Customer-orientated Six Sigma in call centre performance measurement

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Abstract

Purpose – The aim of this paper is to explore the role of Six Sigma performance measurement at both strategic and operational levels within call centres where the definition of Six Sigma is widened to include systems thinking constructs.

Design/methodology/approach – A two-phase methodology is used involving two call centre cases within a call centre group. Phase 1 establishes the need for Six Sigma customer-based measures in addition to internal performance measures and phase 2 studies the implementation of this wider set of Six Sigma performance measures.

Findings – The development and application of Six Sigma performance measures that cover both strategic and operational performance measures lead to a more sustainable approach to business improvement, rather than traditional call centre internal performance measures which may be misleading for the overall performance of the call centre.

Research limitations/implications – The development of the strategic and operational, or double, DMAIC approach offers opportunities for developing wider applications in service contexts using customer-orientated performance measures.

Practical implications – If call centres rely solely on internal performance measures, a misleading picture of call centre performance may be obtained. There is a need to apply Six Sigma to cover both strategic and operational performance measures.

Originality/value – A combined strategic and operational approach to Six Sigma has been developed which enables service-based organisations (call centres) to develop sustainable business improvement.

Keywords Call centres, Six sigma, Performance measures, Strategic evaluation, Operations and production management, Business improvement

Paper type Research paper

Introduction

Call centres are often the first point-of-contact for customers and play a key role on whether customers decide to leave or stay with an organisation (Taylor *et al.*, 2003; Conz, 2007; Cleveland, 2007). However, Bellman (2007) indicates that almost 20 per cent of all

callers hang up with their issues unresolved. And of those, 68 per cent are at risk of defection. The operating of call centres are normally viewed as a cost to organisations (Conz, 2007), a key factor in organisations outsourcing to other lower wage countries or attempting to make more transactions electronic (Curry and Lyon, 2008). However, as shown by Harney and Jordan, 2008) these initiatives, although positioned as a way to improve customer experience, are mainly internally focussed, looking at cost and performance. The result of these measures being incorporated into scorecards as targets means that managers are now focussed on improving the output and discussing issues such as "how can abandoned calls numbers be reduced to 5 per cent?", rather than focussing on the input - "what are customers calling about and how well are their calls first time?". This focus has meant there is also an absence of leading performance measures to better position the call centres to react to and improve further the customer experience.

Call centres, although being service organisations, are data centric in that they record data on performance over long periods of time. The availability of such data along with the need for business improvement offers the possibility of applying business improvement methods that have been developed in other sectors. One such approach is that of Six Sigma where there is a reciprocal challenge first for call centres to avail of the full range of Six Sigma based improvement, and second, for Six Sigma to be adapted to address strategic and operational issues in a service based environment.

The aim of this paper is to explore the role of Six Sigma as a performance management system at both strategic and operational levels within call centres where the definition of Six Sigma is widened to include systems thinking constructs. This aim reflects the challenge facing call centres which is how to deliver an excellent customer experience while simultaneously reducing costs and by understanding the true demand from customers and determining call centres capability to deal with that demand, looking at improvement in a holistic way.

Call centre operations

The initial call centres were in-house operations in larger organisations (Koh *et al.*, 2005). The advantage of structuring in this way is that of a coherent department focused on telephone services. Moreover, there is the cost benefit of having more calls handled by fewer people (Hart *et al.*, 2005). However, there are problems with this approach as shown by Koh *et al.* (2005). First, it led to stretch targets by way of calls per hour. Second, it led to a high turnover in staff as people became demotivated by the pressurised atmosphere. The Contact Babel (2006) UK contact centre review points out that almost all studies over the previous four years have reported average staff attrition rates at between 15 per cent and 25 per cent. In 2006 the figure was 23 per cent which was the fourth annual increase in a row which results in increased costs of recruiting and training linked to the high staff turnover. Seddon (2001) found that resolution at the first point-of-contact in call centres varied but was never higher than 65 per cent and was as low as 21 per cent in financial service organisations. Gettys (2007) determined that a Lean Six Sigma expert carrying out basic process analysis at a financial services call centre found that: the majority of calls that could not be resolved on the first call required some research by the service representatives; the service representatives were primarily judged on whether they were available to answer, limiting the time they could devote to other issues, and customers whose inquiries were not answered within a few days would call back. This increased the call volume,

inflated the numbers of calls that could not be resolved on the first call, and led to multiple entries in the computer system for the same problem.

This focus on performance measures of quantity, how many calls and how quickly they are answered, has resulted in the majority of call centres failing to learn about the customer or to establish relations (Curry and Lyon, 2008; Hart *et al.*, 2005). Moreover, an emphasis on keeping call times as brief as possible could actually cause the agent, at best, to sound impersonal and unsympathetic to the customer. At worst the customers" enquiry will not be fully resolved (Seddon, 2001) leading to further calls and possible damage to the company's reputation with the customer. Nevertheless, this early approach to call centres generated very substantial efficiency and cost gains for companies (Taylor *et al.*, 2003).

From the early 1990s onwards Customer Relationship Management (CRM) has become synonymous with call centre operations. The integration of information telephony systems, designed to provide advisors with information they need to service the customer, has led many call centres organisations to apply CRM. However, Seddon (2005) states that call centres are still designed in much the same way as the mass-production manufacturing factories over the last century with a history of worker alienation, high staff turnover and low morale with the decision making being separated from the work, the last point having it's roots within Taylor's scientific management principles first published in 1911 (Curry and Lyon, 2008).

Technology has come a long way within call centres over the last 20 years. From telephony switch boards manned by people with separate IT systems, to today's environment where Telephony, IT delivery systems and reporting suites are fully integrated giving the call centre a complete view of the customers journey through these systems. Bellman (2007) points out there are many and varied tools that organisations can utilise:

> This diverse toolkit includes interactive voice response (IVR), knowledge management systems, agent scripting, presence and instant messaging, real-time speech analytics, and training and policy.

Difficulties arise when this technology has been designed to meet internal operational performance measures without fully understanding the customer needs and/or the support functions needed (Bellman, 2007). Curry and Lyon (2008) and Koh *et al.* (2005) determine that call centres face the challenges of providing an outstanding customer experience while at the same time improving productivity.

Six Sigma in services and call centres

From a sectoral standpoint the Six Sigma literature is predominantly manufacturing based, with mass manufacturing being the basis for most studies (e.g. McAdam and Lafferty, 2004). However, there is evidence in both the academic and practitioner literatures that Six Sigma developments and applications in other organisational sectors and functions are growing rapidly (e.g. Antony *et al.*, 2008; Chakrabarty and Tan, 2007), which is an indication that the Six Sigma discourse is deepening (de de Koning and de Mast, 2006; McAdam and Lafferty, 2004). However, there is a need for further research to support the descriptive based claims in service sector studies (Proudlove *et al.*, 2008; McAdam and Lafferty, 2004) and the more involved and complex people interactions as opposed to machine dominance (Sehwail and DeYong, 2003). Antony *et al.* (2008) and

Chakrabarty and Tan's (2007) review of Six Sigma applications in services concludes that the development is slow but increasing in terms of structure and more in-depth applications and that more research in this area is needed.

A key development of service based Six Sigma is in the data centric service organisations involving long run data streams. These applications are found mainly in the healthcare sector, both public and private due to Government emphasis on health sector reform; (see for example, Peltokorpi and Kujala, 2006 – hip replacements; Morgan and Cooper, 2004 – Rehab; Revere and Black, 2003 – patient care). These top down agent based applications of Six Sigma focus on the operational methodology of Six Sigma rather than wider strategic interpretations. Hence, there is an emphasis on applying the key methodology within Six Sigma, namely Define, Measure, Analyse, Implement, Control (DMAIC) and the key success factors that need to be addressed to implement DMAIC in specific service based contexts (Antony *et al.*, 2008).

This emphasis on translating Six Sigma methodology from mass manufacturing to that of a service based context with attendant consideration of contextual key success factors reflects a tendency in quality and operations literature to apply business improvement approaches across sectors at a methodological level without considering the wider strategic assumptions and implications that lie behind such approaches (de Koning and Mast, 2006). It is therefore suggested that an inquiry into Six Sigma in service based organisations, and call centres in particular, should cover both strategic and operational aspects of Six Sigma, which will expose an organisation to the full range and depth of the Six Sigma philosophy, rather than using limited applications at lower operational levels.

The need for strategic and operational developments of Six Sigma is stressed by Nonthaleerak and Hendry (2008) who critique the DMAIC formula based on a multiple case analysis ($n = 9$). Their study suggests that the Define and Control steps within operational applications of Six Sigma have limitations in that the Define step and its associated criteria for selecting Six Sigma projects may focus on lower level problems as opposed to strategic customer based opportunities. Similarly, the Control step may fail to create strategically sustainable gains in strategic projects due to their cross functional nature which precludes attribution of ownership. Similarly, Friday-Stroud and Butterfield (2007) suggest the need to incorporate strategy and decision making constructs to develop a more robust or expanded DMAIC.

In attempting to address these issues and devise a framework for Six Sigma within call centres a systems thinking approach has been used to integrate both strategic and operational levels of Six Sigma. Seddon (2001) proposes a six stage approach called the Vanguard Model when applying systems thinking in service organisations. This model addresses the wider and more strategic issues within an organisation when attempting to apply new knowledge, namely Six Sigma in the current study. Amelsberg (2002) suggests that systems thinking concepts can be used to integrate strategic and operational aspects of Six Sigma by using a double DMAIC approach. The first DMAIC is used at a strategic level and is an interpretation of DMAIC from a strategic systems perspective. The resultant outcomes are then used to start the second or operational level DMAIC. Table I illustrates how the strategic level DMAIC can be interpreted using systems thinking concepts (key stages in the Vanguard model) (columns 1 and 2) leading to the operational DMAIC (column 3). Friday-Stroud and Sutterfield (2007) have used a similar approach in suggesting steps in strategic

Strategic level Six Sigma service issues	Systems thinking issues	Operational level Six Sigma methodology
Define: key strategic objectives to achieve breakthrough improvements	Purpose: What is the purpose of the call centre service from the customer's perspective rather than from an internal cost or functional view?	Define – define Six Sigma projects consistent with the strategic objectives
Measure: the entire business systems that support the strategic objectives	Identify what the true nature of demand is from the customer's external perspective, not from the call centres internal view	Measure – measure performance of the Six Sigma projects at an operational level
Analyse: determine gaps in the systems performance measures and benchmarks	Measuring the call centre's capability to deal with this demand at the first point-of-contact for the customer and what are the barriers that prohibit first contact resolution	Analyse – analyse project performance in relation to operational goals
Improve: focus on improving systems elements to achieve customer performance goals	Flow: map the flow of the work as an end-to-end process based on customer demand	Improve – improve the key service through internal performance measures
	Value: understand how the value sought by the customer will help the call centre in designing to increase its capability to meet this demand and identify new offerings and opportunities	
	Waste: identifying how much waste is in the system and more importantly how it flows through the system, to enable the call centre to increase value for the customer	
Control: characteristics that are critical to value and standardise and integrate with the call centres strategic plans	Focuses on identifying what "systems conditions" impede meeting the customer's demand, challenging "command and control" thinking, and embedding a strategic Six Sigma philosophy as the corner-stone for achieving organisational excellence	Control: establish sustainability of improvements in operational processes and measures with continuous improvement

Table I.
Strategic and operational DMAIC

management a precursor to applying DMAIC at an operational level. However, the systems thinking approach, as adopted in Table I, has advantages in that rather than simply translating strategy to operational level DMAIC, it uses Six Sigma concepts at a strategic level which is then integrated with Six Sigma at operational level. This approach recognises Six Sigma as a business improvement philosophy at both strategic and operational levels within an organisation.

This strategic and operational approach to Six Sigma, using systems thinking concepts, challenges service organisations such as call centres to both deliver customer requirements and reduce operating costs (Amelsberg, 2002). It questions the sole use of internal performance measures and targets that managers use to drive and assess performance in call centres. Hence, there is a need to integrate strategic and operational level decision making and measurement in the approach to Six Sigma as shown in Table I.

Research questions and methodology

The research issues arising from the aims of the study and the literature discussion were expressed as "how and "what" type research questions as suggested by Yin (2003):

RQ1. How can Six Sigma be used to improve call centre performance at both strategic and operational levels through the identification of both customer and internal measures?

RQ2. In what way can the Six Sigma DMAIC methodology be applied to cover both strategic and operational improvement in call centres; especially in regard to the Define and Control steps?

Both Yin (2003) and Eisenhardt (1989) suggest that an interpretative research stance is more appropriate to these types of research questions to enable in-depth inquiry. Eisenhardt (1989) shows that reflection and comparison with existing theory or external comparisons can help in bringing objectivity to the process (i.e. Phase 1). Multiple sources of data are embraced and engaged in a recursive sense making process (Phase 2). The chosen research methodology was that of case studies which is suited to the interpretive research approach (Yin, 2003).

Two case studies from within a larger organisation or group of call centres, were chosen for the study. These call centres were mature in nature with established processes and measurement functionality. The case studies covered were the helpdesk call centre referred to as call centre 1 (phase 1) and the Repair call centre (call centre 2 – phase 2).

The call centres' were each set a plethora of new internal targets by the parent organisation, including Abandoned Call Rates (ABN), sales achieved, call handling time, and per cent of calls answered within 15 seconds. Resource teams were also split to manage these new teams, schedule their attendance and report on their performance. The routes into the call centre were also changed to ensure customers were directed to the most appropriate team, this included 0800 numbers and Integrated Voice Response Systems (IVRs). Although the decision to restructure in this way was mainly to help better serve the customer, there was no customer demand analysis carried out to support or challenge if the new structure would increase the capability of BT Ireland to serve customers better.

There was a two-phase approach to the research. Phase 1 probed the use of performance measures in call centre 1 to determine an appropriate set of performance measure for Six Sigma application beyond that of the existing operational measures used within call centre 1. The second phase used this expanded set of measures to apply strategic and operational Six Sigma to call centre 2.

A multi-layered research approach using a combination of primary and secondary research was used in both phases, including participant-observer methodology in phase 2 after the manner suggested by Remenyi *et al.* (1998). The framework analysis was the key steps shown within Table I, which cover the double DMAIC or combined strategic and operational approach to Six Sigma from a systems thinking approach.

The number and frequency of meetings, interviews and focus groups are shown in Table II. Internal secondary data was gathered through interviews, phone calls, system interrogation and accessing company records.

Instrument	Purpose	Outcome	Number
Phase 1 – Case analysis and establishment of strategic and operational measures for Six Sigma – case study 1			
Interviews	To understand change within the case organisation	Confirmation that BPR and TQM are both utilised in BT Ireland	10
	To understand the current structure of call centres in case organisation	Current structure defined and outlined within research	
Focus groups	To review case study data gathered and discuss next area of analysis	Data analysis completed for case study	8
Workshops	To share case study analysis findings with call centre management and their teams and to gain approval for further analysis	Data shared and published and all approval sought granted	4
Phase 2 - Proof of concept – case study 2			
Interviews	To check progress on DMAIC steps with key managers	Achievements and problems	10
Focus groups	To review proof of concept data gathered and discuss next area of analysis	Data analysis completed for proof of concept	30
Workshops	To share proof of concept analysis findings with call centre management and their teams and to gain approval for further analysis	Data shared and publish and all approval sought granted	8

Table II.
Research methods

The primary data collection process required for the case study and proof of concept was carried out by a combination of both the researchers and the intervention team. One of the researchers acted in a participant observer role as part of his role of Business Improvement Manager and supported the intervention team in analysing and presenting the findings. Internal secondary data consisted of current performance on calls offered; call handling time, abandon calls and percentage of calls. This data was analysed using Six Sigma software to produce data run charts.

Results and discussion
Phase 1 – Case analysis and establishment of strategic and operational measures for Six Sigma – call centre 1
The type and frequency of calls coming into the call centre were measured. The call type analysis showed that three distinct types of calls were received:

(1) value;

(2) help; and

(3) failure.

A template was established that enabled the frequency of each type of call to be measured – 1,015 calls were captured and categorised in this phase (Figure 1).

The analysis showed that Value made up 20 per cent of calls, Help was 60 per cent and Failure was 20 per cent. From this data the researcher was able to calculate the capability of call centre 1 to handle their customer demand at the first point-of-contact as 68.5 per cent. This result is consistent with Seddon's (2001) findings of 60 per cent to

	201	20%	Resolved/Dealt with on line
VALUE			
HELP	606	60%	Passed activity/contact to other unit to resolve/deal
FAILURE	208	20%	Advised customer to speak to another organisation
TOTAL	1,015		No order/request placed

Contact Types	You were able to resolve on line	You raised an order	You raised an activity for duplicate bill, itemisation, recon. etc.	You raised an open issue and placed in a queue	You had to transfer to another BT department or give alt. number	You had to advise customer to speak to another organisation	Customer did not place an order/request	
VALUE								
I want a product/service	20	113	4	4	27	1	32	201
HELP								
I want to do something/I want you to do something for me	109	66	42	18	58	7		300
I need information	126	9	4	4	22	3		168
I don't understand	54	4	0	11	7	1		77
I have a problem using/with a product/service	10	4	0	2	40	5		61
	299	83	46	35	127	16		606
FAILURE								
I don't agree with the charges/bill	30	5	3	11	2	0		51
There's a problem with BT plant/Civil issues	2			1	1			4
You haven't done what you said you would	18	11	9	45	21	1		105
You've done something............ I didn't ask you to do/you didn't tell me about/you shouldn't have done	11	2	5	11	6			35
I'm unhappy with the level of service	3	0	1	3	6			13
	64	18	18	71	36	1		208

Figure 1.
Analysis of value, help and failure call categories

70 per cent in service organisations. Further capability analysis showed that although Value and Failure calls made up 20 per cent each of the overall calls total, advisors were almost twice as likely to resolve a Value call (84 per cent capability) at the first-point-of-contact versus 48 per cent capability on a Failure call (Table III).

Not getting things right for the customer at the first point-of-contact resulted in almost 30 per cent of the calls received being passed to other parts of the organisation to get resolved, meaning they have to be investigated by more than one advisor and necessitating a call back or letter to be generated to ensure the customer obtained closure on their issue, hence requiring further resource and thus increasing costs (Hart *et al.*, 2005).

	Dealt with/resolved online (%)	Activity/contact passed to other division to deal (%)	Customer advised to speak to other organisation (%)	
Value	84.0	15.5	0.5	**Table III.**
Help	70.5	27.0	2.5	Call centre 1 capability to
Failure	48.0	51.5	0.5	deal at first
Total	68.5	29.5	2.0	point-of-contact analysis

The handling cost of an online call cost the call centre £3. This is similar to the costs presented by Contact Babel UK call centre review (Contact Babel, 2006). When passed to offline teams customer's enquiries were touched at least 2.5 times, increasing that cost to £10 per call. The researchers also tracked and analysed the standard call centre measures that were in existence, namely call handling Time (CHT), abandoned call rates (ABN per cent) and percentage of calls answered in 15 seconds (PCA15) which are standard internalised call centre performance measures (Curry and Lyon, 2008).

Using Six Sigma analysis involving Statistical Process Control (SPC) run charts these measures and their variation were analysed using weekly intervals performed over a four-year period. The team identified that call handling Time (CHT), abandoned call rates (ABN per cent) and percentage of calls answered in 15 seconds (PCA15) had all improved from August 2006. Call handling time had improved from a mean of 357 seconds to a mean of 285 seconds (Figure 2).

Abandoned call rates had reduced from a mean of 13.8 per cent to a mean of 4.8 per cent (Figure 3), another excellent improvement in performance.

Percentage of calls answered within 15 seconds increased from a mean of 32.6 per cent to 47.1 per cent (Figure 4), meaning that 47.1 per cent of customer where having their calls answered within 15 seconds of calling. This improvement also has a direct impact on ABN call rates as customer are more likely to hang up if the are being held in a queue for long periods.

The strategic approach to Six Sigma (Table I) indicates that a customer perspective on performance measures or customer central to quality issues (CTQs) is also needed (Friday-Stroud and Sutterfield, 2007). Thus, in. line with the actual internal measure improvements (Figures 1-4) the researchers and the intervention team, focussing on customer demand, identified that call volumes i.e. demand, had also been increasing. This is highlighted with notes in Figure 5. The mean increased from 13,776 calls per week to 18,218 calls per week, an increase of 24.5 per cent. Given that this trend was going against a declining customer base, and improvements in the internal call centre measures, thus the reasons were probed. The results were shared with a group of advisors, coaches and managers from the call centre 1 teams at a workshop where the researcher facilitated a cause and effect analysis to help the group determine what had caused these changes. It was discovered that five new people had been added and the date they started working coincided with the change in the call centre's performance. Further workshops held with the call centre senior management team revealed that the five new people had been sourced from an employment agency and were brought in to help deal with an increase in call volumes and to help the centre meet it's abandoned call target of < 5 per cent. It was envisaged that this additional resource would also ensure that customers did not hang up and were answered promptly. These advisors were known as "call grabbers". Their role was to answer calls politely, write the customer's information and request on a sheet that had been designed for the advisor. Customers were then advised that they would be contact them with 24-48 hours to have their request dealt with. The records were gathered up by an experienced adviser throughout the day and distributed out to other experienced advisors with a view that these customers would be called back during periods of low call volumes. The impact of the call grabbers had the desired affect on the internal call centre measures as illustrated in Figures 1-4. The researchers however, decided to analyse the impact that call grabbers had on the customer and the business in line with the strategic and
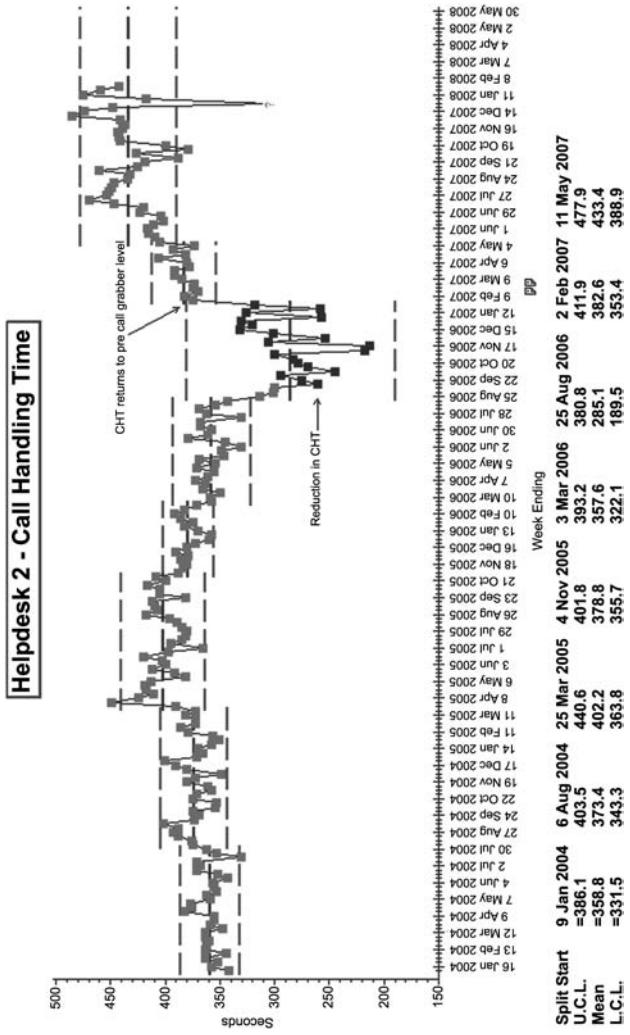
Figure 2.
Call centre 1 – call
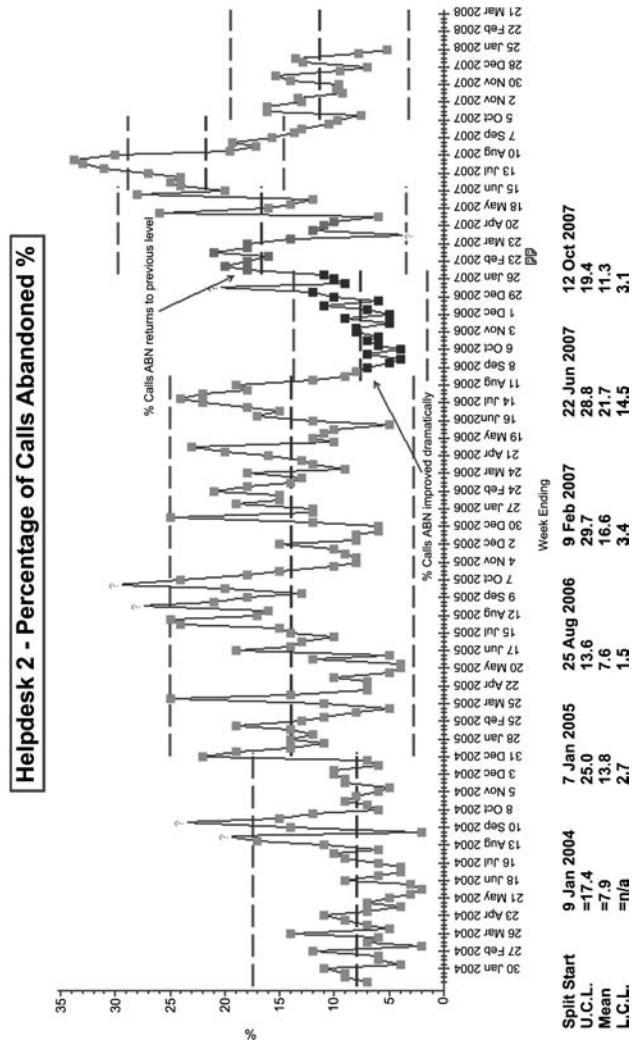handling performance
from January 2004 to
January 2008

Figure 3.
Call centre 1 – call
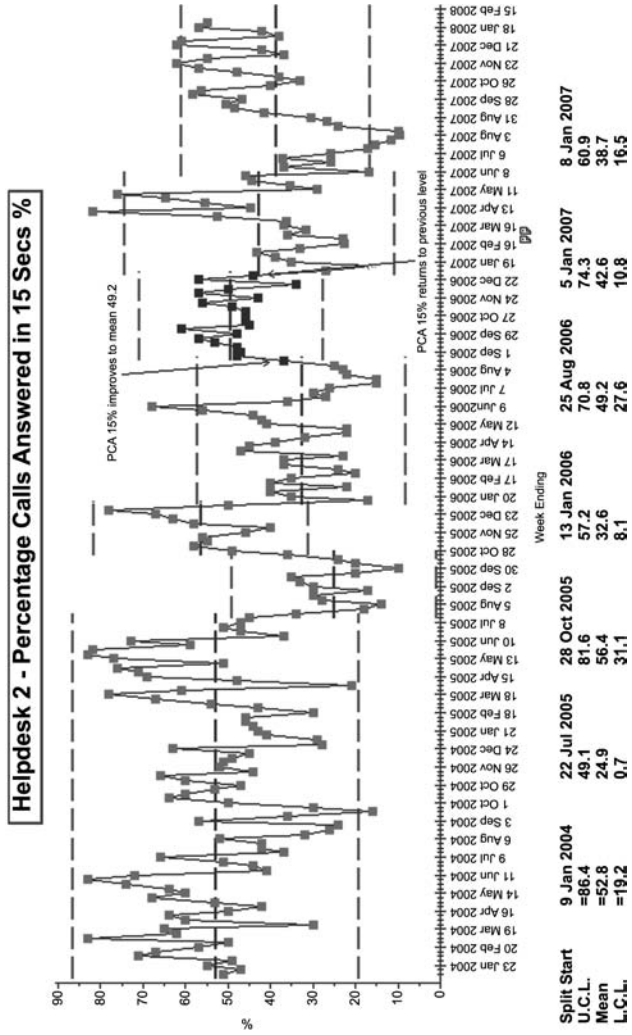abandoned rates per cent
from January 2004 to
January 2008

www.man

Figure 4.
Call centre 1 – Percentage
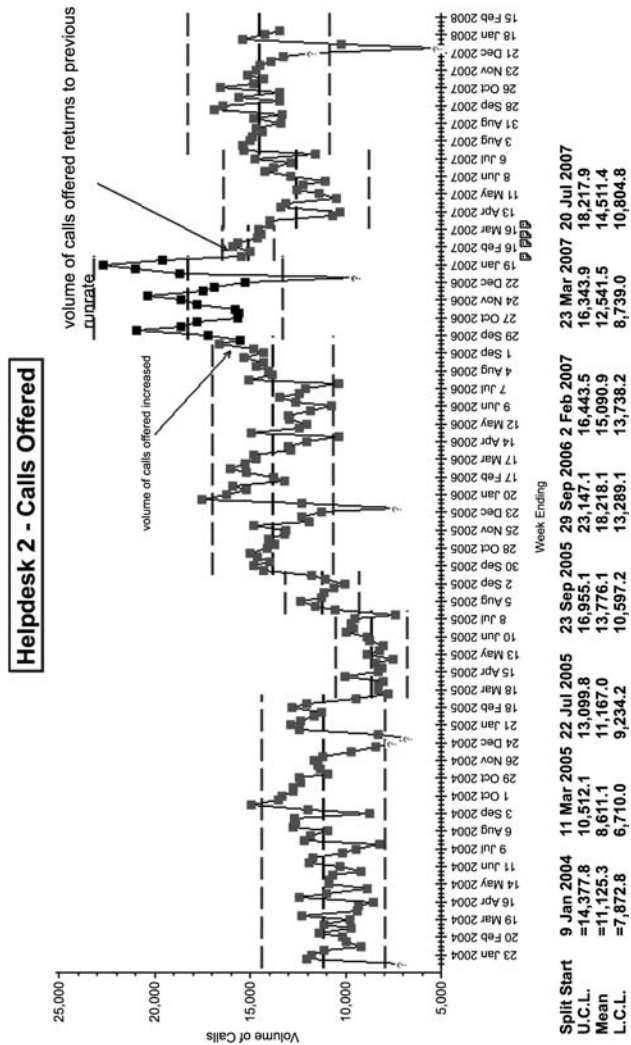calls answered in 15
seconds from January
2004 to January 2008

Figure 5.
Call centre 1 – Calls
offered from January 2004
to January 2008

systems approach to Six Sigma (Table I). In order to review and share the findings of the analysis the intervention team organised and ran a weekly focus group to analyse the impact on customers and the organisation. Over a three-week period 718 calls that had been taken by the call grabbers were analysed. The analysis showed that advisers were unable to contact 35 per cent of customers when they called them. Added to this 22 per cent of customers called back into the call centre before the experienced advisers had the opportunity to call the customers back (Figure 6). When calculated it was clear to see how the call grabbing process was adding additional calls into call centre 1, while making the jobs of advisers much more difficult (despite the promising picture shown in the internal measures, Figures 1-4).

Each call grabber was answering up to 75 calls per day, over five days, a total of up to 1,875 calls per week. Thus, 805 call backs per week were successful, 412 calls per week repeats (customer called back before the call centre could call the customer), 69 per cent of these customers called back within the first 24 hours of their initial call, the rest after 24 hours, 656 outbound calls were made by experienced advisers, but the customer was not spoken to, thus these customers were likely to call back into the call centre.

The intervention team shared the findings at a focus group attended by advisers, coaches and managers. The attendees were then encouraged to list the qualitative, less measurable affects that this focus on only improving internal measures was having on their day-to-day operations; the findings were grouped as follows:

- *The impact on the management team:* overall management responsibility of additional people; monitoring timekeeping and sick leave; customer escalations from the Call Grabbers; budget expenditure; delays in cancellations or start order; poor customer experience; standard of call grabbers – a number of dismissals – involving coach observing calls; collection/counting and increased pressure from senior management to meet targets.

- *The impact on the advisers and coaches:* Customer dissatisfaction about delay of call back – making call more difficult to handle and leading to escalations; additional pressure from managers to answer and deal with calls faster than
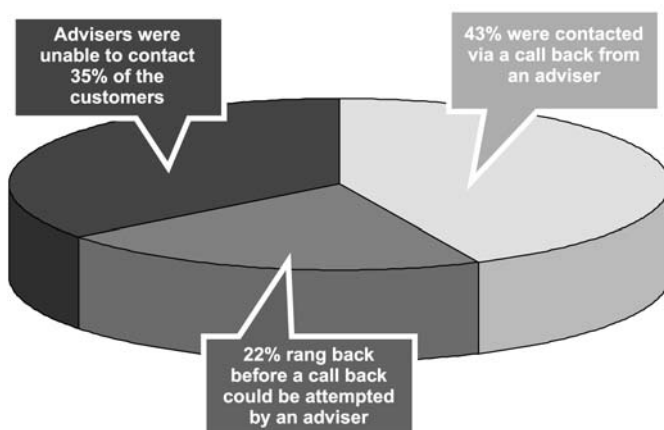

Figure 6.
Analysis of Call Grabber
impact on call centre 1 (718
calls)

normal to meet targets; additional pressure to work overtime in order to help out; increased pressure contributing to increased sick leave.

• *The impact on the business:* increased costs of paying the agency for hiring the call grabbers; increased overtime costs and increased customer dissatisfaction.

The final focus group was attended by the senior management team of both call centre 1 and call centre 2 and a number of advisers, coaches and managers from within the Group and was facilitated by the researchers. Based on the quantitative data presented, the team agreed that call grabbing in the call centre, although improving the internal measures, was adding no value to customers and was increasing calls in and costs. The decision was then taken by senior management to cease call grabbing activities immediately (January 2007). The impact of this has can be seen in Figures 1-4, where call handling time, abandoned call rates, percentage of calls answered in 15 seconds and volume of calls offered returned to their pre call grabber average. This return to normal state further emphasised that the introduction of call grabbing to improve internally focused measures had impacted negatively on both costs to the organisation and customers.

The findings support the views expressed by Reynolds quoted in Bellman (2007) that focusing on quantitative performance related measures such as CHT leads to the desire to finish calls quickly rather than resolving customers' issues and hence increasing costs. Phase 2 of the research, the proof of concept, was initiated, to determine if focusing on delivering what matters to customers reduces costs and improves internal quantitative measures, as suggested in the approach to Six Sigma shown in Table I (Antony *et al.*, 2008; McAdam and Lafferty, 2004).

Phase 2: Proof of concept at project level – call centre 2
Building on the knowledge gained in phase 1 the researchers focused on applying the double DMAIC approach (Table I) the repair team (call centre 2) which was responsible for answering calls from customers who have difficulty using their phone service. The volume of calls can be affected by bad weather conditions which increase the likelihood of faults occurring in the network. The call responder's role is to diagnose the customer's problem and send it to the appropriate team to resolve. At this point, a call diversion service is offered where customers can have their calls diverted to a mobile or other number free of charge, ensuring they do not miss any calls. Once the fault is cleared the call diversion has to be manually cancelled. Where no fault is detected the customer is advised to check their own equipment and call back in. The repair team manage a range of offline queues, where customer faults are queued until the customer checks their own equipment or the adviser makes a call-back. Before the proof of concept (phase 2) commenced the repair team did not track the amount of work that flowed through these queues. Their measurement of performance was restricted to that of call quantity and faults raised. The proof of concept followed the double DMAIC approach (Table I) and is discussed under each step as follows.

Define. Working with the intervention team, the repair advisers determined the customer issues and the effect on the organisation as a whole, followed by the purpose of their roles in relation to these issues as suggested by Conz (2007). The team developed a purpose statement that reflected what their role was within the organisation as a whole and the call centre in particular for delivering what mattered to customers and the organisation. From the output of the focus group the team defined and accepted a new

purpose statement which gave them something to aspire to while allowing them to devise measures that related to the purpose and would determine if the repair team were achieving their purpose (Curry and Lyon, 2008). The statement agreed was:

> To deliver a World class customer experience by ... resolving customer enquiries at first point-of-contact in an effective, timely and cost efficient manner ... and by ... identifying the customer's problem and where necessary, routing it to the appropriate dealer group to expedite solutions first time.

The team organised a focus group and used their collective knowledge to identify the key drivers customers would see as a good experience. They also listed the issues that were important to the organisation. The key drivers for delivering what matters to customers are as follows:

(1) *Customer drivers*:
- on time;
- right 1st time;
- deal with it at the 1st point-of-contact; and
- give it to the person who can do it.

(2) *Business drivers*:
- cannot improve at all costs;
- we are effective and efficient;
- on time; and
- right 1st time.

It was envisaged that the new customer focused measures devised would enable call centre 2 to measure their ability to resolve more enquires at the first point-of-contact, and to answer calls in a timelier manner.

Measure and analyse. In order to determine the customer demand within the repair call centre (No. 1) the team had first to develop a typology for the type of calls that came to the team. The researchers decided to approach this phase of analysis in a way that looked at the demand from the customer's perspective (Koh *et al.*, 2005; Harney and Jordan, 2008). A group of five advisers volunteered to sit beside a colleague and listen to their calls. The advisers then wrote down exactly what customers said. This information was reviewed at the end of each day. A list of call types was produced in three specific categories. To facilitate gathering the frequency of each type and to ensure no ambiguity arose relating to what each category meant, the team provided an explanation for each:

(1) *Help* – These calls are from customers who require assistance in using, or information about, products and services or need help in detecting and resolving a problem they are experiencing.

(2) *Repair* – A call only becomes a Repair call type when a fault has been identified as the responsibility of the organisation and action is needed to resolve the issue.

(3) *Failure* – These are calls from customers who have failed to receive an appropriate service from the call centre (e.g. customer requests not carried out;

having to chase the progress of an enquiry/problem) – in other words failing to get it right first time. This type of call can be due to failure within our Help or Repair processes.

The type analysis was then shared with the whole repair team who worked together to complete the frequency analysis. A template was then constructed using the call types in order to measure the frequency of the call types. The repair team listened to 1,004 calls over a three-week period and compiled and reviewed the data at the end of each day. The high level output can be viewed in Table IV. Of the 1,004 calls, 14 per cent were classed as inappropriate as customers had either called the wrong number or had to be transferred to another call centre within the Group to have their enquiries dealt with, a symptom of IVR mis-operation. The team decided to exclude these calls from their scope of focus as they felt they had little or no control of where they received their calls from. Therefore, they focused on the 864 calls that were appropriate to their function.

A workshop was held to discuss the results with the repair team. The team were surprised that only 27 per cent of the 864 received were true repair calls. On further investigation the researcher found that the repair team raised a fault for each Help and Repair call received. They also raised a fault on Failure calls, where the original fault had been closed but where the customer had confirmed their fault had not been resolved. Taking the Help calls only as one example the team concluded that they were raising faults on 51 per cent of their calls although no fault existed. It was also confirmed with the repair management team that this was the process advisors followed as "this was how we determine how much work they get through" (i.e. an internal measure that did not address the effect at strategic and systems levels) as suggested by Friday-Stroud and Sutterfield (2007).

Capability of response is the ability of the team to deal with the call at the first point-of-contact or pass it directly to someone who can. The analysis showed that on repair calls the team detected and despatched 84 per cent of their work directly to someone who could resolve it for the customer (Table V). Even though repair calls made up only 27 per cent of their overall total, the repair team were quoting possible time related charges to all customers who fell into the help or repair category, 78 per cent in total. The team questioned the rationale behind quoting time related charges on all these calls when only 16 per cent had no fault detected and where fault may be within the customer's equipment. They identified this as a key issue in delivering what matters to customers.

Frequency analysis	No	%
Total calls analysed	1,004	
Wrong numbers	30	
Transfers to other BT departments	110	
Inappropriate calls	140	
Help	440	51
Repair	235	27
Failure	189	22
Appropriate calls	864	

Table IV.
Call centre 2 repair frequency results

On Help calls (Table VI) the team passed on 13 per cent as faults offline as they were unable to conduct tests (UTT), while they resolved 34 per cent at the first point-of-contact after testing for the customer. A total of 53 per cent were tested and placed into the offline queues awaiting customers to test their own equipment. Customers were encouraged to test their equipment and call back into the team or advisors who subsequently agreed a time to call these customers back to confirm if they had found a problem in their own equipment or if the fault still existed. The call back process can prove difficult as, although a time is agreed with customer, call backs are normally not carried out during periods of high call volumes as the team had a target of <5 per cent abandoned calls. The team therefore identified this as a key problem within their process of delivering what matters to customers.

The team determined there were two types of failure demand. Type 1 related to customers calling back before action had been taken to resolve their problem, 129 calls (Table VII), while type 2 related to faults where action had been taken, but the customer still had a problem, 60 calls (Tables VII and VIII). By looking at the data in

	Fault detected and despatched	No fault or problem detected but customer wants a visit	Total
Repair	197	38	235
%	84	16	100

Table V.
Repair capability analysis

	Fault passed to off line for UTT	Help given/contact resolved – no call back required	Help given – call back required	Total
Help	57	149	234	440
%	13	34	53	100

Table VI.
Help capability analysis

	Customer rang before the ERT/APPT	Customer rang on the day of the ERT/APPT	Customer rang after the day of the ERT/APPT	No ERT or APPT assigned yet	Fault report closed	Total
Failure	50	40	30	6	3	129
%	39	31	23	5	2	

Table VII.
Failure (type 1) capability analysis

	I was able to assist/resolve the issue	I had to get someone else to help resolve issue	I had to transfer the customer to another dept	Total
Failure	43	11	6	60
%	72	18	10	100

Table VIII.
Failure (type 2) capability analysis

this way the team were able to determine if the failure occurred during the customers' original issues, or if the organisation had dealt with the customers' issues, but not fully resolved it to the customers' satisfaction.

The analysis showed that in 70 per cent of calls relating to the customers' original problem, the customer called back within the estimated response time (ERT) or the appointment time (APPT) they had been given. They also found that a further 23 per cent of customers called the day after the ERT or APPT. From this analysis they concluded that the customer did not feel confident that their issue would be resolved when the organisation said and/or they had not been communicated to by the organisation to advise the commitment date could not be met. The team identified this as a key issue in delivering what mattered to their customers.

Where the organisation had dealt with the customers' issue but had not resolved it fully (Table VIII), the team found this was down to mainly one issue, namely call diversion with 15 per cent of all failure calls due to the call diversion service not being set up correctly or not being cancelled when the customers fault had been cleared. This was something that could be resolved by the adviser quite easily as the 72 per cent resolution shows in Table VIII, it was however unnecessary failure. The team identified this as a key issue in delivering what matters to customers.

Therefore, by following the double DMAIC approach as shown in Table I the team had now a full understanding of the type and frequency of their customer demand and also their capability to respond to that demand. They also had a list of key issues that affected how they delivered what matters to their customers (Curry and Lyon, 2008). These are listed in the Improve stage of DMAIC that follows (Table IX).

Improve. These findings gave the team their focus for improvement within the Implement step within DMAIC. In order to complete the end-to-end view from the

Issue	Action to resolve
Time-related charges were being quoted on all repair and help calls even though an engineer visit may not be required	Only quote TRCs when a visit has been arranged, or when a customer refuses to check their own equipment
The current process actively encouraged customers to call back into the team whether a fault was detected or not	Advise customers to call back only when a fault still exists after they have checked their equipment
Faults were placed in the offline queues in order for a call back to be made to the customer, a waste of valuable adviser resource	Only raise a fault and place in the call back queue when the customer has specifically requested a call back. As above, ask the customer to call back only when a fault still exists after they have checked their equipment
70 per cent of customers called into the team before or on the day their fault was due to be repaired, suggesting customers were not confident their issue would not be dealt with	Only raise a fault when a hard fault has been detected and be specific when advising of the date of repair. This will ensure that false expectations are not set with customers
The call diversion process contributed 15 per cent to the overall failure demand	Share call diversion analysis with the team responsible for setting up and cancelling this service and work with them to remove this unnecessary waste

Table IX.
Repair action plan to deliver what matters to customers

customers' perspective the team set about mapped the flow of their work, as suggested by Morgan and Cooper (2004), based on the following question:

- How good are we at delivering what matters to our customers?

The researcher working with the repair team in his role as business improvement manager facilitated the mapping of the end-to-end flow of the work as suggested within DMAIC (Antony, 2006). The team considered bringing in experts in the actual systems, but felt this would lead to the flow being mapped from an "internal" perspective. There was also a concern that the customer focus that had been built up would get lost in the detail, with people wanting to focus on improving what they know, the systems, and ignoring the key focus, the customer.

A workshop was held that simply asked the participants to brainstorm and list the following:

(1) Where do you get your work from, and how?

(2) Where do you send your work to, and how?

From this information the team mapped a process (Figure 7). This was shared and iterated with the team to ensure it was accurate. The team also applied their demand analysis, gathered from the Measure and Analyse steps of DMAIC, to the map. Next, a plan was developed to address the issues highlighted in the Capability of Response (Table IX) showing the issues identified and the actions to resolve them are shown in the plan. The team also measured the volume of work that flowed through their offline queues, what they resolved online and what the passed to the offline teams and how long it took, all related to their purpose statement (from the Define step).

Control. Based on Nonthaleerak and Hendry's (2008) critique of the DMAIC Control step and Table I the team delivered their action plan within one month and the impact
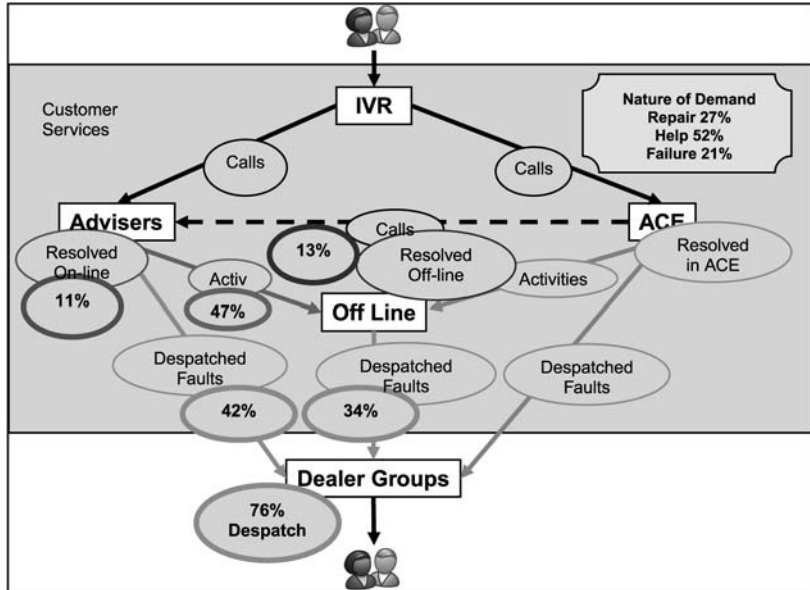

Figure 7.
Call centre 2 repair flow and capability to respond

was tracked against the existing internal measures and the newly devised customer measures.

Looking at three new measures the team used the run charts to track the impact of the action plan delivered against these. First, capability to resolve issues for customers increased from 9.5 to 20.4 per cent when the first changes were made. This has subsequently increased to 26.4 per cent (Figure 8). However, from December 2007 there has been a slight downturn in this performance due to a change in the IT systems used to deal with customer issues.

The percentage of Help work sent to and resolved offline decreased from a mean of 18.7 per cent to mean 6.2 per cent. This meant the repair team no longer needed to deploy resource (2 people) each day to monitor these offline queues and call customers back. The team set up a rota where one person checked the queues for 15 minutes in the morning and again in the afternoon and all employees could be utilised in taking incoming calls.

The volume of activities sent to hold queues to be monitored for call backs reduced from a mean of 1,082 faults to a mean of 338 (Figure 9). Because the team continue to monitor performance this way, they continue to focus on removing waste. The team revisited this process in July 2007, further reducing the volume to a mean of 225. This reduction in volumes being sent offline and the subsequent reduction in the variation of the volumes has been maintained to the last measurement date of March 2008 (Figure 10).

From the analysis it is seen that the process has been improved from the customers' perspective. Customers no longer had to call back if they resolved the fault themselves, they were no longer quoted charges when not applicable, and their faults were detected and directly dispatched by the adviser instead of being placed in a hold queue for further analysis. The variation of the volume and percentage of work being sent to offline queues or despatched also reduced, meaning the repair, engineering and offline teams could better predict their workload, thus enabling the correct number of people to be assigned to these tasks.

In order to test the overall effectiveness of the double DMAIC approach (Table I) existing internally focused measure were also checked. The researcher tracked the impact on existing measures incorporating calls offered, calls abandoned and CHT and PCA15 per cent that management focused upon (Figure 11).

During the improvement period from August to October 2006 the Group was severely damaged by lightning strikes, strong winds and fallen trees. Calls offered increased due to these adverse weather conditions by an average of 1,000 calls per week. In previous instances of storm damage the repair management team implemented a contingency plan to deal with the forecast increase in calls and keep the ABN per cent of calls within target. This involved utilising back office employees or other employees trained in handling simple repair calls. During the proof of concept period (Phase 2) however, this contingency plan was not required, due to the fact that the amount of activities being sent offline had reduced dramatically, enabling the repair team to utilise their two regular offline advisers in online activity.

Within the same period the team were able to reduce their abandon call per cent mean from 5.1 per cent to 4.1 per cent, as highlighted in Figure 12, the best performance for over two years even though call volumes were higher. The team answered these calls without adding additional external resource to their team. Considering that ABN call <5 per cent target is the key measure for call centres and the team achieved a
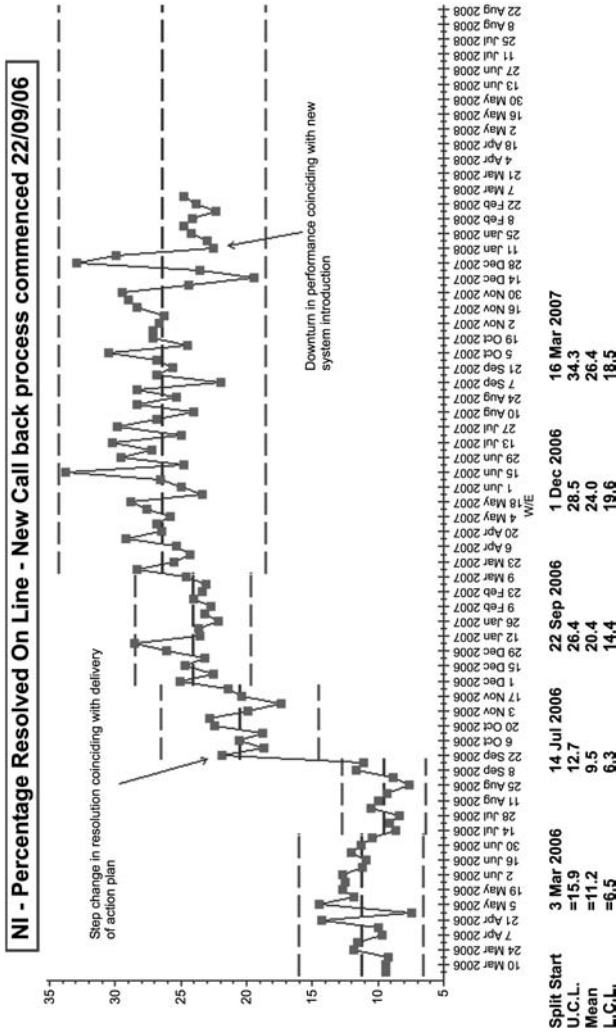
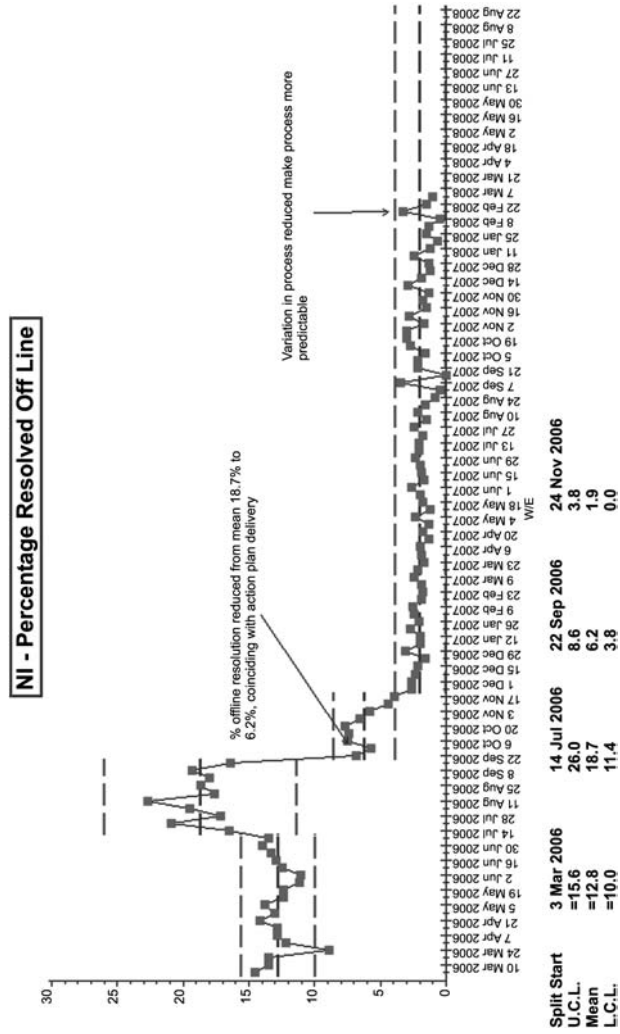**Figure 8.**
Repair online resolution
tracker

538

Figure 9.
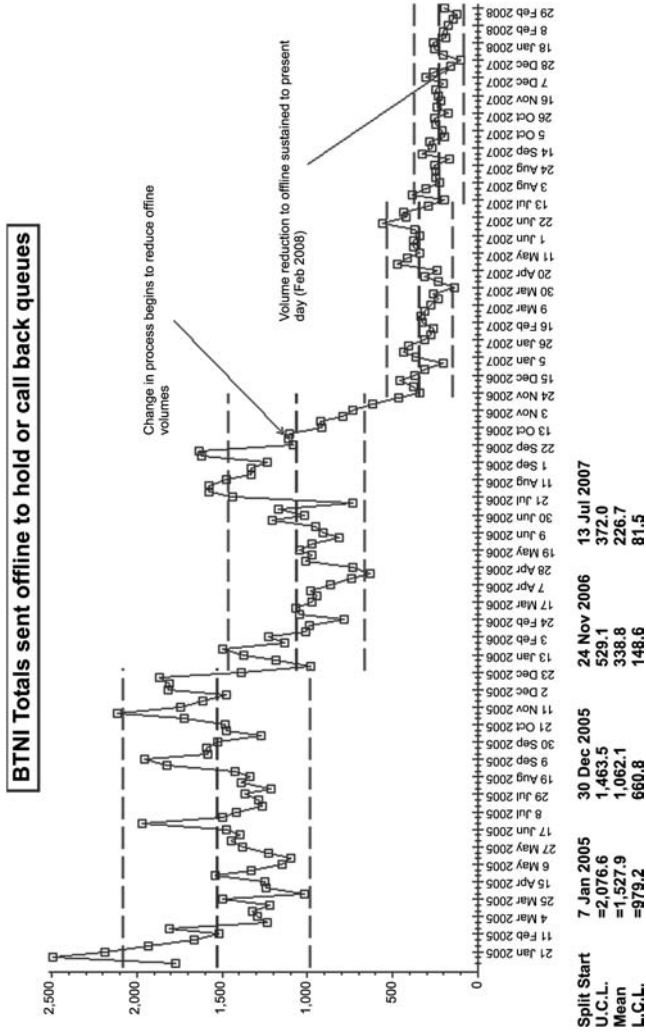Repair per cent sent and
resolved offline

Figure 10.
Repair volumes sent to
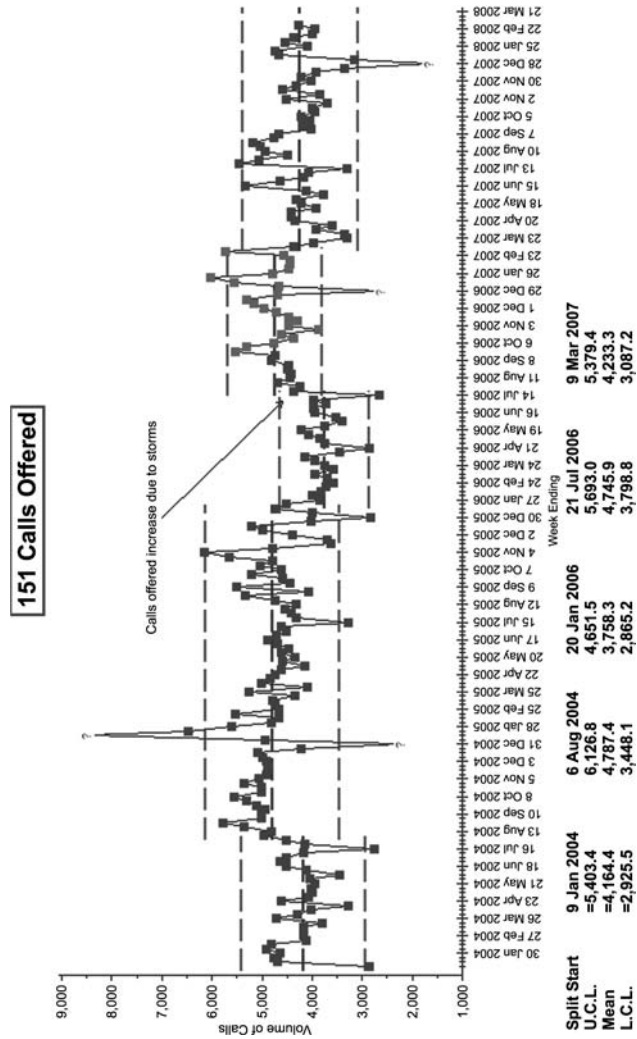hold queues awaiting call
back to/from customer

540

Figure 11.
Repair calls offered from
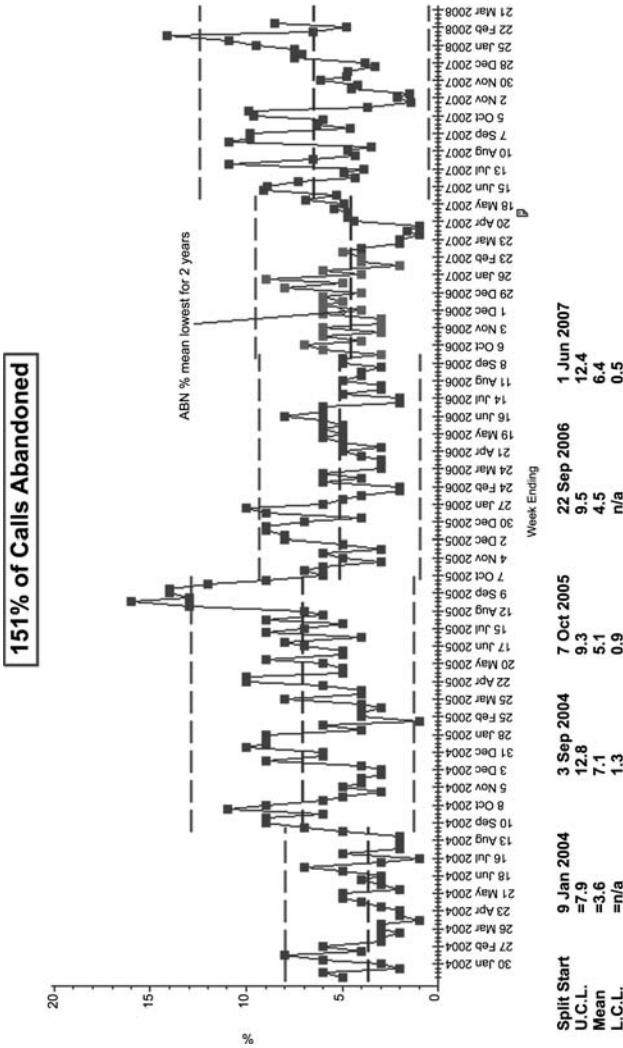January 2004 to January
2008

Figure 12.
Repair per cent abandoned
calls (ABN per cent)

better than target average during high call volumes and over the winter period, which historically brings higher call volumes ensuring higher ABN rates, the management team determined the proof of concept trial to be a success and agreed to embed the changes within the Group as suggested by Amelsberg (2002) and Nonthaleerak and Hendry (2008).

The reduction of call backs from customers meant that call handling time (CHT) reduced within the same period even though it was envisaged that this would increase as advisors took more time to correctly diagnose the customers issues to ensure it was handled and despatched correctly (Figure 13). Further analysis showed that because the team had reduced the failure demand less customers called back with failure related calls, meaning advisers did not have to spend time explaining, investigating and dealing with the reasons for failure, a process that normally meant putting the customer on hold in order for the adviser to investigate.

As part of the proof of concept the repair advisors also developed a comprehensive training plan linked to the key strategic goals of the organisation and customer expectations similar to that of Taylor *et al.* (2003), ensuring they did not revert back to their previous way of working.

Conclusions and recommendations
From a theoretical perspective a Six Sigma approach has been developed which addresses business improvement issues at a strategic and operational level within organisations, while maintaining the DMAIC methodology. This approach, referred to as the double DMAIC approach to Six Sigma uses systems thinking concepts to ensure that the effects of changes made at a given level are understood at all levels and areas within an organisation.

Applying this theory in phase 1 to call centre 1 has shown that improvement of localised and internal performance measures using operational DMAIC approaches can be misleading and these improvements can be offset by deterioration in performance at other levels in the system or organisation (Curry and Lyon, 2008; Taylor *et al.*, 2003).

In phase 2 the full application of the double DMAIC approach enabled changes to be made and measured from a customer perspective, as suggested by Amelsberg (2002), which in turn had a beneficial effect on internal performance measures. By understanding what matters to customers and identifying and removing the barriers to delivering what matters, call centre 2 removed waste from the system, allowing offline advisors to move to answering calls and resolving customer issues at the first point-of-contact. The results were shared with the repair senior management team as part of the proof of concept review. The review determined that in addition to the improvements highlighted above, the repair team also reduced costs by increasing their capability to resolve issues at the first point-of-contact. Analysis carried out by the resource team supported this finding and concluded that work being handled by the team of 26 advisers during the proof of concept was equivalent to the work of 30 advisors before the proof of concept was carried out, an increased capacity of 14 per cent, equalling reduced costs.

These figures show the need for, first, more research on Six Sigma in service organisations such as call centres (Antony, 2006; Chakrabarty and Tan, 2007) and second, the need for further applications and refinement of the double DMAIC approach at strategic and operational levels (Friday-Stroud and Sutterfield, 2007).
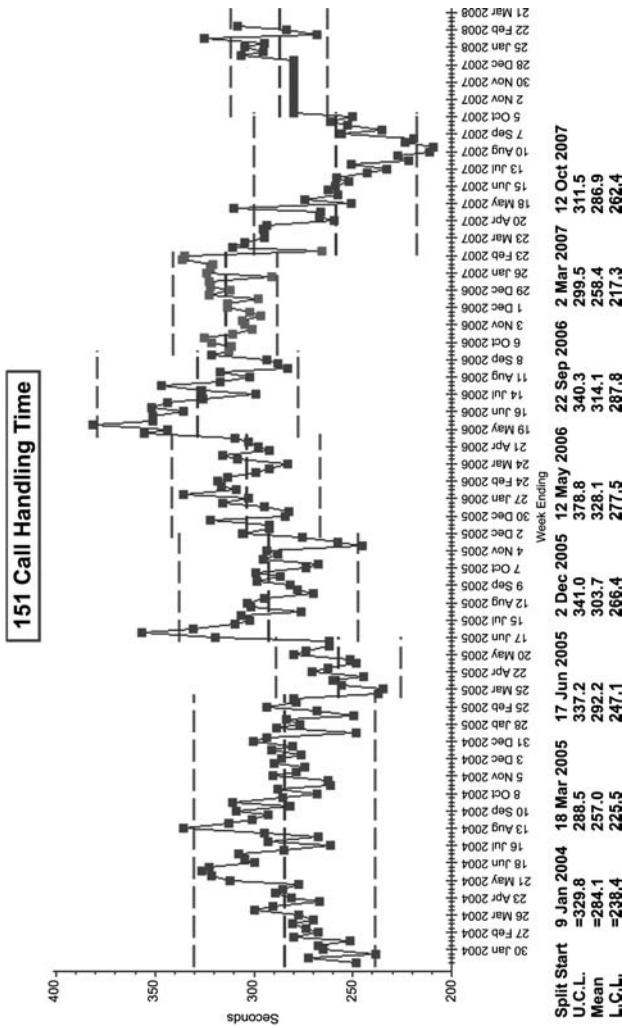
Figure 13.
Repair call handling time
(CHT) performance

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Further reading

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