research has shown that when mobile telephones are used for business calls only, they are of great benefit. This work does not take into account the possible use of mobile telephones for non-business communication. It may be worthwhile to spend some resources to monitor mobile telephone calls more closely as this could have a significant affect on the annual mobile telephone bill and increase the value of the mobile telephone.

# REFERENCES

Colman, A and Pulford, B (2006) *A crash course in SPSS for windows*. 3ed. Oxford: Blackwell Publishing.

- ICE (1999) ICE conditions of contract. 7ed. London: Thomas Telford.
- Kinnear, P R and Gray, C D (2006) SPSS 14 Made Simple. Hove: Psychology.
- Norusis, M J (2005) SPSS 13.0 guide to data analysis. Upper Saddle River: Prentice Hall.
- NRPB (2004) Mobile phones and health: 2004. Volume 15 No. 5. Didcot: NPRB.
- Parcell, K (2006) *Utility of mobile phones in the construction industry*, Unpublished MSc Thesis, Department of Civil Engineering, University of Portsmouth.