

Consumer Behaviour in Voice Based Interactions

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Abstract

The following technological trends have occurred in parallel and together positioned and enabled the execution of my research: (a) The field of consumer behaviour that focuses on intuitive judgment and perception biases has developed significantly in recent years, (b) Speech and voice technologies have reached a commercial stage, and (c) The Big Data boom and other proprietary data that are owned by large corporates have located the industry in a better position than traditional academic bodies in terms of research capabilities.

These global developments have created the opportunity to conduct this research which aims to explore the relationship between voice and speech attributes and consumer behaviour in the context of telephone based call centre interactions. The access to call centre recordings and their derivative analysis has enhanced this research with the unique experience of a practitioner rather than being limited to an at arm's length theoretical analysis.

The research questions aim to identify voice and speech attributes that affect (positively or negatively) customer satisfaction levels, and ways in which a company can utilize these attributes to change the way its call centre staff operate.

The research methodology is based on a qualitative survey through which I collected data from a real-world call centre (auditory observation), and a triangulation of this data with that of a focus group session. The data went through a correlation test through a sample survey and a synthesis that processes the research findings into theoretical, published literature.

Following these research insights, I have developed a *Hidden Forces Model* which is based on the findings arising from the research. This model offers an alternative way to operate call centres considering adjustments in social interaction by the service staff in order to impact and optimise customer satisfaction for the benefit of the company.

Chapter 1: Introduction

1.1 Introduction

My professional research rationale combines my practical achievements in the last 22 years and my personal aspiration to stretch my career towards doctorate level research.

After such a long career I feel hunger for deeper level of research. I feel that I am able to leverage my unique professional knowledge and experience beyond routine work; towards the research zone.

This growing motivation drove me to Middlesex's DProf programme in which I could host my professional and personal desires. It can be my personal portal towards new challenges and new destinations.

Beyond the actual contribution to The Company ("TC") and the academic contribution to the research community, I wish personally to become part of the research community within a few years, probably in training or consultancy work. Hence I seek to bring my knowledge up to a doctorate research level by developing research in the field that lies in-between telecommunication technology and consumer behaviour, which are my strongest areas of competence.

My current position in TC features an innovative environment that encourages 'wild ideas' through value-added applications in research and development. It integrates consumer research with a corporate environment equipped with a heavy IT eco system.

As a Vice President for Products and Services Development in TC, I deal with many ideas that must be examined from technological feasibility and economy perspectives.

I must also consider the complications of integrating these new ideas into TC's IT and engineering platforms.

I believe that these routines are a necessary foundation for developing my professional research idea.

The deep knowledge and experience that I have gained during my career integrate two professional domains, both of which are relevant and important to my professional doctorate's project idea:

- A. Telecommunications voice-base interactions and data architectures. This includes value added services, speech recognition and voice analysis.
- B. Decision-making and consumer behaviour research. This includes development of supporting research tools and designing innovative consumer models.

The research project that I wish to propose deals with the question whether voice and speech dynamics influence the relationship between customers and call centre's customer service representatives (CSRs), and how. If it is a factor, how can I implement the research outcomes in TC's call centres in order to improve their functioning?

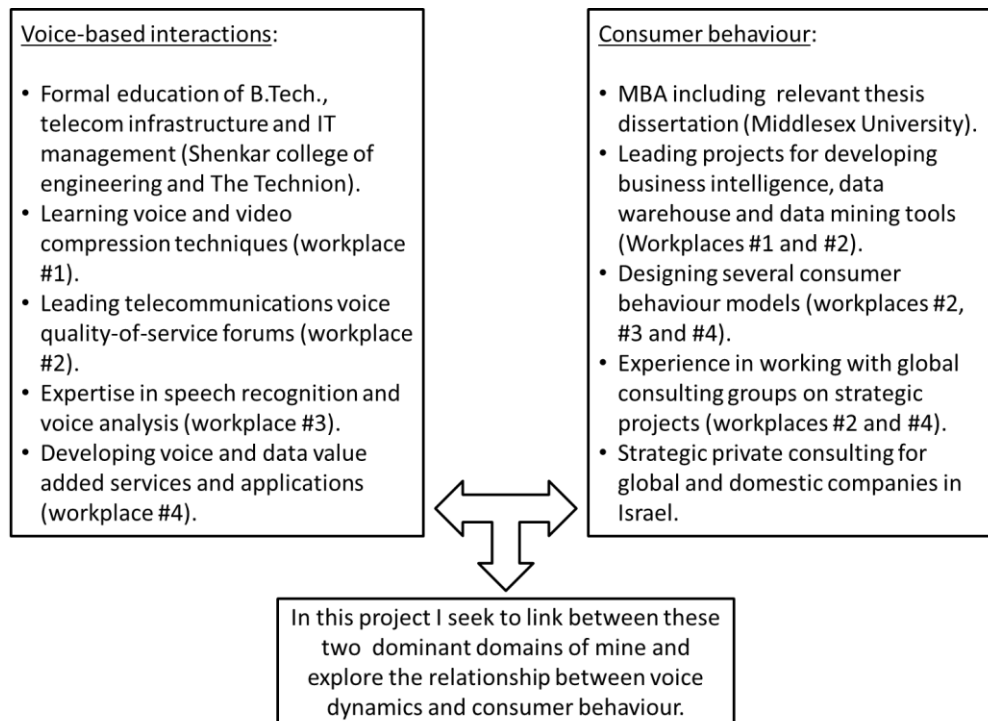
Clearly, this kind of research involves a significant share of my professional context in the telecommunication area, and may also provide new perspectives – that have hardly been explored academically – on the decision-making process, consumer behaviour and even socio-biology.

I also believe that my professional environment, which involves current and previous colleagues, can be an important support network for the kind of research that I aim to deliver.

The unique combination of the two mentioned domains are integrating two professional domains with which I have been dominantly dealt along my career; *voice-based interactions* and *consumer behaviour*. Yet it is still a great challenge to tie both areas together and integrate them into one doctorate-level research study.

In figure 1 I have tried to briefly illustrate my two-pillar professional knowledge position and the very unique opportunity they create for me in this project:

Figure 1: Professional knowledge pillars



In the area of voice-based interaction I acted in a few professional roles, especially in my previous workplace and TC, from which I collected massive technical knowledge, covering: frequency spectrum analysis, mobile telecom 2G/3G/4G architectures, voice compression techniques, intelligent networks (IN), transmission, operational support systems (OSS), business support systems (BSS), value added services (VAS), telecom-grade applications and voice over internet protocol (VoIP) which is considered to be the future of the telecom industry.

I also strengthened my telecom professional knowledge by expanding my education into the IT area, covering IT traditional architectures such as Enterprise Resource Planning (ERP), Customer Relations Management (CRM)¹, Business Intelligence (BI) and analytics applications, and new IT configurations such as Software as a Service (SaaS) and Cloud computing.

The main theme which is consistently reflected in my IT education is the strategic value that innovative IT can contribute to the organization, and this fits in exactly with my research proposal.

My experience in Speechview as the company CEO is rather significant for the requested knowledge to this project. Speechview was an R&D centre that involved several technological practices, the most dominant of which was speech recognition and voice analysis. Speechview's core technology enabled the conversion of the human speech stream into 3D animated facial gestures (lip-sync²) in real time. The technology was based on analysis of phonemes³ of human speech. Each phoneme was characterized by its own unique frequencies so that the engine, which relied on heavy statistical and algorithmic models, was trained to identify a phoneme series as accurately as possible. It avoided words, syllables, dictionaries, or syntax.

This professional knowledge is critically helpful for the analysis and categorization of voice attributes, as implemented in this research project.

In the area of consumer behaviour modeling I gained a lot of knowledge which covers both theoretical-academic and practical-professional aspects. My works have been influenced greatly by two academic figures – both are behavioural economists – Professor Daniel Kahneman (Nobel Prize Winner) and Professor Dan Ariely.

¹ CRM – IT platform on which the entire customer history is saved and available for the customer service representatives in real time

² Lip-Sync – synching audio stream speech to lips and facial gestures, just like in animated movies

³ Phonemes – the basic building blocks of any language except tonal ones like Chinese

Both of them dramatically affected my conceptual approach with regard to consumer behaviour and why we, as human beings, make the choices that we do.

I was invited a few times to be a guest-lecturer to the MBA programme at Bar-Ilan University to share my practical knowledge and demonstrate some technological tools in the field of consumer behaviour and decision-making.

During the years that I acted in strategic planning positions, I developed a few consumer behaviour models through internal research works conducted through heavy number crunching analysis, but also through external surveys and qualitative studies combining focus groups, projective tools, and laddering techniques.

Those projects involved innovative and radical approaches that demonstrated well the perfect synthesis between my practical research experience and the valuable contribution it can provide to the domain of academic research. Those projects enabled the companies to introduce new agendas in the marketplace, such as:

- Re-segmentation of customer base from Social-ethnicity to Lifestyle segmentation and brand (Conducted in my previous workplace).
- Exploration of the impact of Geographical Communities on the market growth and consumer behaviour in terms of product adaptation (conducted in my current workplace - TC).
- Exploration of the impact of Social Networking on its group members' consumer behaviour in terms of customer churn rate (conducted in my current workplace - TC).

All the projects show the progressive learning that I have done in the field of consumer behaviour (I am using two of them as case studies in chapter 4). I believe that the accumulated knowledge that I gained during these years has a substantial

synergy with my professional doctorate project, and it may provide a valuable contribution to the research that I seek to conduct: Exploring Consumer Behaviour in Voice-based Interactions.

One of the biggest challenges in this project was to balance between my stakeholders, who wish to see value contribution to the company, and my academic supervisors, who wish to see value contribution to the research community. I believe that this project has managed to bridge the gap between the two forms of thinking and create a new concept that accommodates the approaches of both practitioner insider and academic researcher. I believe that my current professional position is optimal for such bridging, because it involves developments in products and services that can drive the company's innovations.

I consider my doctorate project highly synergetic to my day-to-day contexts, namely, the exploration of innovative ideas, testing them from various aspects, and developing part of them into practical applications.

Furthermore, I believe that there are only a few corporate marketing strategy professionals who have a deep technical knowledge, and vice versa, only a few telecommunication engineers that have a vast knowledge in corporate strategy.

I believe that this unique combination provides a good opportunity to execute such a project.

Another substantial challenge in this research was to integrate my professional context into the academic world and consolidate both into one research. A key success factor to shape the research was to play optimally the dual role of insider and practitioner-researcher, combining real world disciplines and academic methodologies.

In this sense, this kind of research format might potentially create position problems for the insider-worker on one hand and the practitioner-researcher on the other.

The main concerns are related to conflict of interests, ethical doubts, and even tension between the two virtual entities.

Costley and Armsby (2007, p. 344), citing Dadds and Hart (2001), noted that in some circumstances "mainstream traditional approaches do not always suit the needs and available resources of practitioner-researchers". They also claim that according to their observations practitioner-researchers tended to discuss research approaches in methodologies and epistemologies used within their professional field. Those approaches were "accepted and traditionally used within their particular area".

Costley and Armsby also identified reasons why some practitioner-research approaches were rejected. They mentioned constraints, such as length of time that the research takes, difficulties in gaining permissions, data complexity, and lack of resources. They also reported that successful projects were executed by those practitioner-researchers who were able to balance both systems and had the ability to negotiate around normative constraints. My position inside TC, as an innovative leader, helped me to deliver more smoothly the message of a dual-play member when I approached this research a few years ago. It is noteworthy that since then TC was acquired twice by new shareholders who pushed the organization towards short-term ROI⁴ rather than a long-term, lasting strategy. In addition, during the last three years the Israeli mobile telecommunication market has been shaken very aggressively by the Israeli regulator and lost 70% of its size in terms of revenue. These two profound trends made my research slightly less crucial for my new shareholders who sought to concentrate on creating immediate value rather than implementing innovative ideas as value-added services.

Another point that Costley and Armsby (2007, p. 348) raised is the fact that in some cases, in order to unlock complex contexts, practitioner-researchers adopted more pragmatic research policies that "reflected a clear social science approach...towards qualitative and interpretative approaches". This point was significant to me in selecting optional research methodologies as part of my research strategy. My practitioner

⁴ ROI – Return On Investment

research sought to discover interpretative ideas and insights, derived from cause and effect observations, conducted in a very challenging out-of-lab environment.

Interpretive research seeks to explore people's experiences so it is "typically inductive in nature and often associated with qualitative approaches to data gathering and analysis" (Gray, 2014, p. 37).

One of the issues that troubled me a great deal is the fact that my professional doctorate project would be too company-business orientated, rather than university-academic orientated. Costley and Armsby (2007) pointed to cases where the practitioner-research was driven to solve real world problems rather than conducting a research theoretically. Coghlan and Brannick (2014, p. 54) refer to '*action research*' as a distinctive feature of organizational development, as it is not enough to attempt to merely explain things, but a need attempt bringing about change. This relies on improved real-life data. In this sense, it is similar to practitioner research. Boud and Garrick (1999) related the urge to strengthen the relationship between education institutes and industries to the global competition and economic climate which create new forms of knowledge; *useful*, rather than simply understood per-se.

Obviously, these agendas have dramatically influenced the practitioner-researcher's choice in approach, because it focused part of my routine study methods into legitimate research tools; I could incorporate them as part of my research methodological strategy.

Moreover, my professional position within the organization enabled me to lead a significant organizational process, that of practitioner-research derivative. Furthermore, just like in other professional projects with an innovative theme, I could fascinate my employees and colleagues at TC with this project, as well.

My seniority and long-standing at TC enabled me to overcome micro-politics and marginal nuances which could have adversely affected my research. An example of

this is my need to gain access to complex sources of data, such as the last 24 hour CRM recordings. In chapter 3 (sub chapter 3.1.2) I have dedicated a section to ethical considerations in which I described potential conflicts of interest and other ethical concerns. I split them into two major groups: *confidentiality and respect*, as well as *integrity and responsibility*. In order to prevent unwanted situations I equipped each one of them with moral-code based solutions.

Another point to deal with was the question of subjectivity which is quite repetitive in the context of practitioner-research. The practitioner's subjectivity inevitably must play an influential role, as Costley and Armsby (2007, p. 350) stated, "Contextual knowledge was seen to be linked to subjectivity because it was part of what made the research relevant and genuine". Of course I needed to avoid or minimize the effect of subjectivity by receiving feedback from others (colleagues at work and academic partners) and be more flexible by not being occupied in conceptual thoughts. This point has brought me to design my research methodological strategy in two phases; the second of which aims to provide more evidence and further interpretation to the main research findings conducted in phase 1 (triangulation).

Another key concern was the ethical considerations in my research. Here again, I had dramatically minimized my ideological stance and rely more on official methodological research tools. Therefore, I took a responsible approach and made sure that the entire research process is transparent and the results are valid. I avoided personal judgments and rough estimations. For example, my research aimed to measure the impact of voice dynamics and consequently the interaction's degree of success, so one could have asked: How did you define interaction success? Could you measure conversation results objectively? The design of my Methodology strategy aims to meet these concerns (chapter 3, sub chapter 3.2 below).

The following quote suggests an interesting model which aims to improve our choice of research policy:

"To understand practice in a more multi-dimensional way it must be studied using multi-disciplinary, multi-method approaches". (Kemmis 2010, p. 4)

Kemmis took into consideration individual and social perspectives, objective and subjective perspectives, and both combinations. This model had the capacity to guide me in choosing the appropriate research methodology and in formulating my study properly.

In general, on one hand the practitioner-researcher model is optimal in terms of creating synergic values for both the research community and the organization itself. Furthermore, the model can create an opportunity to use real world information and then implement its findings in an academic research environment. On the other hand, carrying out a research work in addition to day-to-day normal responsibilities can also create a few major challenges, such as time and resource allocation conflicts, the practitioner's loss of self-confidence due to a limited expertise in theoretical, official research techniques. It is also important to remember that data seeking for non-core purposes may create opposition within the organization and some technical difficulties.

My hopes not to reach a two-way tension situation (where my academic programme supervisors are commenting that I practice rather than researching, and vice versa, if at work, my shareholders are commenting that I research rather than work...) were proven false. In most of those cases I mitigated the potential conflicts by creating a common interest for both sides which naturally resulted in a mutual commitment, as Doncaster (2000) stated that the raw material and work experience can be used by practitioner-researchers within the WBL programme and create relevant knowledge to their organization.

1.2 Background and Context

TC is a mobile operator in Israel. It used to be a niche player holding 5% market share. Current heavy investments in 3/4G⁵ network enables TC to diversify itself into new mass market segments, so the shareholders expect to reach 20% market share by 2017.

This investment has enabled TC to reshape many procedures and units within the organization by:

- Upgrading engineering and IT infrastructures.
- Enhancing sales and marketing capabilities.
- Developing new advanced products and services.
- Improving customer care and service platforms.

There is no doubt that one of the most challenging activities for TC was the development of new, up-to-date channels for customer service and sales. Three major elements can be identified in this process:

- In the physical layer: Developing and upgrading new and existing points of sales and service centres.
- In the online arena: Developing and upgrading sales and customer care online platforms through customer care call centres, telesales and internet website.
- In the eco system surroundings: Developing and upgrading customer care supporting systems through a Customer Relations Management CRM platform.

My project has concentrated on part of the second element above: call centres. Since customer care call centres are based on voice interaction and considered as a very important point of contact with the customers, my professional background played a

⁵ GSM 3.75G UMTS network with 4G LTE-ready backbone

key role in conducting research that combines voice analysis, value added service and consumer behaviour modeling.

In the last few years there has been a consistent growth in telephone calls to and from TC's call centres.

On one hand, the complexity of the products and services results in many users calling and asking for help. Also, the complexity of price schemes and growing consumer awareness create massive traffic for TC's call centres, mainly of customers who wish to complain about over pricing, nontransparent charges, bad service experience, and so on.

Forecasts inside TC rely on actual figures from the last few years and show clearly that the number of calls to TC call centres will consistently grow. This is because people still prefer to deal with human beings rather than interactive machines, as their queries are becoming more and more complicated. In addition, the 24/7 accessibility turns the option of call centres automatically defaulted⁶.

One of the most crucially related platforms of the CRM is the Contact Centre that is used as a gateway for incoming calls and through which every service call is supported. This platform includes: a switchboard with an Automatic Call Distribution (ACD) module, an Interactive Voice Response (IVR) module, Computer Telephony Integration (CTI) module, Internet interface for chat and social networks sessions, Fax interface, and Recording module for CSR-customer conversations and screenshots documentation. I have used the last module as my source of information through which I sampled the recordings.

CRM has become part of the organizational strategy in most of the companies. It can potentially optimize revenues, profitability and customer satisfaction by focusing on the customer through implementation of customer support-dedicated tools. Moreover, CRM - which used to be a classic customer care platform - has increasingly become

⁶ This information is backed by the largest call centres outsourcing provider in Israel.

more of a marketing-orientated tool through its analytic capabilities and its real-time contribution to retain customers and improve their satisfaction (Stauber, 2004).

This is why call centres and CRM systems have recently become a target for all sorts of corporate solution providers who offer conversation recording and archiving, smart queuing algorithms (ordering by customer value), interactive audio advertising, callback when the caller's queue arrives, real time data mining for up-selling/cross-selling and other applications. This is actually the point where my professional context was recruited for carrying out my research which aims to improve customer experience in voice-based interaction through manipulative techniques which are related to the voice-based interaction dynamics, such as call centre CSR's and the customer's voice pitch fundamental frequency (tonality), voice amplitude (volume), speech rate, call possession rate, call duration and more.

The contribution of this project to TC from an organizational perspective and its impact on TC's intellectual property may be huge for the following reasons:

- Service – the project has the capacity to improve customer experience. Customer care and service are today considered to be the hottest domain in the mobile market battleground.
- Business – a better customer experience means increased customer satisfaction. In terms of consumer behaviour increased satisfaction results in more loyalty, a lower churn rate, a wider customer base, and higher revenue (Goldschmidt, 2008, Hu et al, 2009, Kuo et al, 2009, Srivastava and Rai, 2013, Dipta and Nugroho, 2013). Moreover, this kind of application may be extended to telesales centres, which would lead to a greater sales' success rate.
- Innovation – this project will position TC as a top innovative company in the service arena.

To provide a rich contextual positioning for my research work I have, in chapter 4, described two previous projects that I conducted between 2008 and 2010. These two case studies laid the foundations of the current research and reflect my ongoing research work in the field of *consumer behaviour* analysis. These projects made a profound impact on TC's business performance; they were successfully implemented and became part of the company's corporate strategy.

The first case study deals with the impact of *geographical communities* on TC's market growth and consumer behaviour in terms of product adaptation.

The second case study deals with the impact of *social networking* on its group members' consumer behaviour in terms of customer churn rate.

My idea to integrate those two case studies relies on the following rationale. Since my first project deals with the *physical layer* of consumer behaviour (geography-based community), and my second project deals with the *social layer* of consumer behaviour (social networking), my practitioner research will deal with the *personal socio-biological layer* of consumer behaviour, i.e. finding a link between various attributes of voice and speech and customer experience in voice-based interactions.

The two case studies overlaid by my practitioner research contribute to the understanding of the broader picture of the social aspects, which affect consumer decision-making and experience. By merging these research works, I seek to demonstrate the ongoing development in my research work from 2008 until today.

Chapter 2: Objectives and Review of Relevant Literature

2.1 Aims and Objectives

"We know that voices are socially significant... it would be strange indeed if the voice was not subject to socially motivated adaptations", said Graddol and Swann (1989, p. 26-27), and so, my research aims to illuminate the domain of the human voice with new aspects of consumer behaviour.

The aim of the research is to explore the call centres voice-based interactions with customers, to identify significant attributes and patterns in voice-based interactions in order to develop a methodology to positively impact TC business, and to contribute to the understanding of the dynamics of voice-based interactions in call centres.

On a high level, my research aims to contribute significant knowledge to the human voice and speech analysis domain as a whole and to its impact on consumer behaviour in particular.

Until now there have been quite a few academic studies which investigated voice and speech profiles with reference to human behaviour; Stanford (1986) in his research covered a few researched population types, Collins and Missing (2001) and Puts (2004) focused on gender attractiveness, whilst Andrew, Gaulin and Verdolini (2004) examined human dominance. All of the studies are important and contributed a lot to the socio-biology science. I believe that my research can bring an additional new aspect by using real world data without eliminating out-of-the-lab 'noise'. This

environment may function as a bridge between the academic theory and a practical application.

My project is a real-life development which aims to explore significant patterns in call centres voice-based interactions which positively impact TC business, and contribute to the understanding of voice-based interactions in call centres in general.

This project does not seek to prove results but rather to describe certain phenomena that are related to the domain of voice interaction between corporate service representatives and customers. By these descriptions I pave the way to future research to look more in depth at each finding which has been suggested. Also, in the near future I intend to implement part of the findings practically in a production environment inside or outside TC.

The main research questions are as follows:

- A. How do voice and speech dynamics influence the relationship between customers and call centre's Customer Service Representatives (CSRs)?
- B. Which aspects of the following voice dynamics (voice fundamental frequency pitch, resonance frequency, voice clarity, voice amplitude / intensity, speech rate, call possession rate) of consumers and call centre's CSRs has an impact – positive or negative – on voice-based interactions' customer satisfaction?
- C. How do voice-based interaction's results affect TC business in terms of customer satisfaction level?
- D. In what ways can TC call centres change the way they function to respond to these findings?

The first three of these research questions seek to produce new insights and knowledge where the last one seeks to embed those new insights within the physical systems of TC, either through technological developments or through procedural focuses.

In order to achieve the research aims I had to satisfy the following objectives:

- A. Review theories and literature of decision-making, consumer behaviour, human voice including aspects of socio-biology.
- B. Design a methodological observation in order to find connection between voice-based interaction's dynamics and consumer behaviour in effect.
- C. Set up the auditory observation using archived customer care conversation recordings, with all the necessary ethical arrangements.
- D. Analyse the auditory observations by measuring voice pitch frequencies, voice clarity, voice amplitude / intensity, speech rate, call possession rate.
- E. Interpreting the interaction's outcomes in terms of success / non-success results.
- F. Support the auditory observation findings by data triangulation through: conducting focus groups with call centre staff, and conducting customer satisfaction surveys.
- G. Devise a model to inform call centres to improve voice-based interaction and customer satisfaction.

2.2 Review of Relevant Literature and Information

When I designed this research, my starting point included general academic literature that deals with the domains of decision-making and consumer behaviour as well as human voice analysis. As my project has developed I have diversified my references towards more specific areas of consumer behaviour. This is due to the fact that I decided to present (in chapter 4) two case studies through which I have laid the foundations to my ongoing evolving DProf practitioner research which seeks to find a link between various attributes of voice and speech and consumer behaviour in voice-based interactions.

The two case studies, like my DProf practitioner project, deal with social aspects that involve consumer behaviour's sub-surface / subconscious dimensions in social interactions. The first case study seeks to explore 'the effect of geographical communities on consumer behaviour' and the second one seeks to explore 'the effect of mobile social networking on consumer behaviour'.

Another domain I covered is voice and speech analysis from both sides; the biological-technical aspects and the social meanings that emerged in other studies.

I also took into consideration the need to explore the worlds of service call centres and the mobile phone industry. These areas were reviewed using professional sources and a great deal of academic literature.

Lastly, I commented that the range of references in some parts of my project is quite wide and includes older literature. This is due to the fact that social science in the fields of geographically-based, community-based societies and voice and speech socio-biological meanings is rich in important old references that added value to this study.

The consumer behaviour study has been evolved dramatically in recent decades. It started to shift up in the late 60's with science orientated books which attempted to define consumer behaviour in figures and numbers, for example, one of Haines (1969) optional definitions is:

“ $Y = K_1 + K_2 [(1 + K_3 e^{\lambda_1 t}) / (1 - K_3 e^{\lambda_2 t})]$, where the K's are appropriate functions of $\alpha_1, \alpha_2, \lambda_1$ and λ_2 ”...

Of-course, the attempt to formulate consumer behaviour in rational parameters only looks unusual today. No wonder why in later stage academics started to split consumer

behaviour into two separate modes: decision-making process – consciously or subconsciously – and action.

Block and Roering (1976) and Engle, Kollat and Backwell (1973) define consumer behaviour as the “acts of individuals directly involved in obtaining and using economic goods and services including the decision processes that precede and determine these acts”.

Wilkie (1994, p. 8) takes the definition of consumer behaviour a few steps further: "The mental, emotional and physical activities that people engage in when selecting, purchasing, using and disposing of products and services so as to satisfy needs and desires". Wilkie identifies seven keys to consumer behaviour: it is motivated, it includes many activities, it is a process, it varies in timing and complexity, it involves different roles, it is influenced by external factors, and it differs for different people.

Kahneman (2005) observes many types of decision-making process which have been developed through many aspects: mathematically and statistically, economically and politically, socially and psychologically.

In my research the interpretation of consumer behaviour will be derived mainly from the broader area of behavioural science which traditionally contains psychology, anthropology, sociology, economics, political science, and linguistics.

The specific area of consumer behaviour aims to enrich the knowledge of marketers about the way human beings behave in response to various aspects of their environment. One of those aspects – sensation and perception, which is relevant to my project, contains the stimulus which is the physical energy that can excite the consumer senses (Cohen, 1981).

We can approach consumer behaviour from more aspects. For example East (1997) distinguishes between various types of consumption: Important, repetitive, involuntary, and group-influenced. Each one of them includes a different process of decision-making on the part of the consumer.

Following the concept of different consumers or different types of consumption necessarily result in different decision-making processes, many American academic authors started splitting the heterogenic American market into well-observed segments. Hawkins, Best and Coney (2001) review in-depth consumer behaviour in a complex cultural environment: a changing society with sub-cultures with different values that create cross-cultural variations. Therefore, when a consumer makes a buying decision his interpretation to the product or service characteristics (such as: physical features, social surroundings, temporal perspective and so on) varies according to his individual characteristics (such as: culture and sub-culture, demographics, motivation, personality, attitude and so on).

The development of decision-making process and consumer behaviour analysis in recent years pushes the academic models towards the psychological world and sometimes towards the neurological world. It is still in its theoretical stage and it has not been proved yet, but by the allocated R&D budgets to this domain it is indicative that it is going to be the next wave in the consumer behaviour study. Lynch and Larson (2009) position this trend as a *Neuro Revolution* through which we will be able to better understand the influence of human brains on our emotions and our consequent decisions in various domains (cited by Shechter, 2013). Furthermore, Hasson (cited by Shani, 2014) suggests that there is inter-influence between people's brains during interactional sessions.

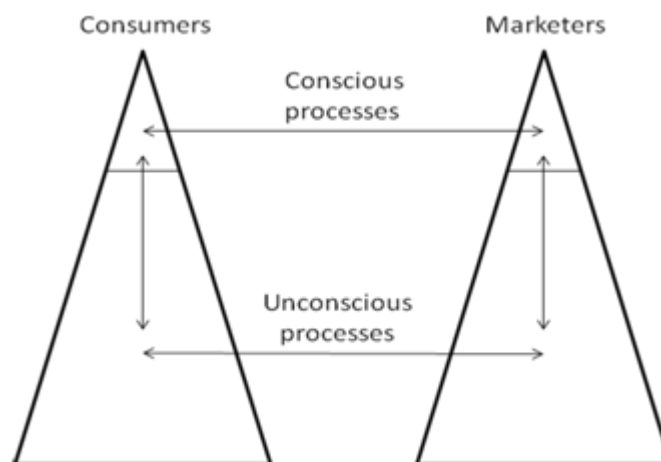
The analysis of hidden forces that drive consumer behaviour from rational to irrational started with simple marketing techniques (Geva, 1994) and gradually evolved into the recent wave of *neuro-economics* research led by academic pioneers from the field of

behaviouristic economy (Kahneman, 2005 and Ariely, 2008 & 2013 that heavily explore *intuitive judgment* and *perception biases*) and academic leaders from the field of neuroscience who claim that the human decision-making process is driven by information that the body feeds the brain (Ollier, 2012).

The psychological core that affects the internal consumer processes covers motivation, ability, attention, perception, categorization, comprehension of information, and change in attitude. The decision-making processes combine both cognitive and effective dimensions that consider judgment processes and contextual effects (Hoyer and MacInnis, 2007).

Zaltman (2004) describes in figure 2 his new paradigm of an integrated mind-brain-body-society the relationship between consumers and marketers as follows:

Figure 2: Zaltman's mind-brain-body consumer decision-making process



The areas of the human brain that involve choice are activated well before we become consciously aware that we have made that choice. That is, decisions 'happen' before they are seemingly 'made'. It appears that this specific area within the broad domain of consumer behaviour is the most relevant topic for my project.

Ariely (2008) surprises us even more by asking: how come our headaches lasts longer when we buy a 10 cents Aspirin? And why will we choose the 1 dollar Aspirin next time we look for a pain killer? Ariely's answers remain always the same: because we think and act irrationally! And this comes directly to part of my research questions whether there are hidden dynamics between the company's service representative and the customer that may affect the interaction results.

Before approaching my research questions I decided to draw upon two studies I conducted between 2008 and 2010. These studies sought to explore consumer behaviour in both geographical and social networking contexts. They were initiated because TC's footprint relates to 'groupness' and 'togetherness'. With this additional research, TC could potentially shed light on the seeming irrationality in consumers' decision-making and the impact of hidden forces on consumer behaviour. The first study reviews aspects of group behaviour and the mutual influence of social communities in given geographic regions.

Over time urban sociology research has provided clear evidence for the impact of locality on the *expression of our individual selves*. Individuals interpret and act in relation to other members of their society, so their social identity and their behavioural routines are influenced by the collective positions (Dickens, 1990).

An early researcher (Toennies, 1887) distinguished *community* from *society*. Community is driven by togetherness and common benefits and is typically located in rural villages. Society is driven by individualism and private benefits and is typically located in cities.

Moreover, Wirth (1938) was bothered by the harmful social ramifications of urbanization due to the loss of social solidarity. Other researchers displayed opposing views through which they highlighted the social pressure and 'mechanic' solidarity

within rural communities. Furthermore, urban societies are more tolerant of their members and enable more freedom of choice (Durkheim, 1897). Urban society members distance themselves from one another in order to dedicate their time and resources to the people about whom they care (Simmel, 1964), so they can comfortably develop themselves and feel self-fulfilled (Park 1952). It appears that city residents tend to be a more heterogeneous society and rural communities more homogenous (Dickens, 1990). The question is do all communities necessarily behave in a uniform manner (Wren, 1999)?

Urban physical metropolis which mapped their economic and social structure could clearly identify social neighbourhoods that highly correlated with the profile of individual residents within it, such as their poverty status, high income, ethnic origin and education (White cited by Hutchison, 1993) i.e. the region's landscape of commercial, financial, cultural and entertainment facilities, is reminiscent of the layout of the human residence.

To support this argument I could not think of a better example than Israel itself. Israel's landscape is a perfect case to investigate region-based communities as it contains Kibbutz settlements, Jewish orthodox towns, Arab towns and villages, West Bank settlements, Russian Jewish immigrant quarters in various cities and foreign worker-dedicated neighbourhoods.

These communities mostly share the same ideas and life philosophies and they are characterized by their extensive social life in a group in which individuals define themselves as 'members', as stated by Hartley (1997). Membership of these groups dramatically affects the individual's values and attitudes (Siegel and Siegel, 1968).

These communities are usually geographically isolated and this perfectly matches the theory that members in urban environment create weaker community cohesiveness due to weaker social connections with their immediate geographical groups (Park, 1952). This is contrary to people who live in remote rural villages who share common beliefs and ideology, just like Israel's aforementioned. In other words, city residents tend to

be a more heterogeneous society due to the rapid growth of population in cities, which breaks down the primary idea of social community. Rural communities tend to be more homogenous (Dickens, 1990).

The above theories were recruited to serve my first case study: whether geographical community members tend to adopt the same positions regarding TC (market share) and have similar usage patterns (usage intensiveness), and indeed my study results showed a moderate to strong correlation between geographically-based settlements with high social cohesiveness and TC customers behaviour.

Of course, today, the new internet-based media introduces many options in order to narrow geographical distance and enables users to become part of an online community, while minimizing the necessity of physical proximity (Ling, 2008). We should bear in mind that this study was conducted in 2008-2009 when new media was still incubated. Nevertheless, the geographically-based communities still have their own unique characteristics, as my study results indicate. Very important supporting evidence for this assumption is supplied by Ariely (2013), who demonstrates through his research how social campus-based belongingness draws out behavioural boundaries and helps us to adjust our moral compass.

Furthermore, probability of friendship between two new-media users as a function of their geographical distance is rather high (Scellato et al, 2011). Also, today, geographically-based communities appear in new media forms, e.g. residential applications for social car-parking, pet caring and jogging partnering (Amit, 2014). This trend indicates that even in a non-boundaries world geographical location still plays a strong feature in community building.

My second case study (conducted in 2009-2010), explored the impact of mobile social networking on consumer behaviour. It drew on literature from the world of informal social communities such as mobile networks. Radu and Ciprian (2011) call these kinds of communities' *opportunistic networks*, as each mobile device has an opportunity to move and disseminate data. Behrouz and Feng (2013) refer to *opportunistic mobile social networks* as mobile users with social characteristics who can be categorized by their movement patterns and common similarities and interests.

These ideas are based on earlier literature about *social life* and its derivatives, such as social structures; positions and roles among its members (Blau, 1977).

Laumann (1983) identifies various approaches to categorize social networks: *position-based*, *event-based*, and *relation-based*. The third approach might be the most suitable way to define TC's mobile social network. It not only encompasses friendships and collaborations but also information sharing and technical connection between network members (Wasserman and Faust, 1994). Marin and Wellman's (2009) *Ego Network* serves my analytical approach by considering each member as one focal point and examining the network members connected to this individual.

Rainie and Wellman (2009) point out three elements which enable the *Networked Individual* revolution: social networks, internet and mobile handsets. They distinguish the difference between a social network and a group, where a group has clearly identified boundaries and social networks are unlimited. They provide the Silicon Valley hi-tech super innovation zone as an example of knowledge sharing.

The behaviour patterns of social networks are formed through the relationship between its members (Wasserman and Faust, 1994). Marin and Wellman (2009) suggest that social network's ties are based on mutual feelings and cognitive awareness. They impact various domains such as cultural knowledge.

Rigorous research by Christakis and Fowler (2009) and Chistakis (2010), indicated that social network members are influenced by their networking friends and influence them in return. This strongly supports the conclusions of my study that illustrated the influence between the mobile social network's members in their decision-making processes and their consequent behavioural attitude (chapter 4, paragraph 4.2.3).

After presenting the two case studies that demonstrated how geographic-based community and social-based network can affect consumer behaviour, I approached my DProf research with a view to investigating whether interpersonal socio-biological parameters can affect consumer behaviour: How do voice and speech dynamics impact interpersonal consumer behaviour in voice-based interactions service providers and customers?

The social role of voice and speech runs far beyond its biological context (Graddol and Swan, 1989, Mathieson, 2001). In accordance with this paradigm I designed my research as follows: Voice and speech parameters⁷ (of both CSRs and customers) play the role of explaining variables (*cause*), whilst service perception⁸ plays the role of the explained variable (*effect*)⁹.

The way customers feel about the firm's service level is becoming vital increasingly to every organization. Furthermore, companies today understand this strategic development more than ever and therefore they invest heavily in systems that support customer service. They are very focused on improving customer satisfaction (Stauber, 2004).

⁷ Voice fundamental frequency pitch, resonance pitch, clarity, amplitude, speech rate, possession rate.

⁸ The gap between the actual level of service and the customer satisfaction rate – under-rated / correlated / over-rated.

⁹ Cause and effect are two parameters that are used in exploratory research in which there is a major emphasis on the discovery of ideas and insights (Churchill, 1995).

According to Goldschmidt (2008), customer satisfaction is a function of service evaluation by customers and their expectations. This definition correlates precisely with my research design: My research results rely on the quality of service as perceived by the customer.

Since good customer service has a significant effect on customer satisfaction (Dipta and Nugroho, 2013, Hu et al, 2009, Kuo et al, 2009, Yulin et al, 2014), and customer satisfaction is one of those crucial parameters in insuring organization growth through customer loyalty (Srivastava and Rai, 2013), my research contributes new dimensions in understanding the forces that drive customer behaviour in service interactions in general, and most specifically in voice-based interactions.

Many of those forces have been researched and applied in call centres by both organizations (by setting up on-going upgraded policies) and CSRs (who implement those policies in practice), i.e. caring, knowledge, methodology, accuracy, positive, polite, creative, active listener and others (Goodman, 2000, Ukens, 2007, Knapp, 2011). My research seeks to spot the hidden forces that affect customer satisfaction which lies beyond the current scope of CSRs training, i.e. voice and speech dynamics.

Goodman (2000), Eisner (2001), Goldschmidt (2008), Knapp (2011) and others have examined and explored customer satisfaction from various angles: price, product quality, service technical KPIs, customer welcoming, organizational culture, organizational methodology, organizational training level, operational support systems and more. My research contributes a new, unexplored approach: How do voice and speech-related hidden elements that exist in interactions between a specific CSR and a specific customer affect – either positively or negatively – customer satisfaction as a function of actual service level.

The voice and speech variable parameters that I have sampled in my research involve the fundamental and the resonance frequencies of the speakers' voice. According to Mathieson (2001), human voice is created through the vocal tract which consists of a complex system combined the upper respiratory tract and the lower respiratory tract. All this system functions independently and any modification in one element affects all the other elements immediately. Each element creates different voice type and this is the reason why our voice is so unique and individual. Voice pitch frequency is derived from vibration of air molecules. The vibrations are represented by the cycle number of air puffs waves per second. This frequency is called Hertz/Hz.

Geva (1994) remarks that the human ear can only detect waves within the frequency spectrum between 20Hz and 20,000Hz (20KHz). Sound outside this range is not detectable by the human ear.

The discussion about voice fundamental frequency range and its average values is supported by a few references i.e. Majewski (1972), Graddol (1986), Graddol and Swan (1989), and Geva (1994). This literature provided content that enabled me set the research crucial values of average frequency pitch of male speakers (around 110-115Hz) and of female speakers (around 190-210Hz).

Voice resonance frequency is rather important too, since it creates harmonic acoustics. Boone et al (2009) states that the human voice does not produce a single tone but a series of higher frequency tones. These upper harmonics are normally organized in a mathematical ratio values (harmony), as it was most likely discovered by Pythagoras science group about 2,500 years ago (Singh, 1998).

Since the anatomical and physiological structures lead to an enormous number of variations in vocal harmonies, just like figure prints, they create an individual's unique identity and personality. This is the place where the social context of voice takes place,

i.e. voice frequencies are connected to social positions and human perceptions, as Graddol and Swann (1989) kept indicating in their noble book *Gender Voice*. Even Mathieson (2001) who is identified with the stream of biology-orientated voice analysts considers voice as means that constantly transmits information about the speaker, especially in different social contexts.

Many studies have confirmed that voice triggers signal for human attractiveness and social dominance: Ohala et al (1994) called it 'the frequency code' where low pitched voice sounds confident and dominant and high pitched voice are related to submissive and subordinate individuals.

In recent years there have been more evidential academic studies in the fields of voice pitch frequency impact. All of them concluded that voice frequencies set a partner's attractiveness level. Collins and Missing (2001) investigated the relation between vocal attractiveness in women as judged by men. Puts (2004) tested the hypothesis that "female choice for good genes influenced the evolution of male voice pitch". Andrew et al (2004) examined the relationship among voice pitch, dominance and male mating success. Zuckerman et al (2002) examined the "effects of attractiveness and maturity of face and voice on interpersonal impressions". Borkowska and Pawlowski (2011) showed that women's low voice pitch is perceived more dominant by men, but at the same time women's high pitch is perceived more attractive by men.

Moreover, women's own voice pitch is adapted and raised when they are attracted to men with low voice pitch (Vukovic et al, 2010). Klofstad et al (2012) and Tigue et al (2012) indicated that men and women prefer leaders with low voice pitch. Low-pitched male leaders are perceived as attractive (by women) and competent and strong (by men).

All of these studies align perfectly with my research results, which indicate that low-pitched male CSRs bring about over-rated customer satisfaction by relatively high pitched female customers, and high-pitched male CSRs bring about under-rated customer satisfaction by relatively low-pitched female customers.

Interestingly, Goodman (2000) remarks that varying voice pitch creates more attractiveness and interest from the listener's side. This claim has not been checked in my research.

In conclusion, it appears that the quote of Graddol and Swan (1989) generally summarizes my research findings, as follows: "It would be surprising if people did not use their voices to project a culturally desirable image".

Another parameter that was measured in my research is the speech rate of the CSRs as well as the customers. Speech rate proved to be very difficult to investigate, due to lack of relevant local literature. Relevant articles (such as Amir and Grinfeld, 2011) showed irrelevant Hebrew speech rate values (270 words per minute). This kind of value does not make sense, since it does not match any practical observations.

By way of contrast, according to Goodman's (2000) measurements the average speech rate of English speaking Americans is between 100 and 150 words per minutes. This estimation is much closer to my own measurements (110-120 words per minute). Goodman (2000) states that communicating in average values of speech rate usually makes the speaker feel comfortable, however if the conversational partner is not in the same range then this rule is not valid and adjustments in speech rate may be made. A few evidential cases in my research support this theory, i.e. mismatched speech rates can create uncomfortable situations with customers.

An experiment at Colombia University conducted by Apple et al (1979) was showing surprising results: slow-talking speakers were judged less truthful and weaker (depends on the particular context). This insight has not been reproduced since then neither in theoretical literature, to the best of my knowledge, nor significantly in my research findings.

Another parameter that I checked was possession rate of each party in the interaction. I have synthesized it to *Social Dominance Theory* (SDT) where behavioural asymmetries exist (Sidanius and Pratto, 2001) and *Social Dominance Orientation* (SDO), where individual's desires in social groups are considered (Sidanius and Pratto, 2001). This model suggests that males have a higher social dominance orientation; hence they locate themselves in a higher hierarchical position and consequently tend to be more dominant than females.

Further, Eagly and Wood (1991, cited by Ridgeway, 1992) indicated through their *Social Role Theory* that women are expected to be more 'friendly', 'concerned', and 'expressive', where men are expected to be 'independent', 'masterful', and 'assertive'. Since people behave with those gender role expectations, consistently, the stereotypes strengthen women's social orientation of being less dominant than men in group interaction. This theory reminds of Graddol and Swann (1989), who claimed that men talk more than women in a variety of contexts, depending on the personal and emotional aspects that are involved. My research results display exactly the same insight. Furthermore, Dunbar and Burgoon (2005) pointed out that one way individuals try to influence or alter the behavior of their partner in a relationship is through speech tempo and the amount of dialogue.

The duration of each party in the dialogue (termed ‘conversation possession rate’) as measured in this study was found to be an important factor in identifying the most dominant person in a group meeting (Hung et al, 2007).

Leet-Pellegrini (1980) conducted an important experiment which examined cross-gender interactions between so called ‘experts’ (might be considered equivalent to CSRs in my research) and ‘non-experts’ (might be considered equivalent to customers in my research). The research insights indicated that men talked more than women (also indicated by Tannen, 1993), ‘experts’ talked more than ‘non-experts’, and male ‘experts’ talked more than female ‘experts’, especially in relation to female partners.

My research results partially meet Leet-Pellegrini’s conclusion, as in mixed-gender interactions, males usually talk more than females. However I could not confirm their insight that ‘experts’ (in this study, CSRs) talked more than ‘non-experts’ (in this study, customers). Males held a higher conversations’ possession rate when they interacted with females, whether they were CSRs or customers.

Another interesting link between my research findings and the academic literature originates in Ridgeway’s experiment (1992). This experiment proved that in work types that require a high level of social interaction behaviour, the performance of the all-female groups was more efficient than all-male groups. If I could create an equivalent a voice-based interaction between a female CSR and a female customer to a social-orientated task in an all-female group, then my research findings would support Ridgeway’s conclusion. It would indicate a relatively lower silence rate and shorter average duration in all-female interactions. These parameters imply on better efficiency within all-female interactions.

The chosen methodology in my research is based on a qualitative survey approach which involves auditory observations followed by triangulation (focus groups and sample surveys¹⁰). This multidisciplinary methodological approach has been inspired by Robson (1993) who stated that work-based out-of-lab research aims to solve problems and predicts effects rather than just gaining theoretical knowledge. As such, work-based research usually combines formal methodologies and professional knowledge perspectives.

In this sense, also McCartt, Hess, and Mullen (1995) distinguished between in-lab researchers who seek the ‘truth’ and practitioner researchers who seek to help improve practice, which is exactly what my research delivers. This concept is supported by Hakim (1987) as well. His attitude indicates that a methodological approach in practitioner research is not necessarily selected from a list of textbook methodologies.

In a broader context, Costley, Elliott, and Gibbs (2010) distinguished between formal model paradigms and our day-to-day authentic operating paradigms in a work environment. The Hebrew speech rate issue that I mentioned above is just one example that demonstrates the gap between the two environments’ paradigms.

I believe that my practitioner research, which aims to contribute ideas and insights, will help to improve theory, which in turn will help to improve practice (Trist, 1976).

¹⁰ In order to ensure correct research methodologies I have used Churchill’s guidebook (1995).

Chapter 3: Methodology

3.1 Introduction

3.1.1 Ontological Perspectives and Epistemological Dimensions and their Impact on my Project Perspectives

There are four psychological phenomena which underlying ontological knowledge: anomalous sentences which are neither true nor false, natural classes which humans find more natural than others, similar classes which humans may find more similar to some classes than to others, and natural co-predications which represent sensible / natural / logical combinations of pairs of predications. The four phenomena are closely related to one common knowledge / predictability which is a reflection of the basis of person's understanding of what sorts of things exist in the world and the relationship between them (Keil, 1979).

One can argue that beyond the above mentioned four phenomena everything is questionable, so I cannot claim that my knowledge is perfect. However, from a practical point of view I can argue that my knowledge stands on solid ground. With a high degree of confidence I can argue that I know the crucial terms of my profession. I can also claim that I fully understand the theoretical and practical domains in which I am involved, and that I am familiar with the tangential contexts of each domain. However my knowledge as I know it is subjective because there are some deeper philosophic concerns. Epistemologically, there are questions to be asked about my knowledge: Is my knowledge truthful? How can we identify truth at all? Is truth permanent or does it vary? Can I influence truth? And so on.

Furthermore, according to Ryle (1949) there is a difference between "knowing that" and "knowing how". Kemmis (2010) quotes Eraut (2004) and Higgs, Tichen, and

Neville (2001) who suggest that professional practice knowledge can be described in terms of: (a) propositional \ theoretical \ scientific knowledge, (b) professional craft knowledge and (c) personal knowledge. I feel that my overall knowledge contains pieces of knowledge from each possibility mentioned above. If I ignore the deep "existence" aspects which are widely questioned in ontological contexts, I will be able to claim that in those areas where I feel confident enough to testify that "I know that" – I am confident enough to say that "I know how". I feel that in accepted industry terms today, my "know that" and my "know how" rely on solid pillars which will be hard to destabilize. They are based on a long period of theoretical learning and practical experience. Moreover, during that period I have managed to create tangible values, for example, real products and services that created a well-recognized value for the company.

In addition, nowadays we live in a very special age: the "Wisdom of Crowds" age (Surowiecki, 2004). The Web2.0 phenomenon helps to determine "truths" and "beliefs" in a different way. No more does one speaker affect many other people's beliefs, but "many speakers build together common beliefs", so the error-space is objectively narrowing. I will just provide a famous example from Surowiecki's research to demonstrate this fact:

Surowiecki observed the performance of "experts" in comparison to random audiences in the TV programme "who wants to be a millionaire". He found out that the "experts" offered the right answer 65% of the time, where the audiences provided the correct answer 91% of the time.

Wikipedia and Wikipedia-like were never available before, and there is no doubt that our "knowledge", and mine in particular, can be judged now by a collective knowledge base.

Wikipedia is a great example for the Web2.0 phenomenon. 100,000 editors around the world, on a permanent basis, redesign, redefine and rephrase all those truths and beliefs for 400 million unique users every month. They actually build a new global knowledge base, which carries 18 million rephrased values (The Marker magazine,

2011). I am perfectly aware of the fact that there are criticisms of it from academic bodies but it is a rule of thumb that collective knowledge is stronger than any encyclopedia's editor; it has been widely proven that many people can estimate and evaluate much more accurately than the most professional individuals (Burak, 2007).

In TC's call centres we do not enable interpretation space for customer care representatives, so they have to follow an organizational Wikipedia-like knowledge centre which they can access and where they can find any piece of information they look for. This tool is consistently updated together with input from the representatives themselves. They actually reflect in the system their daily case studies in order to expand the knowledge of the entire group.

Not only is my project based on my own practical knowledge, but in addition I created a research layer as a solid basis on which I have built my assumptions. In both cases had to handle the research carefully, much as Cunliffe (2003, p. 985) quotes Pollner's definition for Radical Reflexivity: "an insecurity regarding the basic assumptions, discourse and practices used in describing reality".

Furthermore, I have made sure that my chosen methodology is adjusted to the research challenges and designed by all the rules of quantitative and qualitative research.

Magolda and King (2004) refer to a Learning Partnership Model (which has common characteristics with Middlesex University's Work Based Learning in terms of combining both professional and academic discipline under one umbrella) and the shift that students have to make from theoretical approaches to professional contexts. Magolda and King and Hanes (2004) suggest developing a method which bridges between official external formulas and self-authorship, where the academy hosts a plan in which students can progress from focusing on expressive modes to providing a critical awareness of proficiency in disciplinary forms.

3.1.2 Ethical Considerations

This kind of research could potentially raise a few ethical dilemmas and conflicts of which I had to be aware. In Israel there are quite a few official academic and research codes of ethics; part of them were defined by governmental institutes (lead by Prof. Assa Casher from Tel Aviv University) and part of them were designed inside the universities themselves (lead by Dr. Yizhak Nevo from Hanegev University and The Open University – elaboration on his ethical concept will be described later on). Although these official codes involve clear and fixed rules and principles in order to provide guidance, ethical research fundamentally depends on the researcher himself.

The personal moral code of a researcher is "the strongest defense against unethical behaviour, before, during, and after conducting a study ... Ethical research depends on the integrity of the individual researcher and his or her values" (Neuman, 1997 p. 443).

Those ethical fixed rules and principles, which could be related to confidentiality and authenticity, aim to clarify moral uncertainties and define what a legitimate process is and what is not. Neuman considers ethical research as research that complies with both moral and legal actions. Any other combination of the two actions will drive the research towards an unethical approach. This is obviously the ethical ground on which I have based my project.

Two large organizations (CEPLIS¹¹, 2000 and BPS¹², 2009) have clearly identified and defined the main ethical considerations in the fields of liberal professions and psychology respectively. They emphasized the following principles: respect, confidentiality, competence, responsibility and integrity.

¹¹ CEPLIS - European Council of the Liberal Professions. See also bibliography below

¹² BPS - The British Psychological Society. See also bibliography below

Robson (1993) has adopted the BPS code of ethics for practitioner-researchers who conduct research with human participants, which is very relevant for my research as well.

Each one of the above mentioned principles consists of a set of values and standards which reflect the basic concepts that drive ethical reasoning, decision-making, and behaviour.

So, for respect, the set of values includes elements such as privacy, confidentiality and use of information. The competence principle covers elements such as professionalism, decision-making, and recognition of competence boundaries. Responsibility includes values such as research participants' protection, whereas integrity consists of values such as honesty, accuracy, and avoidance of conflicts of interest.

Each and any of those ethics values and elements have great implications for my research, as follows:

Since my research involves individuals the use of information was handled extremely carefully and responsibly due to privacy and confidentiality matters. I did not publish names and not use raw materials outside TC. I respected the participants by specifying transparently all the process, its aims and its output.

In addition, since my research is based on qualitative survey there will be a possible room for personal interpretations. These interpretations were highlighted and marked very clearly in order to place the competence border between research facts (for example: voice-pitch frequency) and derived interpretation (for example: positive interaction's results).

And last, integrity is the key for a successful research – I have acted very accurately (for example: in selecting the sample) and was honest when analyzing the research findings.

Nevo (1994) states that just like any other professional discipline, the academic-scientific research discipline has an implicit code of ethics, and the responsibility to turn this code into an explicit one rests on the research community's shoulders. In other words, the research community has the responsibility to publicly reveal the core values of the code of ethics of academic research. The absence of such explicit self-codification may result not only in poor functioning of the academic research but also in the loss of its moral autonomy.

Just for demonstration purposes, Nevo raises the ontological question of what "truth seeking" means. Is it only the way it is seen by the researchers? Or perhaps it is about the way it is reflected in the research community's narrative? Or maybe truth seeking can be supported only by empirical or analytical research? These questions are reinforced in my case as someone who holds professional paradigms and beliefs that are not necessarily inconsistent with the academic conceptual world.

Ben-Gurion University's position in this ethical debate is to accept the individual researcher's inherent subjectivity on one hand, but to grant complete academic freedom to their critics on the other hand.

When I had proposed my research I raised a few general ethical concerns:

- Is my practical knowledge an adequate platform on which to base my research assumptions?
- How shall I choose the best research methodology to serve "truth seeking"?
- How can I design a maximum-balanced and a minimum-bias study?
- How can I deal with interpretation in qualitative study?
- How can I make sure that my data processing is accurate?

- How can I settle the conflict of interests between my desires as a practitioner and my duties as a researcher?

During my research I had to face rigorously the above concerns; moreover, my research could raise a few more ethical issues that could have caused unwanted negative impacts and biases. These issues were carefully considered and addressed in my project plan work and when I considered forms of methodology:

In the domain of confidentiality and respect:

Since my methodology involves auditory observations through access to customer records, I asked TC's Legal Counselor for advice. He pointed out three elements to which I need to pay attention:

Not to reveal the content of the conversations, to keep customers' names private, and to make sure that the prompt "this call is recorded for study and training purposes" is played for each analysed interaction.

In order to implement TC's Legal Counselor advice I listened to customer representative conversations directly from the CRM system and did not download it to any personal device. Also, I did not keep any in my possession any document which involves participants' names, but only conversation content.

In the domain of integrity and responsibility:

I kept the authenticity of data and analysis through avoidance of methodological biases and triangulation of interpretative insights.

Since my research deals with human voice pitch types, I took into consideration elements that could affect the research indirectly, for example, a participant's gender, age, accent, and dialects. Also, I eliminated indirect biases caused by unknown factors, such as waiting time until the call was taken or the time of day by selecting call records with similar service attributes.

In addition, in order to analyse real call centre recordings, I have built a conversation scoring method in order to reduce subjectivity (elaborated later below).

Finally, I was transparent to my managers and colleagues at work.

To conclude the ethics required activities, the following practical actions ensure issues such as legality, participants consent and process transparency:

- A. Ensuring that each sampled interaction has a prompt '*this call is recorded for study and training purposes*' played prior to the interaction.
- B. Analyzing all the sampled interactions only through direct listening from the CRM system rather than downloading them to any personal device.
- C. Ensuring that there is no access to any record or document which involves participants' names.
- D. Clarify to any customer service representative who is part of the focus group that the aggregated content is part of a doctorate research that I conduct. Only after gaining their consent I start to collect the data. Obviously, needless to mention that no political or any other pressure has been involved.
- E. Asking TC's legal council to approve again the whole process once it starts.

3.2 Project Design

3.2.1 General Aspects and Considerations towards Project Design and Chosen Approach

The research methodology that I have chosen, in order to support the research assumptions and provide answers to the research questions, are based on a qualitative survey approach followed by triangulation (focus groups and sample surveys).

I have selected more than one methodology; since practitioner research usually tends to use multiple methodologies, combining off-the-shelf methodologies with professional knowledge-based methodologies.

Quantitative methodologies are less relevant in this kind of research due to the wide range of possible biases (as specified in my ethical considerations above). I can support my findings and reduce subjectivity through quantitative sample surveys but definitely not rely on it solely. I considered qualitative approaches - other than qualitative survey and focus groups that I did choose to use - which are typical in work-based research and found them inadequate. For example, phenomenological approach which aims to gain deep understanding of individual perceptions (Costley, Elliott and Gibbs, 2010) but does not deal with finding significant variations in systematic actions, which is important for my research.

I believe that my mixed methodology which includes qualitative survey will be optimal vehicle to reach the knowledge that I seek to gain (as elaborated in depth in the *Data Collection* section below). I ensured in advance that all the collected required data is relevant and accessible. Also, I ensured the availability of the participants researched and of the information sources.

The project validity depends on the reliability of the data analysis process. My field research provides an accurate analysis relying on valid data in order to represent the real-world confidentially (Neuman, 1997). This has been made by transparent data documentation and balanced analysis which follows the fundamental rules of appropriate research.

The term *paradigm* was first coined by Kuhn (1962) when he was trying to figure out his diagnosed difference between exact science practitioners who failed to evoke controversies over basic scientific facts and social science practitioners who consistently disagreed among themselves. Kuhn (1962, p. 52) raised the anomaly of scientific discoveries by the fact that “research under a paradigm must be a particularly effective way of inducing paradigm change”.

Although the term *paradigm* has no clear definition and there are not any common statements of its meaning, the generic sense of paradigm is a basic set of beliefs and guides either everyday ones or in relation with disciplined inquiry (Guba, 1990). Guba characterizes all the paradigms into three basic questions: the ontological question – which deals with the "knowable", the epistemological question – which deals with the relationship between the inquirer and the "knowable", and the methodological question – which deals with how the inquirer should find out knowledge.

I think that the methodological question is a most important question for carrying out my project since practitioner research has been accepted as a trans-disciplinary concept that may bridge traditional formal paradigms and the pragmatic knowledge that the inquirer may contribute.

Paradigms have to be carefully considered rather than categorized and fitted to existing models. In practitioner research most of the personal paradigms are specific and consist of characteristics of more than one official methodological model. They must reflect the practitioner's genuine belief and be coherent. One has to distinguish

between formal model paradigms and our day-to-day authentic operating paradigms in a work environment, as they can move to a different point of view quite rapidly (Costley, Elliott, Gibbs, 2010). In addition, apparently, our view of knowledge changes as we develop greater epistemological maturity (Kitchener and King, 1981). So, as a starting point, I mapped the paradigms that lead to my research assumptions in order to provide my project with more validity and robustness, as follows:

- The Israeli mobile market in 2010 is saturated (130% penetration rate and no significant annual growth). The market consists of three well established operators, plus five new Mobile Virtual Network Operators (MVNOs), plus two new full operators. The competition is driven by customer loyalty strategies. These facts were based on many reviews that were published often in daily press as well as industrial and professional reviews.
- A mobile operators' call centre is one of the most crucial focal points with the customer. The call centre's CSRs provide service "by the book" through a highly managed information system. The customers make their decisions based on those conversations and according to the quality level of the solution which was offered. This conclusion is based on TC's internal ongoing analysis.
- Consumer behaviour is based on many conscious decisions, such as product quality and price, but also on some subconscious decisions, such as smell and colour and other subconscious effects. This fact relies on many studies which are mentioned in a wide range of literature (Haines 1969, Engle et al 1973, Block and Roering 1976, Cohen 1981, Wilkie 1994, Geva, 1994, East 1997, Hawkins et al 2001, Zaltman 2004, Kahneman 2005, Hoyer and MacInnis, 2007, Ariely 2008 & 2013).
- 'Trust' and 'satisfaction' are the two major parameters that affect customer loyalty, where customer loyalty in saturated markets is the biggest parameter impacting the operators' business results (based on market studies which were conducted in TC).

From this point, I tried to explore the research question whether voice-based interactions and other conversation dynamics can play a subconscious factor in influencing consumer behaviour, and if so, in what form.

McCartt, Hess, and Mullen (1995, p. 189) have described the situation prior to developing collaborative models for researchers and practitioners' cooperation:

"Researchers and practitioners seemed to occupy two different planets. Researchers were portrayed as valuing scientific rigor and seeking 'truth', whereas practitioners were typified as relying on experience and professional wisdom to help clients and improve practice".

Robson (1993) characterizes the real world practitioner's out of the laboratory applied research in comparison to a pure basic research. Robson defines the real world field research as a process which comes to solve problems and predicts effects rather than just gaining theoretical knowledge and finding causes in the case of the academic lab world. Robson also identifies another major difference that has significant implications to my research design: the practical enquiry uses multiple research methods rather than single methods which are typical to academic peers.

To me, it strengthens a lot the concept of hybrid methodological approach which combines academic accepted methods and practical professional tools. On the other hand, this creates also the dissonance, that potential researcher-practitioner like I may face, between professional desires and academic duties.

Hakim (1987) indicates that a methodological approach in practitioner research is not necessarily selected from a list of textbook methodologies. Work-based research usually combines formal methodologies and professional knowledge perspectives.

Hakim suggests that the most substantial factor that characterizes practical research more than anything else is the use of a multidisciplinary approach which leads to use of all potential research designs which might be helpful in providing answers to the posed questions.

Moreover, Trist (1976, p. 46) argues that while natural sciences first reach to research conclusions and then apply them, social sciences make theoretical progress in parallel to practical implementation: "practice helps to improve theory, which in turn helps to improve practice". This argument is directly linked to the claim to adopt new research approaches in order to close the gaps between researchers and practitioners (McCartt and Mullen, 1995). The implications of this concept are significant for the way I have decided to design my overall research approach.

3.2.2 Project Design Approach

In this research I provide evidence to my progressive work in the field of consumer behaviour analysis. The approach that I took in this research was to integrate my ongoing progress in the field of consumer behaviour into the practitioner research project; hence I brought two former projects that I conducted during the years 2008-2010. I am presenting them in depth in chapter 4 as two case studies, prior to approaching my practitioner research description. These two case studies deal with consumer behaviour from two different aspects and were implemented in practice in TC where they created a tangible value for the company. They are used as foundations to my DProf practitioner research and contribute to the understanding of the broad picture of consumer behaviour, as follows:

- First part (case study number 1): Exploration of the impact of Geographical Communities on TC's market growth and consumer behaviour in terms of product

features adaptation. This study was conducted in TC during the years 2008-2009 and deals with the physical layer of consumer behaviour.

- Second part (case study number 2): Exploration of the impact of Social Networking on its group members' consumer behaviour in terms of customer churn rate. This study was conducted in TC during the years 2009-2010 and deals with social layer of consumer behaviour.
- Third part (my DProf practitioner research): Exploration of the impact of Socio-biological dynamics – voice and speech attributes – on consumer behaviour in voice interactions. It deals with the personal socio-biological layer of consumer behaviour. My depended variable in this research is customer experience extent.

The methodologies of the two case studies (demonstrated in the first two parts) are widely explained and embedded in the case studies themselves. The methodology of my practitioner research is elaborated here below.

3.2.3 Methodology Overarching Approach of the Practitioner Research

The research methodology is based on a qualitative survey approach followed by triangulation in order to cross-check the research findings from several angles and reduce subjectivity.

My methodological approach involves the following research activities:

In phase 1: The main research approach is a *Qualitative Survey* through which I ran auditory observations.

Qualitative survey is quite rarely mentioned in the social research methodology theory world, since survey is automatically related to the quantitative form of population observation and study (*Sample Survey* – will be elaborated later on). Qualitative

survey is defined as a study which "observes social interactions or communications between persons... in a given population" (Jansen 2010, p. 2). It determines the diversity of a specific domain of interest within a given group, without the restriction as to the number of empirical cycles etc.

By Jansen, if in quantitative sample survey we count the number of researched with the same attributes; in the qualitative survey we establish the meaningful variation within that population or the exploration of meanings and experience. The qualitative survey – which studies the diversity rather than distribution – appears in various fields such as biology, education, anthropology and psychology, in order to analyse combinations, attitudes, involvements etc.

My main research methodology relies on qualitative survey through *Auditory Observations* which are based on archived audio-recordings of customer interactions through TC call centres. It aimed to document all the voice-based interaction's dynamics (of both CSRs and customers: voice pitch, voice intensity, speech rate, call duration, possession rates) and find significant variations through identified patterns which indicate a well-recognized customer behaviour under specific voice based interaction's attributes. These records are accessible, they are drawn from large representative samples, and above all, they are well documented, for example, by date, hour, CSR profile, customer profile, interaction subject, and interaction results. This action has followed all the ethical considerations: access approval by the system manager, data protection, confidentiality and avoidance of information misuse.

In phase 2: The above mentioned qualitative approach is followed by *Triangulation* research tools for additional evidence, cross examination, reliability testing, findings confirmatory and subjectivity reduction. Cohen and Manion (2000) define triangulation as a research strategy to understand fully complex human behaviour by studying it from more than one point of view. Denzin (2006) distinguishes between four types of Triangulation – data, investigator and theory triangulations – where the

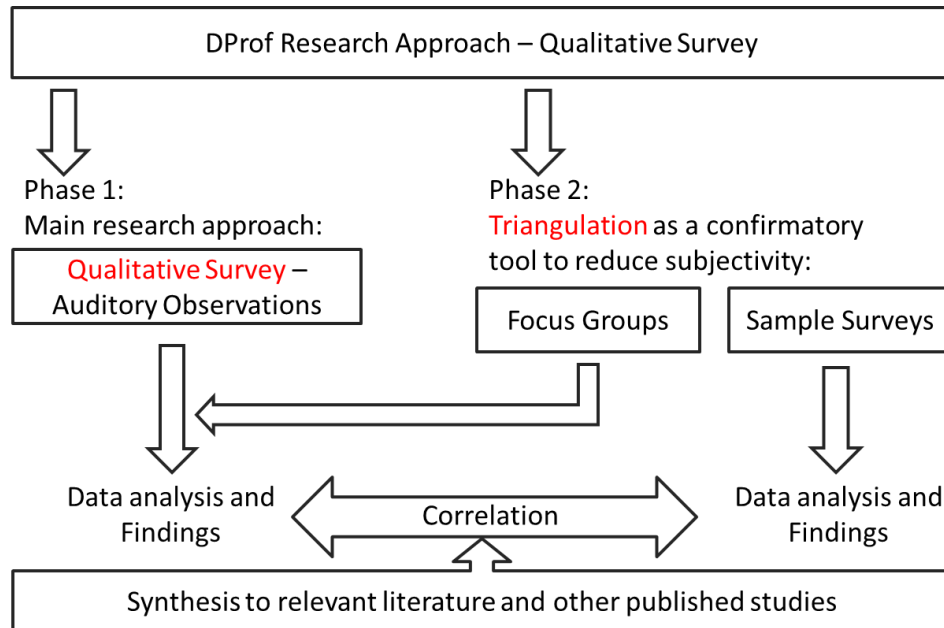
forth one is the *Methodological Triangulation* which uses more than one method to collect data, for example interviews, observations and documents. The triangulation methods that I will use are:

A. *Focus Groups*: focus group is a method that helps to gather insights about a specific topic. It gathers a small group of individuals for a directed discussion which is managed by a moderator (myself, in this case). Each individual is exposed to the group members' ideas and express his opinion for consideration (Churchill, 1995). The main idea is to build a group which consists of the call centres' CSRswho were sampled in the auditory observations, play the recorded conversations they had, and explore how they interpret the conversation outcomes.

B. *Sample Surveys* (also Cross-sectional surveys) which were already conducted internally in TC. Sample survey is a quantitative method to measure variables of interest from sample of elements that selected to be representative of some identified population at a single point of time. So in this form of research the emphasis is on the frequency of occurrence rather than meaningful variations or experience as tend to be in qualitative survey (Churchill, 1995). Through the sample surveys that are conducted on consistent basis in TC I will review those researched individuals who were observed in the auditory observation's main research in order to cross-examine my interpretation in comparison to their sampled satisfaction feelings de-facto.

In order to demonstrate my overall research strategy I summarized it in the chart below (figure 3):

Figure 3: Practitioner research overarching methodology



3.3 Data Collection and the Process of Analysis

In my research I have operated three different concepts in two phases for data collection which are analysed in several ways:

3.3.1 Phase 1 Main Research Approach – Qualitative Survey – Auditory Observation

Observation as a whole is a research method through which we watch or listen in a natural work environment, and then "describe, analyse, interpret, what we have observed" (Robson, 1995, p. 190). The advantages of this method are its directness and natural character; small details and tiny nuances are reflected and help to puzzle the picture in a better and more representative way. Questionnaires and other survey

tools deliver what the research subjects "say"; observation enables the researcher to learn what the research subjects "do".

The disadvantages of the observational approach mainly concern the issue that research subjects might be affected by the fact that they are being observed. In my case there is no such bias, because I listen to real-life conversations which were recorded prior to my auditory observation. There is also the practical problem that this method consumes a lot of time.

The biggest advantage of observation, especially archived observation, is the resolution that the research can reach; small gestures and nuances can make the difference in comparison to other information gathering techniques. It gives the researcher the ability to sense what is going on in an authentic way. In my research case it is even more significant because I do not interview or listen to live conversations as an observer who might impact the participants. In fact I analysed interactions in retrospect, and yet, I had to be extra-sensitive through careful listening, as Neuman (1997, p. 361) indicates:

"A great deal of what researchers do in the field is to pay attention, watch and listen carefully. They use all the senses, noticing what is seen, heard, smelled, tasted, or touched. The researcher becomes an instrument that absorbs all sources of information... a field researcher notes aspects of physical appearance...because they expressed messages that can affect social interactions".

Robson (1993, p. 192) claims that the observational approach "is commonly used in an exploratory phase, typically in an unstructured form, to seek and find out what is going on in a situation as a precursor to subsequent testing out of these insights as hypothesis." Although I structured the data collection process in advance, I still faced unexpected outcomes that I had not considered originally (will be elaborated in chapter 4).

The main method of data collection is based on archived records of customer interaction through TC call centres. These records were accessible, they were drawn from large representative samples, and above all, they were well documented, for example, by date, hour, CSR profile, customer profile, interaction subject, interaction results. In this action I have taken a very cautious approach and took into consideration all the ethical concerns as described above earlier.

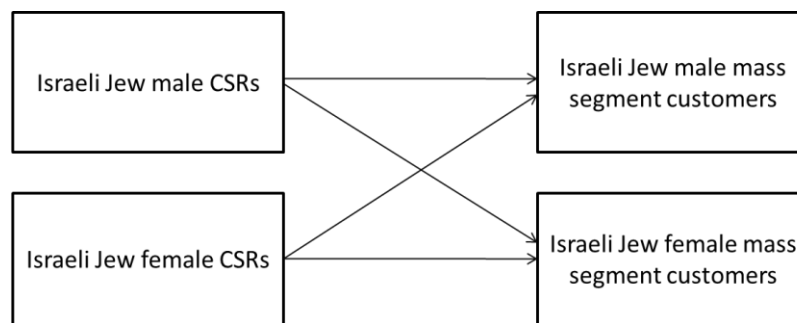
There are three factors that could potentially cause severe bias and confusion, so I isolated them in advance:

- Gender: these will be sampled and documented separately. "A field researcher observes people and their actions noticing each person's observable physical characteristics: age, sex etc... 'Gender insensitivity occurs when the sex of participants in the research process is neglected' (Eichler, 1988, p. 51). The researcher records such details because something of significance might be revealed" (Neuman, 1997, p. 361-362).
- Customer segments: I focused only on mass segments from the private sector because corporate and business segments are uniquely treated by service providers of all kinds. Since TC's strategy became mass-market driven some three years ago, my research has become increasingly relevant. My project - which aims to illuminate consumer behaviour in one of the most significant customer points of contact (the call centre) - significantly supports such a strategy.
- Accent and dialects: I sampled only Jewish-Israeli mass segment customers in order to avoid any negative impact of accents and dialects on the research results. In Israel there are five main types of populations (in order of size): Israeli Jews, Jewish Orthodox, Israeli Arabs, new Jewish immigrants (mainly Russians) and foreign workers. Each one of them is well recognized in terms of accent and dialects; hence, I concentrated in my research only on Israeli Jews.

Beyond those three factors, there are a few more unknown parameters which are related to the analysed call recordings, such as waiting time until the call was answered or the time of day. In order to avoid such bias I sampled calls with the same characteristics and no deviated statistics regarding waiting time (which could negatively affect customer satisfaction before the conversation had even begun).

The recordings will be categorized into four major groups according to the desired sample considering the above list (WHO), as drawn in figure 4 below:

Figure 4: Sampled records categorization



I sampled 10 interactions of each group as follows (HOW MANY):

10 interactions of male call centre CSRs to male customers.

10 interactions of male call centre CSRs to female customers.

10 interactions of female call centre CSRs to male customers.

10 interactions of female call centre CSRs to female customers.

Total sample of 40 observations.

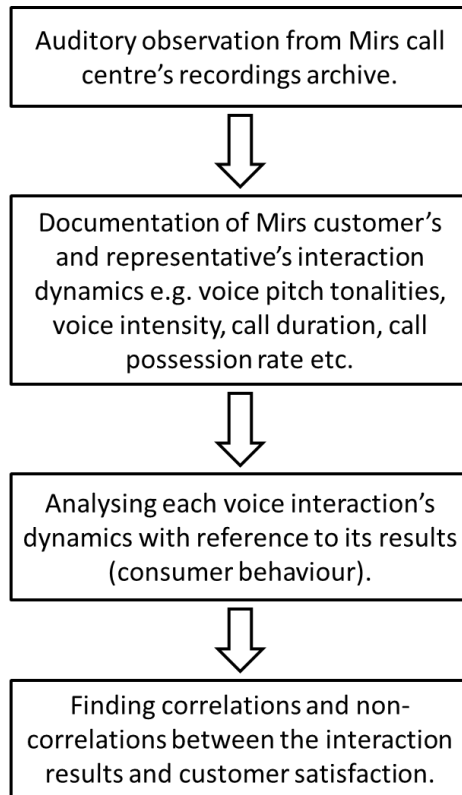
The recordings were selected randomly according to the following manner (HOW):

All the sampled calls will be drawn from two specific months in order to avoid bias. TC call centre handles around 70,000 calls per month. The mass market segment contributes around 30,000 calls per month, so 60,000 recorded calls in two months is my target population (N). My sampled calls (n) were selected as follows: one sampled call every 1,500 calls ($N/n = 60,000/40$), following the simple random sample rationale:

"Simple random samples are distinguished by the fact that each population element has not only a known but an equal chance of being selected and, further, that every combination of n population elements is a sample possibility and is just as likely to occur as any other combination of n units". (Churchill, 1995, p. 586)

The analysis process in the qualitative survey – auditory observations – includes the following activity, as drawn below (figure 5):

Figure 5: Project analysis process



The 40 auditory observations mentioned above with its gender distribution were analysed for consistency and reliability in the following structure:

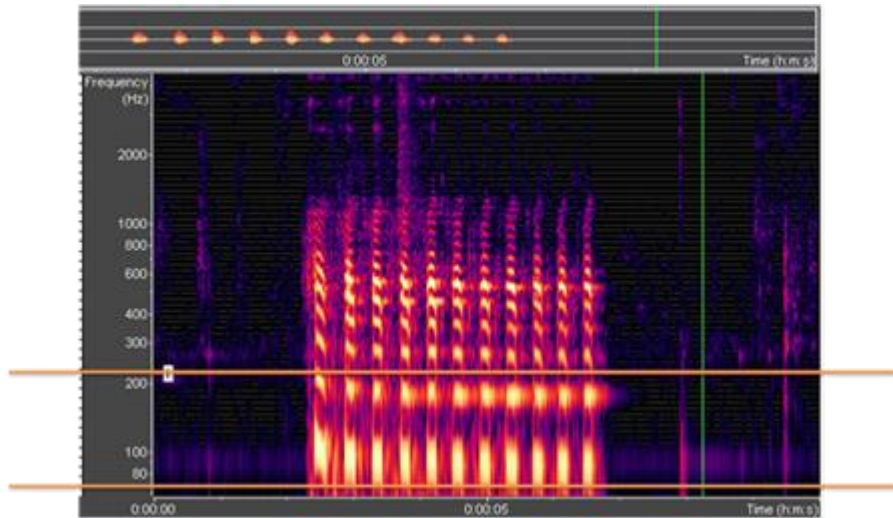
- CSRs' voice pitch profile (fundamental frequency and resonance harmonic frequency range).
- Customers' voice pitch profile (fundamental frequency and resonance harmonic frequency range).
- CSR's voice clarity: how clear or rough the voice of the CSR is.
- Customer's voice clarity: how clear or rough is the customer's voice.
- CSR's voice intensity: how loud is the voice of the CSRs.
- Customer's voice intensity: how loud is the voice of the customer.
- CSR's speech rate: how rapidly or slowly the CSR speaks.

- Customer's speech rate: how rapidly or slowly the customer speaks.
- CSR's call possession rate: what percentage of the interaction the CSR holds.
- Customer's call possession rate: what percentage of the interaction the customer holds.
- Interaction silence rate: percentage of the interaction that is silent.
- Call duration: how long the call takes.
- Subject of the conversation.
- Level of interaction success: how well the CSR handles the service call; was the problem solved entirely / partially / not solved at all. This last parameter is rather subjective and more interpretative than the others. (Phase 2 of this research will provide additional supporting interpretation through the focus group).

The voice pitch frequency analysis was originally designed to categorize the samples into three groups, namely voice profiles A, B and C of the CSRs and of the customers. Each group represents a different voice pitch level (from low frequency to high frequency respectively). Since there was a solid belief throughout the industry that cellular telephone codecs can deliver voice frequencies only in the spectral range of 300Hz to 3400Hz, I had to design my methodology accordingly, i.e. three groups that indicate generally 'low pitch', 'mid-range pitch' and 'high pitch'. Fortunately, the real-world data eventually showed the entire frequency spectrum (starting at 70Hz as shown below in figure 6) so I could measure voice pitch accurately.

Beyond the fundamental voice frequency, I measured all the other voice and speech parameters as planned, i.e. voice resonance frequency, speech rate and so on.

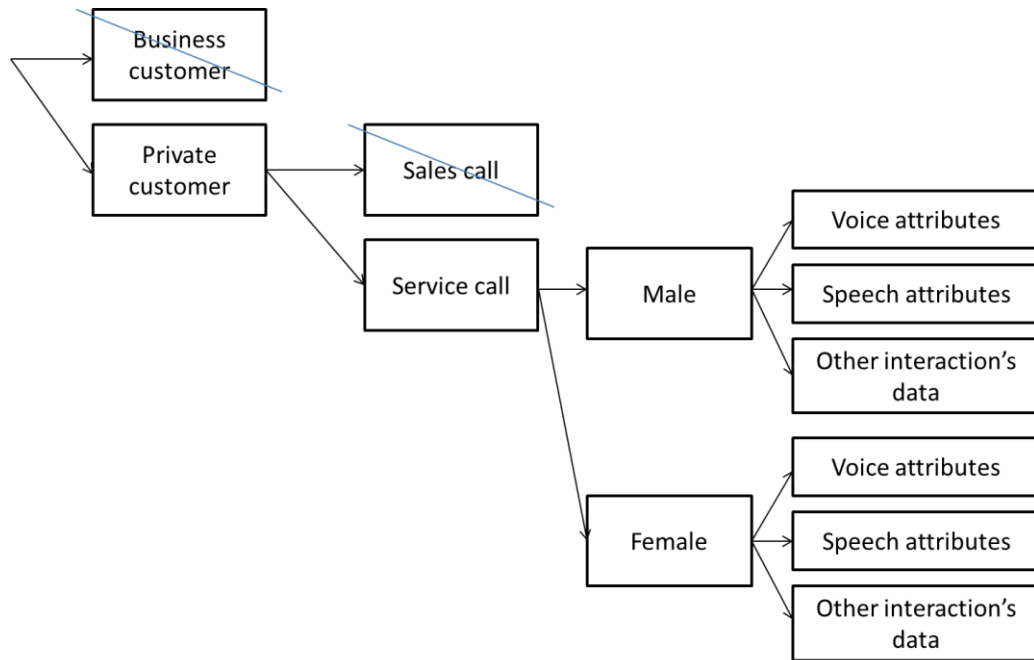
Figure 6: Screen shot of low pitched voice (Fundamental frequency of around 90Hz)



After gathering all the call details I sought to find significant consistencies through identified patterns which indicate a recognized customer behaviour under specific voice based interaction's attributes.

The following chart summarizes the target sub-groups to be sampled, as follows (figure 7):

Figure 7: Target recordings to be sampled



3.3.2 Phase 2: Triangulation

This phase consists of two elements of findings confirmatory:

3.3.2.1 Findings Confirmatory - Focus Group:

In addition to the observational findings mentioned above, I have implemented an additional methodological tool in a less fluid and more constructed way, by using a focus group for cross examination and for further insights.

The focus group consisted of seven members. The members were call centre CSRs who were sampled in the auditory observations and team leaders.

The main idea was to play the recorded conversations in which they were involved and explore together how they interpret the conversation outcomes – theirs and their colleagues'.

They questions that I asked were:

- What do think the outcome of the interaction? Positive / negative.
- Do you think the customer is satisfied with the provided service level?
- What are the interaction's key attributes and dynamics that mostly affected the conversation results – for good and for bad?
- Do you think you can personally apply in future interactions part of those key attributes conversation dynamics?

For ethics considerations used the information only for my research and no one else is able to gain access to it.

The purpose of this session is to provide the following contributions:

- Cross-check my auditory observation's interpretations from first source of judgment (call centre CSRs).
- Strengthening the research reliability by operating additional research methodology and get additional evidence for findings confirmatory.
- Gaining more insights that have been hidden and were not taken into consideration in my main research.

3.3.2.2 Findings Correlation – Sample Survey:

TC conducts on a daily basis instant surveys that samples customers who had an interaction with one of TC's customer care call centres in the past 48 hours.

The Customer Service Division, which is responsible for conducting these surveys through an independent body, samples about 2,500 customers per month (around 36,000 customers per year).

The sampled customers are asked to refer to the following issues:

- Call centre CSR's quality of service scoring.
- Quality of professional solution provided.
- CSR's response compared to the customer's expectations.
- Interaction overall experience – positive / negative.

Through this process I piggybacked on one of those sample surveys and interviewed those researched individuals who were observed in my auditory observation's main research (total of 40 sampled customers). It was important to catch and interview those customers up to 24 hours after their interaction with the customer service.

In order to keep the research simple and clear I asked a single question:

'Following your service call yesterday, how satisfied were you with the service you received from the customer service representative?'

The customer could choose one of these answers:

- 'Very satisfied' (excellent service),
- 'Partially satisfied' (fair service),
- 'Not satisfied' (poor service).

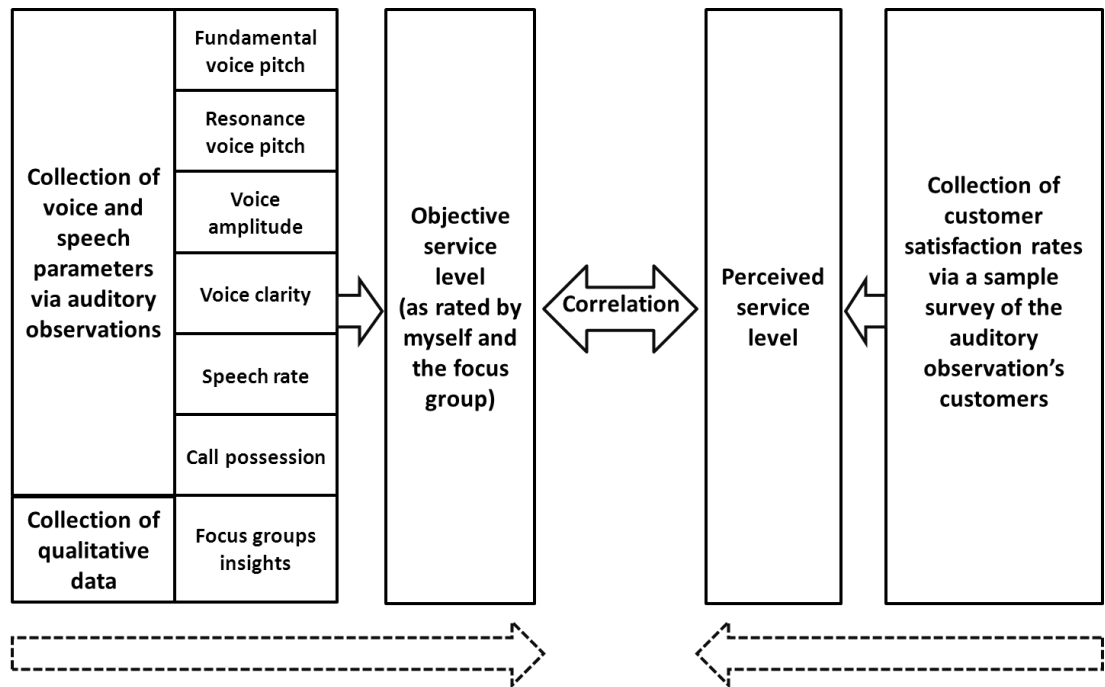
The purpose of this session is to provide cross-reference on top of my auditory observation's interpretations from first source of judgment (TC customers).

3.4 Wrap up

After gathering and analyzing all the collected data I triangulated all the parameters from all the three fronts in order to find significant variations and repetitive patterns: real world recordings subjective interpretations from the first front, focus group judgments and additional insights from the second front, and indications which are raised from analyzing the sample survey.

Figure 8 below provides a high level illustration of my methodological process:

Figure 8: High level illustration of the methodological process



Chapter 4: Project Activity

4.1 Introduction

My professional experience in the fields of Consumer Behaviour analysis combined with Voice and Speech technologies triggered the idea to integrate both fields into one piece of practitioner research. This research binds both domains by linking three different case studies which have been integrated into an ongoing development of my consumer behaviour research.

The first two case studies were conducted at TC during the years 2008-2010 and have made an extremely positive impact on TC's performance; they became part of the company's corporate strategy.

These are the two studies:

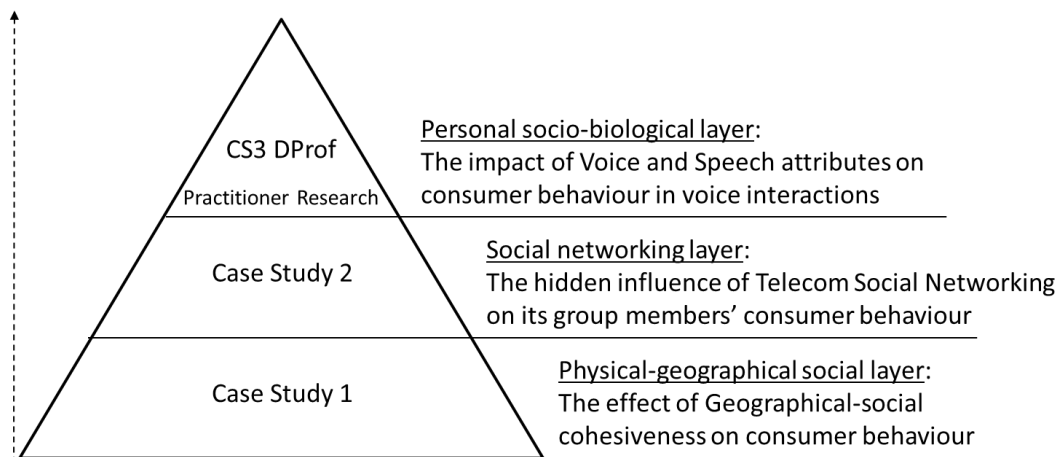
- Case study number 1: Exploration of the impact of Geographical Communities on TC's market growth and consumer behaviour in terms of product features adaptation.
- Case study number 2: Exploration of the impact of Social Networking on its group members' consumer behaviour in terms of customer churn rate.

Through these two case studies laid the foundations to the current DProf practitioner research (which I can count as my third case study) in which I have sought to find a link between various attributes of voice and speech and consumer behaviour / customer experience in voice-based interactions.

All three case studies mentioned above deal with social aspects of the decision-making process and consumer behaviour. However my DProf research contributes an additional dimension which consists of emotional / irrational elements.

The following illustration in figure 9 demonstrates the ongoing development in my research work from 2008 until today:

Figure 9: Previous projects as foundations for the DProf practitioner research (2008-2014)



4.2 Case Study 1 – The Effect of Geographical Communities on Consumer Behaviour

4.2.1 Background, Context, Research Literature and Project Plan

The mobile telephony market in Israel reached saturation (100% penetration rate) in 2008. TC was a niche player holding only 4% market share. Competition between the three big players was quite limited (it was in effect a ‘cartel’). Against the background of this market situation the following questions were asked:

- How can TC operate effectively in order to widen its customer base and sell more new products and services?
- How can TC - with its limited resources - beat giant players with extensive marketing power?
- Should resource allocation be addressed to segment-based marketing, or region-based, or maybe across-the-board?

As a niche player TC focused on corporate organizations as well as small and medium business segments. The products and applications that TC offered were tailor-made for those customers. Also the pre-sell and the post-sell activities were dedicated very effectively. Customer care played a major role in TC's differentiation strategy. In some case a single post-sell employee was allocated to one strategic customer as a single point of contact. Further, TC often developed tailor made products through which different organizations were connected by sharing the same application, for example hospitals and rescue organizations shared the same monitoring software to track ambulances and paramedics, or electricity and water companies who shared the same platform for field meter readers.

According to several qualitative studies there was a strong correlation between TC and a high profile of social community involvement which we termed *social cohesiveness*. This term indicates 'groupness' or 'stick togetherness' and it is associated with essential aspects of individual and group behaviour (Libo, 1953).

I then sought to take this research forward in order to find a link between TC's unique attributes and the adoption degree of those attributes by consumers who live in high profile social communities.

In order to carry out such research I led a team consisted of two statistics-orientated research members. I tried to develop a model which focuses on the social-cultural dimension of consumers in a given geographic region.

I initiated my study by enriching my knowledge with a number of theoretical models which investigated what is known as *urban sociology* and *social influence* (Pickvance, 1976, Heyward, 2004).

My inspiration came from several studies that dealt with consumer behaviour and decision-making affected by micro-social variables. These studies explored the role of the consumer's immediate environment (e.g. his family, relatives, friends and colleagues) on his consumer behaviour. In that study, great emphasis was placed on group inter-relations derived from the social dynamics and interactions between the group members, i.e. mutual influence and dominant individuals who centralized the entire group (*Social influencers*).

Emile Durkheim, who is considered by many the father of sociology, was probably the first to argue in his book *Suicide* (1897) that having a higher profile of social connection results in lower suicide rates.

In my research I sought to learn to what extent macro-social variables affect consumer behaviour. Based on Durkheim's insight I tried to figure out how social integration affects TC's growth, churn and product adoption.

I decided to focus on the geographic aspect in order to find relations between regional dimensions and social-consumer behaviour.

Toennies (1887) distinguished between two social groups: community and society. Toennies claimed that community ('*Gemeinschaft*') is driven by togetherness and common benefits and it is typically located in rural villages. Society ('*Gesellschaft*') is driven by individualism and private benefits and it is typically located in urban cities.

Wirth (1938) was bothered by the bad social implications of urbanism, i.e. the lower significance of family life and neighbourhood and the loss of social solidarity.

Based on these concepts, and based on the fact that TC has been always characterized as a 'community driven' mobile network, I could set up an initial hypothesis with regard to TC's variable performance in differentiated regions. I asked myself whether TC's presence in 'rural settlement communities' is significantly wider than in 'urban societies'. This question turned out to be one of my two main research questions in this work.

However, there are two sides of the coin, so there were opposing views of the regional dimensions mentioned above. Rural communities suffer from many sorts of social pressure and 'mechanic' solidarity. Urban societies are more tolerant of their members and enable more freedom of choice (Durkheim, 1897). Moreover, urban society members are not emotionless or apathetic; they distance themselves from one another in order to dedicate their time and resources to the people about whom they really care (Simmel, 1964). Furthermore, urban life is a sort of mosaic with a variety of choices, so individuals in urban environment can comfortably develop themselves and feel self-fulfilled (Park 1952).

As urban sociology research has developed over the later years, I could see further evidence to the impact of locality on *expressions of individual selves* (Dickens, 1990). Through their actions those individuals "supply impressions which are interpreted and acted on by other members of the society" (Dickens, 1990, p. 10). The collective positions influence the individual conscious awareness and social identity and consequently the behavioural routines.

Based on this concept, I asked myself if I can identify the thin urban line between adopting fashions as members of a mechanized society and adopting personal recommendation as members of an organic community.

Ray Hutchison, in his book *Urban Sociology in Transition* (1993), edited the studies of a number of researchers from the field of urban sociology. One of them is W. A. Schwab who cites Michael White's extraordinary analysis of urban structure (1987) which maps the economic and social structure physical metropolis. The region's landscape of commercial, financial, cultural and entertainment facilities, is reminiscent of the layout of the human residence. It is quite easy to identify social enclaves (neighbourhoods) that highly correlated with the individuals' profile, such as their poverty status, high income, ethnic origin and education. Moreover, people are attracted to specific neighbourhoods in which they feel they can maximize their needs upon the required property investment. This is actually a new political economy in which residents' decisions are based on their perceptions of the utility of their place of residence in comparison with other places (Talarcheck, 1983 and Dahman, 1985, cited by Hutchison, 1993).

To support this argument I could not think of a better example than Israel itself; Jewish orthodox towns, Arab villages, Russian Jewish immigrant neighbourhoods and foreign worker neighbourhoods are well identified in the Israeli landscape.

Within this model I considered the assumption that the above mentioned profile elements create a community *de-facto* within an urban environment, and that environment has the capacity to generate a common language among its members due to their social background and probably their common needs.

However is this enough to create significant social cohesiveness? It appears that the aggregated vectors which operate in an urban environment – negative as well as positive (Park, 1952) – create weaker community cohesiveness due to side effects of the metropolis social network. There appears to be more diffuse social connection (less cohesiveness) in the urban communities because of ‘competing’ connection with other social groups, such as colleagues at work. This is contrary to people who live in remote rural villages who share common beliefs and ideology.

In other words, city residents tend to be a more heterogeneous society due to the rapid growth of population in cities, which broke down the primary idea of social

community. Rural communities tend to be more homogenous (Dickens, 1990). The new media through which the world communicates nowadays has introduced many options to narrow geographical distance and enabled users to become part of an online community¹³ Social interactions are no longer restricted to face-to-face interactions, and new forms of technologically based communication have emerged. Mobile communication can support social interaction and maintain social bonds even when individuals are not in physical proximity (Ling, 2008). However we have to remember that this study was conducted in 2008-2009 when new media was still incubated. Also, the geographically-based communities still have their own unique characteristics, as we will see in the project results below. Furthermore, probability of friendship between two new-media users as a function of their geographical distance is rather high (Scellato et al, 2011).

In addition, the new media enables to link urban communities, which are considered to be less bonded than rural remote communities, more efficiently, i.e. Amit (2014) reports that one of the most popular applications in Tel Aviv city is a social car-park group application. Through this application residents report when they leave home in order to enable other residents to occupy their parking space (instead of an outsider who visits occasionally Tel Aviv). Similar applications have been introduced for pet caring and for jogging partners.

My overarching research sought to understand the behaviour of geographical based communities / collectives i.e. whether “a large number of people who are in the same place... behave in a uniform manner” (Wren, 1999 p. 56).

Obviously this question can fit perfectly to football crowds, but is it applicable to a small community which lives together in a rural settlement?

¹³ By using social networks such as Facebook in desk top computers and Whatsapp application in mobile devices or even online video games on TV sets through X-box or Wii consoles.

I found this question was related to the distinction between personal and social identity. In order to influence one's behaviour he/she does not necessarily have to be among Manchester United supporters in Old Trafford's stands; he/she simply needs to be part of a group. The presence of the phenomenon known as *group mind* effectively demonstrates this argument:

"The way people seem to adopt a qualitatively different mode of thinking when a member of a group than when not a member of a group". (Wren, 1999, p. 66)

Moreover, such settlements in Israel typically reflect not only common residence but also common contexts, ideology and beliefs, e.g. a Kibbutz settlement reflects a social-human philosophy, a Moshav settlement reflects a common agriculture economy, a Jewish West-bank settlement reflects an extremist Jewish-national-political attitude, and an Arab settlement reflects a traditional culture. This kind of settlement is deeply characterized by the social life in a group (community) rather than just residency. The members of such social groups define themselves as members of their group and they are mutually recognized as members by the others (Hartley, 1997).

Furthermore, the membership in such a group affects dramatically its individual's values and attitudes (Siegel and Siegel, cited by Cartwright and Zander, 1968). This thesis is still valid despite the telecommunication revolution of recent decades. Technology has dramatically changed individuals' behaviour, but the geographically-based impact between community members has still remained strong, e.g. Location-based applications such as Foursquare¹⁴ show the existence of strong social and geospatial ties between location-based social network members. This online community displays similar behaviour between its members (Ye et al, 2010). Furthermore, the clustering of geographical areas according to mobile users' 'footprints' proposes a new way to view the physical space (Naolas, 2011).

¹⁴ Foursquare is a location-based application through which its mobile-user members document and upload their leisure activity in each venue they visit ("check-in").

The implications of such assumptions as mentioned above had to be empirically investigated in order to crack the marketing question: do members of a rural community who live in a rural settlement adopt products and services in a more homogeneous manner than the heterogenic approach of residents in large cities? That was our second research question.

My study aimed fundamentally to find out whether TC can differentiate its marketing approach on a geographical basis. Practically, it aimed to find out whether rural communities adopt products differently than urban societies; hence, it aimed to answer the following two questions: What is the correlation between Israeli settlements characterized with high profiled social cohesiveness attributes and TC's market share and growth rate in each settlement? What is the correlation between Israeli settlements characterized with high profiled social cohesiveness attributes and TC usage intensiveness within the community in each settlement?

My methodological approach to answer these questions relied on a quantitative survey through sample surveys (and cross-sectional surveys). Part of the surveys had been already conducted internally at TC, so I could use them as basic assumptions to define regions with a high social cohesiveness profile.

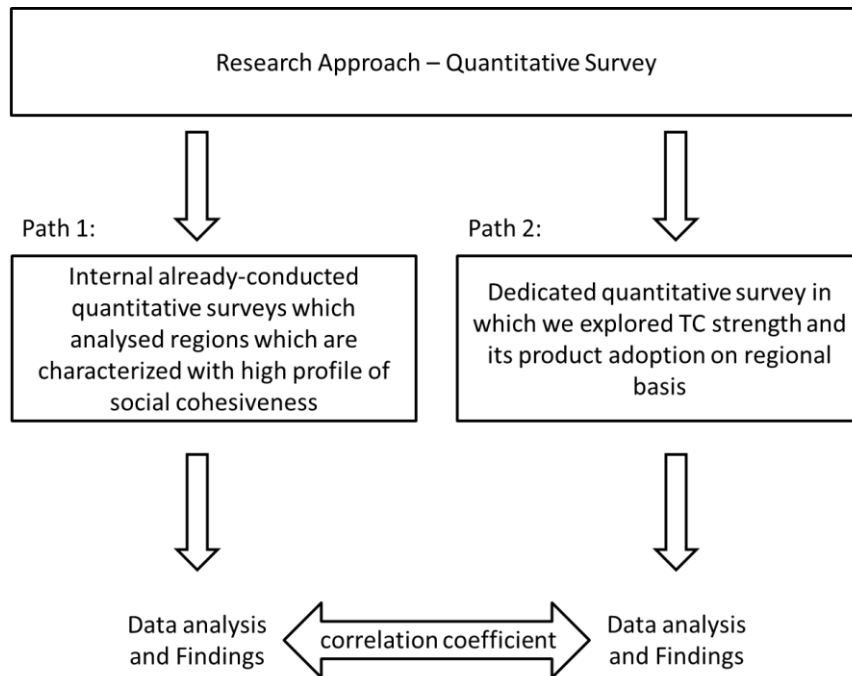
I then mapped Israel geographically to determine those regions characterized by social cohesiveness, i.e. socially intensive communities with a high level of interaction.

The other part was conducted especially in order to answer our above mentioned questions – to find if there is a statistical correlation between high profile social settlements and TC product adoption.

Sample survey is a quantitative method which measures variables of interest which are representative of an identified population at a single point of time. In this form of research the emphasis is on the frequency of occurrence rather than meaningful variations or experience, as tend to be in a qualitative survey (Churchill, 1995).

The following chart (figure 10) summarizes the overarching methodological approach:

Figure 10: The methodological approach of case study no. 1



4.2.2 Project Results and Conclusions

Our geographical scanning of Israel, which was based on previous surveys conducted by TC internally, indicated clearly strong connections between the following factors:

- Low deciles¹⁵ of the population tend to be more traditional / religious.
- Traditional / religious populations are more committed to community life.
- Villages with common agricultural and industrial zones tend to display a high community life profile (due to ideology and common interests respectively).
- Rural towns and villages (on the Israeli borders) tend to display a high community life profile (due to common security concerns and thus their mutual dependency).

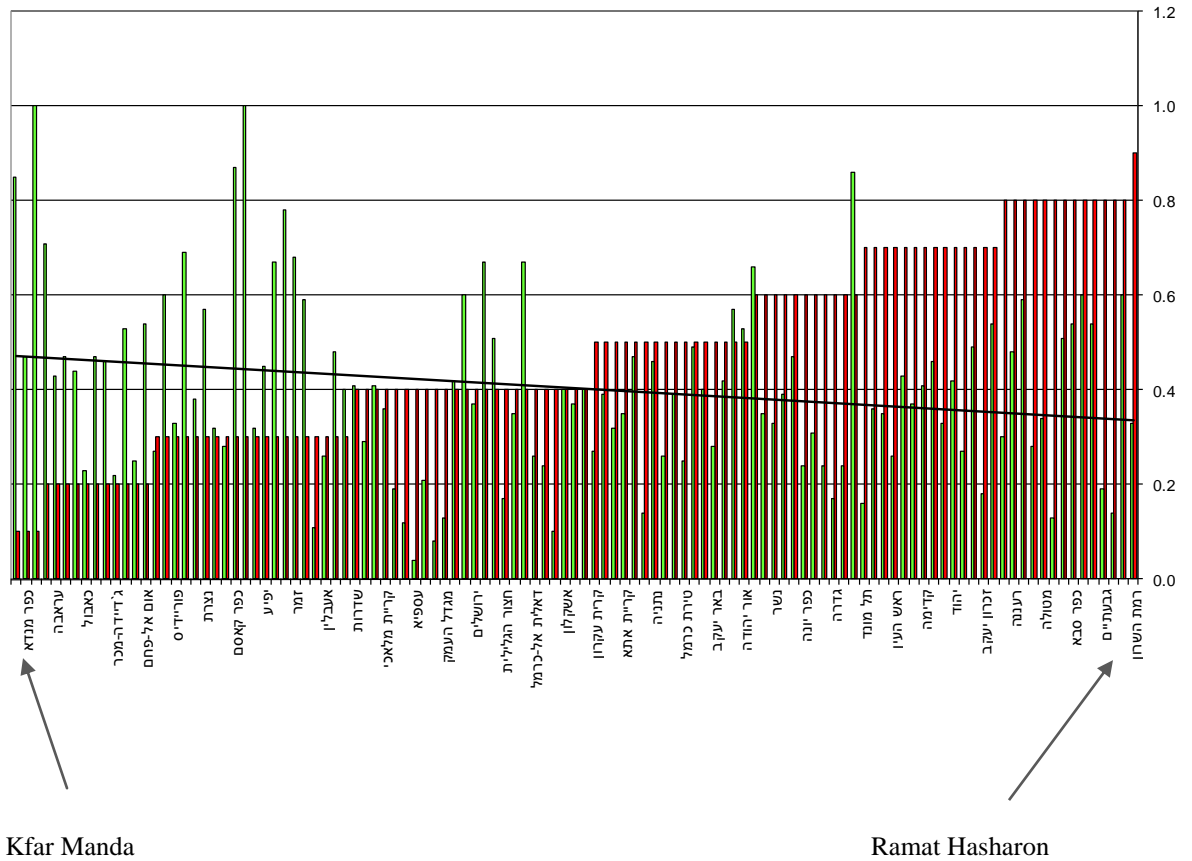
These last two points are supported by a study conducted in San Diego University through which the researcher sought to find similarities and differences in the decision-making process of rural communities compared with that of urban groups regarding water resource planning. The researcher testifies that the rural community was ‘more suspicious’ to official state data and used less advanced tools for decision-making. He also implies that they consequently demonstrated more creativity and collaboration (Jankowski, 2009).

The results of my dedicated research produced the following regressions:

- A. A moderate negative correlation coefficient of $r=-0.19$ between TC penetration (market share and market growth) and social decile per settlement; this is a significant indicator for ‘settlements with high social cohesiveness’.

¹⁵ Population’s decile indicates the Socio Economy Status (SES) of every tenth of the population.

Figure 11: Geographical based distribution of Israeli social deciles (in red) and TC market share (in green)



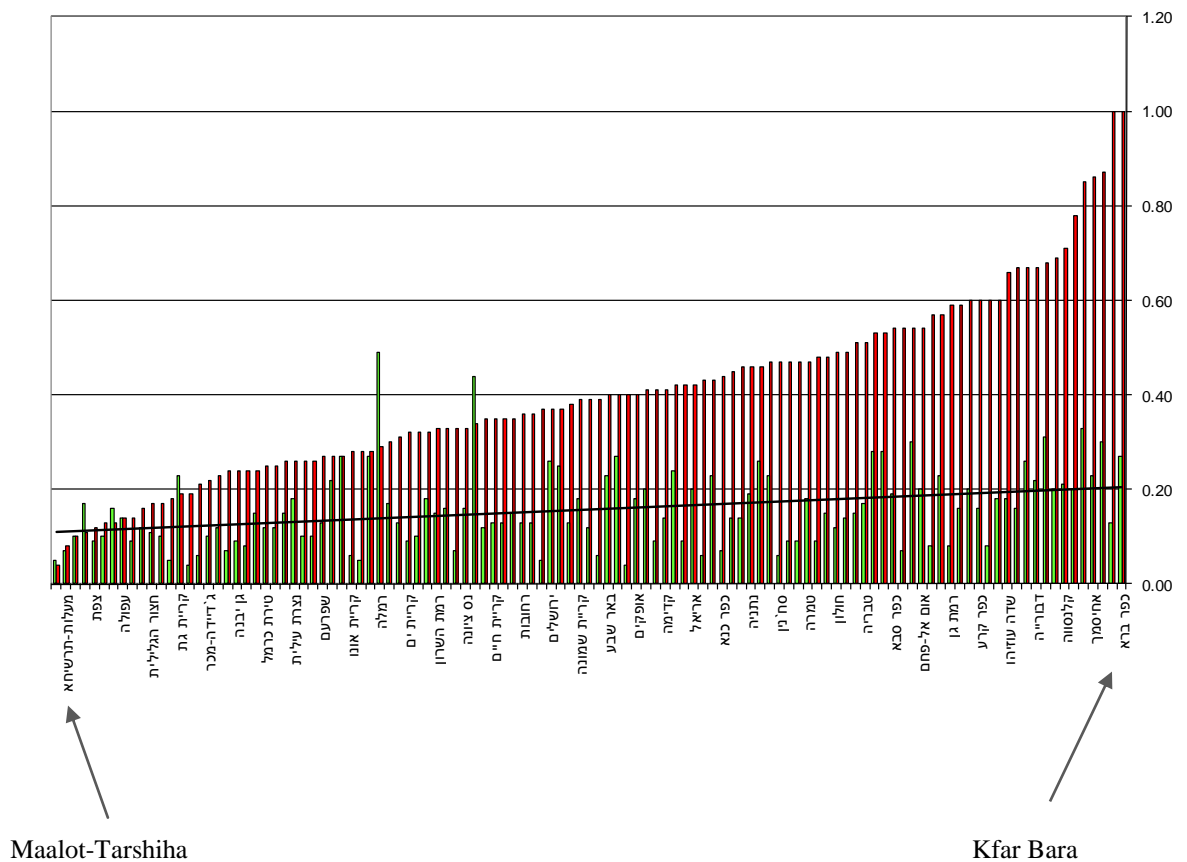
In figure 11 the graph red bars indicate social decile per settlement, so Ramat Hasharon residents (in Hebrew... on the right side of the chart, marked with an arrow) appear to belong to the highest decile of Israel’s population. Ramat Hasharon is a major city in the centre of Israel.

The Green bars (aggregated by the straight line) indicate TC market share and growth rate per settlement. In the city of Ramat Hasharon we can see TC has quite a marginal presence (negative correlation).

On the other end of the chart we can see Kfar Manda, (marked with an arrow, an Arab village located in a rural area), whose residents belong to the lowest decile of Israel’s population, and in which TC holds quite a significant market share (negative correlation).

B. Considering TC's subscriber base: there is a moderately strong positive correlation coefficient of $r=0.37$ between TC's market share and 'high social cohesiveness settlements'. TC subscribers were making heavy use of TC features among themselves (community behaviour).

Figure 12: Geographical based distribution of Israeli social cohesiveness (in red) and TC product adoption rate (in green)



In figure 12 the graphs red bars indicate the social cohesiveness per settlement, so Kfar Bara's residents (in Hebrew... on the right side of the chart, marked with an arrow) appear to be the most social intensive place in Israel. Kfar Bara is an Arab village in the rural north of Israel.

The Green bars (aggregated by the straight line) indicate TC's product adoption rate per settlement; we see a moderately high rate of product adoption in the village of Kfar Bara (positive correlation).

On the other end of the chart in Maalot-Tarshiha (marked with an arrow, a mixed Arab-Jewish town in the rural north of Israel) we see low social cohesiveness and a low product adoption rate (positive correlation).

The following matrix (table 1) sums up the pair-correlation between the decile of the population, social cohesiveness and market share:

Table 1: The statistic correlation between population's decile, social cohesiveness and TC market share

	Population's decile (SES)	Social cohesiveness	Market share
Population's decile	1		
Social cohesiveness	-.214*	1	
Market share	-.189*	.371**	1

*Confidence level: $P < 0.05$

**Confidence level: $P < 0.01$

This significant conclusion drove TC to adapt its marketing strategy accordingly: to focus on geographical 'islands' of high social cohesiveness rather than allocating expensive resources to across-the-board marketing.

In practice, the model's insights were further developed into a pragmatic work-plan which consisted of three elements:

- A. Zone no.1 for action: high cohesiveness profiled community settlements with neither significant market share nor community behaviour among TC subscribers. In this case TC's marketing division developed special selling propositions to encourage more communication amongst TC group members, for example: viral marketing for 'eat as much as you can' free minutes. This was intended as a trigger to widen up the entire subscriber base.
- B. Zone no.2 for action: high cohesiveness profiled community settlements with a low market share but with significant community interaction among TC subscribers. In this case the selling proposition was focused on hard sale campaigns for winning more subscribers in order to widen TC's subscriber base.
- C. Zone no.3 for action: high cohesiveness profiled community settlements with a high market share as well as significant community interaction among TC's subscribers. The idea here was to deepen TC dominance by offering special benefits targeting the community rather than the individual. For example free group calls among the community combined with 'sticky' applications such as location based services.

The following years showed improved business results in the targeted regions to which TC thereafter allocated differential resources.

4.2.3 Further Supporting Evidence

In continuing this research I have recently come across an innovative study which extends my understanding with regard to the community influence question (Ariely, 2013).

In his research Ariely asks whether a single community-outsider can affect whole community behaviour. Ariely has tried to answer this simple question through a series of social experiments as follows.

Ariely has gathered students from all over Carnegie Mellon University campus in the US and encouraged them to solve as many arithmetical matrixes as they could in five minutes. For each correct answer the students received money.

In phase 1, Ariely has discovered that when he created environmental terms for the students to cheat they did so and ‘upgraded’ their number of correct answers (12 on average compared with seven among the control group that functioned in a normal environment).

In phase 2, Ariely sought to measure ‘the social element of dishonesty’. He added to the possible-to-cheat environment an actor who acted the ‘shameless student’. The actor outrageously declared in front of all the group members that he solved correctly all the matrixes sixty seconds after starting the test. Under this condition the class results were even worse than previously: the students reported that they solved correctly 15 matrixes in average.

In phase 3, the research team conducted an identical experiment to that in phase 2 with one modification: the actor was wearing a Pittsburg University shirt (Pittsburg

University is Carnegie Mellon's main rival in Pennsylvania State) in order to indicate to the class that there is a community outsider in the room.

This time the students reported that they solved correctly only nine questions on average.

Ariely explains the three phase results by identifying two different social forces which operate in different ways. When the 'liars' are perceived as part of our social group we feel that untruth is acceptable socially, however when the liars are clearly outsiders it is difficult for us to justify socially untruthful behaviour and consequently our behaviour becomes more moral in order to distinguish our belongingness.

The importance of this research is to show how social belongingness, be it a geographical or other reason, draws out behavioural boundaries and helps us to adjust our moral compass.

My case study demonstrates how official / formal networking can influence our behaviour. A geographical driven settlement and a university class usually share the same social characteristics so we can derive from my study at TC and from Ariely's research the same conclusion: social belongingness affects our decisions and consequently our behaviour. Consequently, my next case study aims to deal with non-formal social networking and its hidden influence on its members' behaviour.

4.3 Case Study 2 – The Effect of Mobile Social Networking on Consumer Behaviour

4.3.1 Background, Context, Research Literature and Project Plan

As described in Case Study 1, I completed my research on geographical communities. The next step was to expand my research into zones in which members of a group shared neither geographic closeness nor ideology. This ruled out a Kibbutz, a political border settlement or even a university class.

I challenged myself by considering the TC cellular network as a social network and explored the social influence on its members.

My team at TC¹⁶ and I had free access to an endless data base related to communication manners among TC subscribers. This enabled us to analyse hundreds of millions of records (CDRs¹⁷) and segment them into many different groups distributed by socio-geographical or lifestyle factors. Moreover, within this non-formal community we could identify those customers who communicated mainly inside TC network. They represented influencers who drove the TC's main telecommunications traffic.

For many years, through our segmentation work we could notice that TC is strongly identified as a network hosting mainly small business and blue collar customers. TC traditionally reflected this kind of profile as several qualitative studies revealed a strong correlation between the TC brand name and the values of 'Social community', 'Groupness' and 'Togetherness'.

¹⁶ The team at TC consisted of two colleagues who jointly with me executed this study.

¹⁷ CDR – Call Detail Record. Every transaction in a mobile network (Voice minute, SMS unit, Data KB) is documented through a dedicated CDR.

From this point we sought to take our study forward in order to find a link between TC's unique positioning in the SOHO (Small Office Home Office) segment and the churn rate of customers who are significantly profiled as hyperactive in-network customers. We considered those customers a unique mobile social network.

Our study sought to address the following questions:

- Can we identify customer loyalty root motivations through usage patterns?
- Can we identify customer churn root motivations through usage patterns?
- Can we quantify the churn risk level by customer profile based on usage patterns?
- How can TC launch differential customer loyalty schemes amongst its subscriber base?
- What is the financial benefit of such a strategy?

In order to carry out such a study my research partners and I tried to develop a model which focuses on the sub-surface behaviour of two groups:

(1) Socially high profiled customers who telecommunicate inside TC network compared to

(2) Customers with a low social profile inside TC network and who were characterized by telecommunicating outside TC network.

The mobile revolution has reached a point where it provides the vast majority of the population with interactive multimedia (such as voice, text, video, music and games) anytime, anywhere. The intensive interactional usage of mobile technology creates small and large social networks in the cellular space. Recent applications such as Whatsapp and Viber¹⁸ are good examples of ways in which our mobile phones create

¹⁸ Whatsapp and Viber are social applications which create social networking groups in order to enrich the customer experience. Whatsapp aims to replace the traditional SMS by providing innovative capabilities such

new social networks, eliminating any geographical boundaries. Today, more than at any time in history mobile technology bridges physical distance and creates new social communities.

This kind of research that I conducted in 2010, at the time of the uncompetitive market, would probably have been done very differently today, in 2013. In the past few years, the Israeli regulator has taken some major steps to minimize migration barriers between mobile operators e.g. ‘number portability¹⁹ and a dramatic reduction in package exit fines²⁰. These regulatory developments alone would not dramatically change the relative difference between the two observed populations. There were additional technological global developments which would probably change the research results, such as the advent of smartphones and the revolution in their operation systems. Four years ago the Israeli cellular market was entirely different; the most important parameter for the Israeli consumer was the identity of the cellular network. The brand name of a mobile operator was perceived as having a certain image and status. One operator positioned itself as the most innovative player in the market, another one positioned itself as the most ‘Israeli’ and yet another positioned itself as a sophisticated content provider. Today the consumer choice is heavily driven by the phone type and its operating system (Apple iOS versus Google Android²¹). Consumers define and position themselves according to the handset they keep rather than the cellular network to which they belong. The Cellular operators have become ‘dumb pipes²²’. This shift in power from mobile operators to Apple and Google

as improved user interface, easy access to social communication groups, multimedia attachments and walkie-talkie. Viber aims to replace the traditional voice through innovative features such as presence indication, High Definition voice quality, creation of social groups, ability to use voice through Wi-Fi only etc.

¹⁹ Customers can migrate from network to network without changing their telephone number.

²⁰ Customers were forced commit for a period of time and were charged when they wished to churn before this period ended.

²¹ iOS is Apple’s iPhone Operating System for mobile phones and Android is Google’s operating system for mobile phones.

²² Dumb Pipe (or dumb bit pipe) is a phrase related to mobile operators who lost their marketing assets to the operating systems giants (Apple, Google, Microsoft). The operating systems corporations enable third parties to approach the mobile customer directly ‘over the top’ of the operator (OTT).

means that this kind of research would have probably yielded the same results if it had been conducted on social network users on Apple iOS or Google Android.

Our study aimed to measure the impact of the hosting network on the hosted customer's loyalty; i.e. to what extent were TC-centric customers loyal to TC's network in comparison to customers who mostly communicate outside TC network.

For the sake of our research we considered TC as a social network; however, since our mindset was attuned to the perception that 'Facebook equals social network', we could not escape the feeling that TC is not a social network, so internally we called it 'a non-official social network'. However, theoretically and according to various academic literature²³ we found supporting evidence to consider TC a social network.

Mobile devices enable communication, interaction and collaboration. Those mobile devices that communicate with each other while their users in close proximity are gathered under *opportunistic networks*. In this kind of network the routes are built dynamically and each device has an opportunity to move and disseminate data (Radu and Ciprian, 2011).

Behrouz and Feng (2013) took this idea further by referring to *opportunistic mobile social networks* as mobile users with social characteristics. They suggested that the disseminated data in this kind of network can be structured due to the fact that the human mobile users accommodate social features such as movement patterns and common similarities and interests. Pretty much identical to what we had in our minds when we came to investigate the hidden influence between the members in TC social network.

²³ For example: Social interactions are no longer restricted to face-to-face interactions, and new forms of technologically based communication have emerged. Mobile communication can support social interactions and maintain social bonds even when individuals are not in physical proximity (Ling, 2008).

Social life exists where human beings interact and associate with others and are not isolated. Through social life we can observe social structures which include different social positions and role relations (Blau, 1977). These structures create a distributed population and consequently inequalities among its members.

In our study we sought to concentrate on the role relations among TC customers i.e. those who generate ‘community traffic’ through a wide range of telecommunication partners inside the network and the impact on the group member’s decisions and behaviour.

Rainie and Wellman (2009) point out three elements which enable the *Networked Individual* revolution: social networks, internet and mobile handsets. They highlight the effect of new technologies on community, for example, support and services are no longer provided on the base of geography. Rather, they have become people driven as the community as a whole has become ‘personal’. In this sense it is important to distinguish between a social network and a group. A group has clear identified boundaries where social networks are limitless.

According to Rainie and Wellman (2009 and 2012) the term ‘social network’ explains the inter-relations and connections between two parties or more.

Social networks are defined as a set of members who are tied by one or more types of relations (Wasserman and Faust, 1994) and the patterns formed by these relations.

The theory of Social Networks analyses the existence or non-existence of interrelations between partners who act within a network through which they interact and exchange resources.

Social relations mostly consist of ties which are based on mutual feelings and cognitive awareness. Social network *flows* are relations through which network members exchange information and influence flows (Marin and Wellman, 2009).

Rainie and Wellman (2009) mention for example Silicon Valley as a hi-tech super innovation zone. One could argue that the level of education, training and expertise in this specific area plays a major role in creating such an innovative environment. On the other hand, social researchers might argue that the key actor in creating this kind of innovative environment is the relations between academic institutes and commercial organizations in this area, and the mutual contribution of the social networking which is created between the organizations themselves. Through this social networking the organizations can share knowledge and innovate.

Laumann (1983) identifies three approaches to tackle the boundaries of social networks. The first approach is *position based*. It involves individuals who are members of an organization with a formal identity. The second approach is *event based*; it defines those individuals who take part in a specific event (or series of events) as a social network. The third approach is *relation based* and it usually starts with a small group which shares a specific interest and gradually expands itself and becomes a population which shares the same type of relations.

It appears that we can relate TC – like any other mobile network – to the third approach where the customers are members who share the same types of interrelations in an expanding social network. The relations between the network members might include not only friendships, collaborations and commercial ties but also web links, information flows or any possible connection between the network members (Wasserman and Fraust, 1994).

Marin and Wellman (2009) point out that the social networking phenomenon has been researched from many angles; researchers have explored the impact of social networking on various domains such as finding a job, promotion, having a good idea, cultures knowledge and more.

My research aimed fundamentally to find out whether TC can differentiate its marketing approach on a social networking basis. Practically, it examined whether there is a hidden influence of each profiled group on its members in term of network loyalty to TC, hence, it aimed to answer the following question: What is the behavioural difference between the two following groups of the TC:

- 1) Customers who mainly make their telecommunications inside TC network, and
- 2) Differently profiled TC subscribers who mainly make their telecommunications use outside TC network?

My methodological approach to answer these questions relied on Marin and Wellman (2009) who suggested a few ways to collect data from a social network.

They mention the phrase *Ego Network* which takes place when data is extracted from the whole network by selecting one focal point member and examining the network members connected to this member. The type of tie which is mostly relevant for this study is a *Direct Tie* which goes from the focal point member to another. Second degree ties (*Undirected Ties*, as phrased by Marin and Wellman) will not be examined.

According to Marin and Wellman these ties can be examined and measured from a few points of view. The most relevant for us is to score the focal point members by the tie strength / contact frequency / number of interrelations / number of communication media used, collected from archives and historical materials.

Based on Marin and Wellman's input, my methodological approach relied on data warehouse analysis in which we distributed around 6,000 SOHO business customers (focal point members).

The SOHO segment in TC consisted of business customers who held one to five users (each one of them is called a subscriber). So we sampled approximately 20 thousand subscribers by their voice and SMS usage patterns. Our reference in this research was the individual customer behaviour rather than the subscriber's behaviour.

For each customer we aggregated all the usage items (minutes of voice and SMS use) inside TC network and then we divided it by its entire use inside and outside TC network (ties frequency). We created three categories according to the customer behaviour, as follows (all the terms below were originated especially for the research by me):

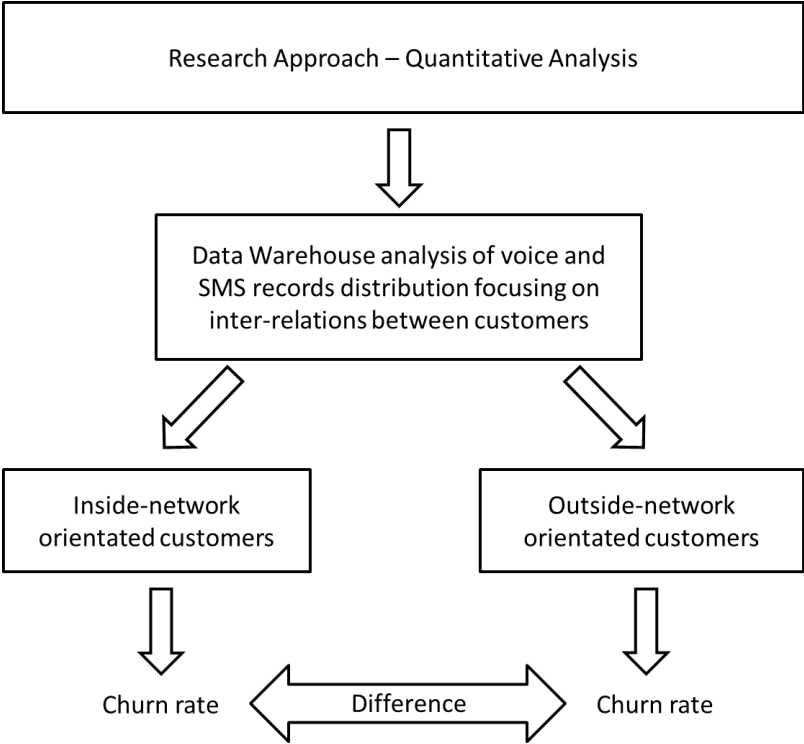
- TC customers who made up to 25% of their usage with other TC customers. The other 75% of their traffic was made with other networks' customers. We called them 'Outsiders'.
- TC customers who made between 25% and 65% of their usage with other TC customers. We called them 'Cross Platform Users'.
- TC customers who made beyond 65% of their usage with other TC customers. We called them 'TC Community'.

Our goal was to explore the hidden influence of each group on its members in terms of loyalty to TC cellular network. Hence we measured each group's annual churn rate as our research variable.

Also, we sought to find the difference in churn rate between the various groups in order to support our assumption that TC Community customers are more committed and loyal to TC network than Outsiders customers.

The following chart (figure 13) summarizes the overarching approach of this research:

Figure 13: The methodological approach of case study no. 2



4.3.2 Results and Conclusions

In our data warehouse analysis we examined 6,000 TC customers (20,000 subscribers) and ran around 15 million records per month. The observed population was analyzed and distributed as shown in table 2 as follows:

Table 2: Usage patterns distribution of TC subscribers

	<i>Outsiders</i> - at least 75% of the traffic is out- network	<i>Cross Platform</i> - In-network and out-network users	<i>TC Community</i> - at least 65% of the traffic is in- network
Weight	33%	32%	35%

As mentioned above, the various groups perform in different ways: Outsiders mainly make their telecommunications use with subscribers from other cellular networks, Cross Platform users combine both inside-network and outside-network telecommunications, whereas TC Community group members are fundamentally linked to one each other and make their telecommunications mainly inside TC network.

In order to measure the hidden influence of each group on its members, I collected annual churn rates from TC's data warehouse per each group. The annual churn rate results were as shown in figure 14 as follows:

Figure 14: TC churn rates among the researched segments

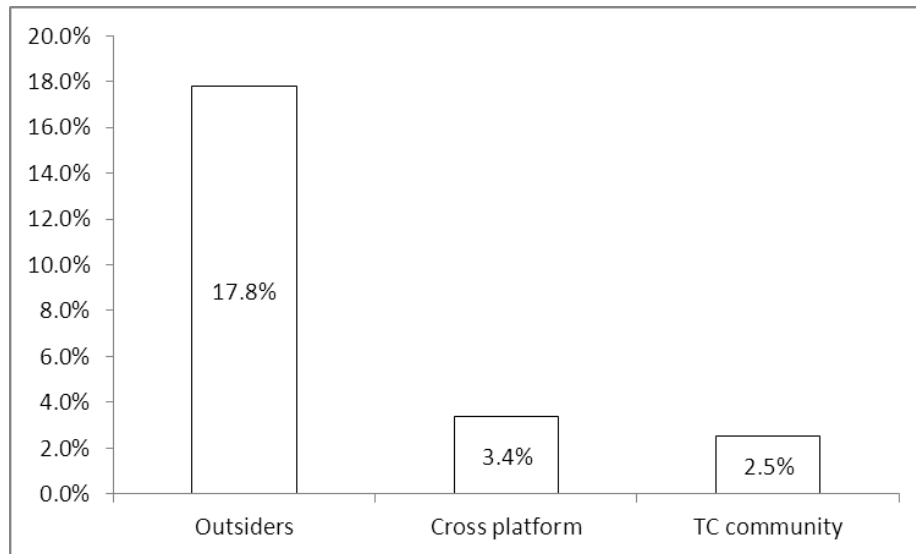


Figure 14 shows very clearly that the three groups have become two groups in practice, i.e. Cross Platform and TC Community customers behave in a similar way – their annual churn rate is rather marginal (around 3% each), where Outsiders customers churn about six times more than Cross Platform and TC Community customers (around 18%).

This gap is substantial so we can state that the inside-network and semi-inside-network users (TC Community and Cross Platform customers respectively) behave differently and are more loyal to TC network than the outsiders.

My research results were further developed into a practical work-plan consisting of three elements:

- A. Action no.1: Developing a new segmentation of TC customers' installed base by their churn risk levels according to the research results; TC Community and Cross Platform customers were categorized as low risk level subscribers for churn, where Outsiders customers were categorized as high risk level subscribers for churn.

- B. Action no.2: Setting a new resource allocation plan which took a differential approach upon each segment. We run two different disciplines; discipline (a) aimed to provide TC Community and Cross Platform customers with loyalty enhancement elements such as a weekly personal conversation and giveaways in order to strengthen their customer belongingness feeling. Discipline (b) aimed to provide the Outsiders customers with churn prevention solutions such as price reduction and handset upgrade in order to balance their cooking decision to churn.
- C. Action no. 3: Implementation of the two mentioned disciplines above in practice; budget allocation per business unit followed by a monitoring process in order to insure performance according to the plans. The budget included an incentive plan for post-sale support personnel.

The following two years showed improved business results since we had implemented a differential marketing approach towards the two populations; TC Community and Cross Platform customers were approached consistently on a personal basis (emotional approach), where Outsiders customers were addressed with attractive commercial offerings (rational approach). The emotional approach helped to enhance customer loyalty in even better values than previously among TC centric customers, where the rational approach helped to significantly improve churn rate among outsider customers.

4.3.3 Further Supporting Evidence

There was still a question whether my study results are purely related to a hidden influence inside a social community or to other motivations such as economic benefits for the subscriber.

Since there is no difference between the payment terms of the various groups it would seem that the difference in results reflects a social networking effect.

Marin and Wellman (2009) mention the term *homophily* which indicates the similarity between network members. It might be the same case in our study. We will meet again this term in the following evidential reference.

Nicholas Christakis in his novel lecture on www.Ted.com (2010) described his research on obesity, and demonstrated the hidden influence of social networks on obesity. His research measures the impact of one's obesity on one's fellow social network members.

Christakis (2010) mapped 2,200 people and marked them as a social network. He simulated each person with a dot, with the dot size reflecting each person's body size; overweight people were marked by a yellow dot.

In his aggregated map we could see clusters in which the yellow colour was very dominant as opposed to other parts of the map where the yellow colour did not exist.

Christakis and his team analyzed the clustering phenomenon more in depth and reached the following conclusion based on their quantitative calculations, as shown in table 3:

Table 3: Christakis' model for social networking's effect clustering

A is obese	B: A's friend	C: B's friend	D: C's friend	E: D's friend
Likelihood to be obese increases by:	45%	25%	10%	0

This conclusion shows significantly the influence of one person on his social network. Only A's friend's friend's friend's friend is not impacted...

Christakis explains these extraordinary research results by naming three possible options:

- "Induction" effect where the phenomenon expands or spreads, e.g. if I am obese and I eat too much so I affect my friends to become obese too through changing the norms around what is considered obesity.
- "Homophily" effect where there is a mutual assimilation between friends, e.g. I want to be a friend of those who look like me.
- "Confounding" effect where an interference element appears and binds two people together because they share the same environment and the same challenges.

The above trends were re-indicated and seen in other studies dealing in behaviour such as drinking, smoking and divorce. This led Christakis to wonder whether emotions have a collective existence and not only individual existence.

His question brings me back to Marin and Wellman's research (2009) in which they indicate that *similarities* in a social network occur when network members share the same attributes and attitudes. This happens not only because there are similar to one another, but because they shape one another's' views and actions.

Christakis concluded that the impact of social networks is not necessarily limited to health phenomena but also to feelings, voting, and economy trends. From this we can understand better innovation and product adaptation.

In their book *Connected* (2009) Christakis and Fowler title the first three chapters as follows:

"When You Smile The World Smiles With You", *"Love The One You're With"*, and *"This Hurts Me As Much As It Hurts You"*.

I think that Christakis and Fowler indicate very clearly through these chapter's titles their research conclusion; we are influenced by our social network members and we influence them in return.

This conclusion is the pillar of logic on which I base my project assumptions and conclusions: TC Community and Cross Platform customers – who are mainly involved inside TC Network and get affected by its group members – churn significantly less than Outsiders customers – who are mainly involved outside TC Network.

4.4 Practitioner Research – The Effect of Speech and Voice Dynamics on Consumer Behaviour in Voice Interactions

4.4.1 Introduction

In the previous two case studies – which explore the physical-geographical layer and the social networking layer – we can notice the emotional / irrational effect of these environments on consumer behaviour.

To me, the fore-coming practitioner research is a direct escalation of my whole research work. This research began with me answering the two questions, namely, whether geographic-based community or social-based network affect consumer behaviour. I then sought to investigate whether interpersonal socio-biological parameters can affect consumer behaviour.

I believe that my DProf practitioner research will provide insight as to the irrational / emotional role of voice and speech dynamics in the interactions between service providers and consumers.

In recent years more and more researchers have analysed the hidden forces that drive consumer behaviour from rational to irrational. It started with preliminary questions, such as: how does it happen that when we show two consumer groups a video advertisement for a pen – in one of them there is a very popular song on the background while in the other there is no song – 79% of the popular song group members were attracted to buy the pen in comparison with only 30% of the no-song's group members? (Geva, 1994, p. 564).

Customer experience must be served by the service provider through a '*magical*' quality of service, appealing to all the senses of the customers e.g. Disney's parades

enrich the customer experience by using high quality and well-adjusted sound pitch and volume (Eisner, 2001, p 66 and 122).

Irrationality research has gradually evolved into the recent huge trend of *neuro-economics* research led by academic leaders (such as Kahneman and Ariely), and industrial research bodies (such as consulting firms and advertising agencies).

Professor Olivier Ollier, a researcher of decision neuroscience, social coordination dynamics and behavioural economics in Aix-Marseille University in France provided this perspective: in order to understand how to turn this human irrationality into official economic policy, we have to realize that human thinking is consistently biased (Shechter, 2012).

Until Kahneman and other economy behaviourists arrived on the scene, the global economy had relied on mathematical algorithms which completely ignored the way that people really behave.

The areas of the human brain that involve choice are activated well before we become consciously aware that we have made that choice. That is, decisions ‘happen’ before they are seemingly ‘made’ (Zaltman 2004).

Ollier uses the idiomatic phrase *Embodied Economics* which extends the understanding of human behaviour even beyond the brain itself. It considers the signals of the whole body: “I am not only my brain. I am part of a body, and this body is a part of an environment”. According to Ollier, Embodied Economics is the gateway towards neuro-economics that takes into consideration the entire information that the body feeds the brain and affects our decisions i.e. hand gestures, posture, movements

and speech. That is to say, “when someone speaks like you and moves like you it is more likely that you will tip him”.

Lynch and Larson (2009) called this trend no less than ‘*the Neuro Revolution*’. They position it as the fourth revolution, after the Neolithic Revolution (Agricultural Revolution, 12,000 years ago), the Industrial Revolution (during the 18th and 19th centuries) and the Information Revolution (started in the last few decades and still occurring). Lynch and Larson claim that through the Neuro Revolution we will be able to better understand and influence human brains. It will necessarily lead to a radical change in all of our life domains i.e. not only law and politics but also marketing and advertising.

Lynch, an evolutionary biologist, said recently that in the near future we will have scientific tools to measure human beings’ emotional state. This information will enable us to improve our interpersonal relationships. In several countries, such as India, courts of justice make use of MRI and EEG technologies to trace feelings and maybe thoughtful feelings, with all the ethical questions this raises (Shechter, 2013).

Hasson, a brain researcher from Princeton University who investigates the inter-influence between brains during interactional sessions explains that the role of science is to explore those forces and elements that operate between brains, just like the gravitation that exists between physical bodies. Hasson believes that his research findings might be applicable in improving communication interactions between human beings (Shani, 2014).

Kahaneman and Tversky (2005) as well as Dan Ariely (2008) – the ultimate sources of my research inspiration – consistently point out the irrational side of the human decision-making process: Kahaneman and Tversky, through their pioneering

behavioural economy heuristics such as the *Experienced Utility*²⁴ models, and Ariely through his experiments-based theories which explore the hidden forces that shape human behaviour.

My research aims to explore the effect of personal, socio-biological voice and speech attributes on consumer behaviour in voice interactions. Or in other words: to what extent voice and speech dynamics influence consumers to become less predictable and influenced by subconscious?

“Even when it might be regarded as natural, a voice constantly transmits information about the speaker. Even more is revealed as it changes in different social contexts and reflects responses and attitudes to situations encountered.”
(Mathieson, 2001)

In order to implement my research the following objectives were set according to my original research methodology (as described in my research planning proposal):

- A. Collect field data from the CRM archive (CSR²⁵ and customers’ voice and speech parameters and conversation data).
- B. Gather information through a customer survey (satisfaction rate).
- C. Conducting a focus group (for data triangulation).
- D. Process derivative information and suggest findings.
- E. Generate research insights.
- F. Raise directions to practically implement the research insights.

²⁴ The inconsistency of consumer behaviour was highlighted by Kahaneman and Tversky; human beings’ inconsistent decision-making process when value and probability are involved in contexts of positive and negative choices. In their experiments they realized that people tend to avoid risk for positive utility and prefer risk for negative utility, which is of course totally irrational.

²⁵ Customer Service Representative.

4.4.2 Research Methodology Implementation – Collecting Auditory Observation Data

In my research I gathered voice and speech data parameters from both sides of the conversation (the CSR and the customer). There are quite a few research studies which deal with voice impact but these always involved only one side of the interaction, for example the impact of a man's voice on women's preferences. None of these studies analysed both sides of the interaction. Analysing both sides of the interaction is important since it has the potential to find possible meaning based on the match or mismatch between the CSR and customer's voice and speech attributes.

In this sense I consider my research innovative and precedential.

In order to shape my research I was assisted by a professional consultant, who joined my research work from the planning stage through to the data collection and analysis of the research results.

My professional consultant ²⁶ brings broad practical and academic knowledge which is critically relevant to my research. His research knowledge covers the fields of the decision-making process and voice analysis. Since 1996 his research has been dedicated to emotion and its derivatives, focusing on decision-making sciences and neurosciences. He was awarded by global professional magazines for his emotional diagnostics research dealing with voice analysis and its emotional and medical impact.

²⁶ My professional consultant is a physician specializing in operations analysis. He served in senior positions in a large number of local and global corporations from a variety of domains such as defense, computing, medical, pharmaceutical, banking, finance, media and commerce. He has been a senior professor in several universities in Israel, among them, Jerusalem Hebrew University, Tel-Aviv University and Bar-Ilan University. At Bar-Ilan University he published a number of scientific papers and books dealing with emotion mapping, including speech and voice analysis, customer loyalty and consumer behaviour. He has patents in the fields of voice signals, voice intonations and diagnostics voice indications.

My own auditory observations included 40 sampled conversations stored on the CRM system. All these recordings were up to 24 hours old in order to maintain their freshness and relevance. I sampled one recording every 1,500 records over a two-month period (based on 30,000 incoming calls per month).

I had made sure that there was an active prompt message in the call centre's IVR²⁷, as follows: "This call is recorded for study and training purposes".

I listened to the sampled recordings only through streaming play directly from the CRM system. These records have never been downloaded to any personal or other device.

As mentioned in the Methodology chapter (chapter 3), I eliminated as much as possible any potential bias, as follows:

- Sampled incoming calls only.
- Split gender combinations into four different groups: male-CSR to male-customer, male-CSR to female-customer, female-CSR to male-customer, female-CSR to female-customer.
- Sampled only mass market segment customers.
- Sampled only service calls, avoiding sales calls.
- Sampled only pure Israeli accent CSRs and customers in order to eliminate the possible impact of non-Israeli accent.
- Sampled only customers who were registered as being between the ages of 18 and 65.
- Sampled records which were accepted in the call centre between the hours 10:00 and 16:00 in order to avoid rush hours.

²⁷ IVR is an Interactive Voice Response system.

- Sampled records with up to three minutes' waiting time. This has considerable value.
- Avoided recordings with poor audio quality caused by background noise or a bad line.

These are the parameters used for selecting calls (the rationale for each parameter is elaborated on later in this chapter):

Play no. 1: Pure listening and context understanding. At the end of the conversation I documented technical details such as conversational context, call duration and silence rate. Afterwards, I rated the conversation results according to my subjective judgment: full solution provided / partial solution provided / no solution provided.

Play no. 2: CSR's talk time (CSR's conversation possession rate) vs. customer's talk time (Customer's conversation possession rate). If we deduct from the call duration both talk times (CSR and customer) the result will enable us to calculate the conversation silence rate.

Play no. 3 (This was done a few times): Measuring CSR's individual voice and speech attributes by sampling the relevant bits of the conversation: voice pitch dominant frequencies, voice resonance frequencies, voice pitch clarity, voice amplitude and speech rate.

Play no. 4 (This was done a few times): Measuring Customer's individual voice and speech attributes by sampling the relevant bits of the conversation: voice pitch dominant frequencies, voice resonance frequencies, voice pitch clarity, voice amplitude and speech rate.

Example of a sampled conversation example (transcribed and translated from the original Hebrew):

- CSR: Hello this is A speaking how can I help you?
- Customer: Hello, I wanted to ask whether the SMS that I send - when my destination call is not available - costs money.
- CSR: With whom am I speaking please?
- Customer: My name is B.
- CSR: Thank you. Can you repeat your question please?
- Customer: I wanted to ask whether the SMS that I send - when my destination call is not available - costs money.
- CSR: Do you mean the automatic “Who Called” SMS service?
- Customer: No. What I mean is as follows: each time I called someone and he is not available there is an SMS which is sent to him from me. Does this SMS cost me money?
- CSR: Absolutely not. It is a machine-generated SMS.
- Customer: No, no, no. You just don't understand. This SMS is sent from me!
- CSR: That is exactly the point. It is not sent from you. It is sent from a dedicated machine to the subscriber that you had wished to reach, so you are not involved. It is sent only when your target destination is out of coverage or his phone is switched off. There is no cost at all.
- Customer: OK, I understand. Thank you.
- CSR: You are welcome.

Data documentation process, for illustration purposes:

- CSR: Female.
- Customer: Male.
- Conversation context: Pricing information.
- Call results: Full solution provided.
- Call duration: 1:18 minutes.
- CSR's possession rate: 43%.
- Customer's possession rate: 47%.
- Silence rate: 10%.
- CSR's voice pitch: 190 Hz.
- CSR's maximum resonance pitch: 1800 Hz.
- CSR's voice amplitude: Mid-level.
- CSR's voice clarity: Clear.
- CSR's speech rate (ignore the number of words in the transcription since the Hebrew version required significantly less words): Average.
- Customer's voice pitch: 120 Hz.
- Customer's maximum resonance pitch: 1000 Hz.
- Customer's voice amplitude: Loud.
- Customer's voice clarity: Semi-clear.
- Customer's speech rate (ignore the number of words in the transcription since the Hebrew version required significantly less words): Average.

The voice and speech parameters that I have chosen to investigate are as follows:

4.4.2.1 Fundamental Dominant Voice Pitch:

A voice is created through the vocal tract which consists of the upper respiratory tract and the lower respiratory tract. The upper tract includes the larynx, pharynx, oral cavity and nasal cavities. The lower respiratory tract includes the trachea, bronchi and lungs. All this system functions independently and any modification in one element affects all the other elements immediately (Mathieson, 2001, p. 13).

Of-course the physical structure, the size and the position of each element creates different voice type and this is the reason why our voice is so unique and individual (Mathieson, 2001, p. 68).

Voice pitch frequency is derived from vibration of air molecules which are caused by created sounds. The vibrations are represented by the number of air puffs per second, or in physical terms – the number of cycles or waves per second (Hertz/Hz, will be elaborated later). The frequency is determined by a few biological and individual factors which are related to gender, body size, age, larynx size and other factors. In other words, a small larynx is characterized by a narrow air path which causes a greater air pressure which in turn leads to higher resistance and tense vocal cords. In this case the frequency pitch is rather high e.g. 300 vibrations per seconds (300 Hz) are considered to be a high frequency voice pitch.

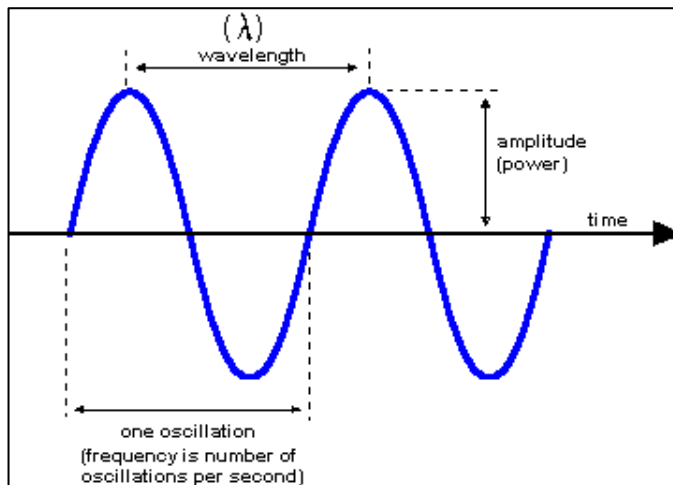
As I mentioned in my Methodology chapter (chapter 3), the music world has identified six voice types and categorized them in two different groups:

- For males: Bass (low frequency pitch), baritone (mid-range frequency) and tenor (high frequency).
- For females: Contralto (low frequency), mezzo-soprano (mid-range frequency) and soprano (high frequency).

These sounds are sensed and interpreted by our hearing nerves as a high frequency sound or a low frequency sound depending on the wavelength of the vibrations.

The wavelength wave form is sinusoidal, as illustrated in figure 15. It is defined as the distance over which the wave's shape repeats itself e.g. peak to peak or off-peak to off-peak. It is symbolized by the Greek letter lambda (λ). The wavelength is measured by fractions of a second. The number of times that a wavelength fits into 1 second is called hertz (Hz). For example if a wind bell creates a 500Hz sound it means that the sound wave created between the wind bell and our ear occurs 500 times in 1 second. The hertz is named after the German physicist Heinrich Hertz (1857-1894), who made important scientific contributions to the study of electromagnetism. The human ear can only detect waves within the frequency spectrum between 20Hz and 20,000Hz (20KHz). Sound outside this range is not detectable by humans (Geva, 1994, p. 88).

Figure 15: Wavelength and wave amplitude (source: Google Images)



The wave height is the distance between the zero point of the X axis and the wave peak (or off-peak). It is called amplitude and it represents the sound power.

In my research case, if for instance one's voice is 'high' (soprano like) then it is represented by figure 16 and if one's voice is 'low' (bass like) then it is represented by figure 17.

Figure 16: High frequency wave (source: Google Images)

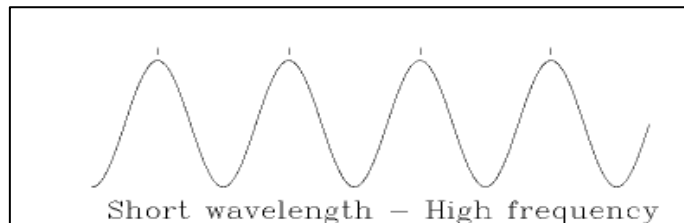
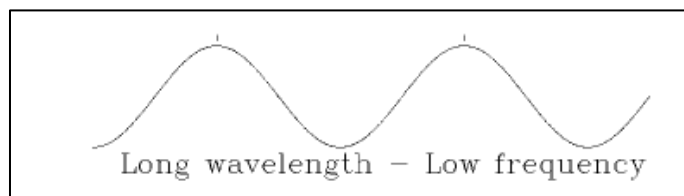


Figure 17: Low frequency wave (source: Google Images)



“Men and women voice is created in a complex manner by physical and biological phenomena which are beyond voluntary control.”

(Graddol and Swan, 1989, p. 17)

This conclusion is derived from a few evidential studies which connect voice pitch with hormonal activity within both males and females.

Voice pitch of human beings varies while they speak. Some of them speak monotonously where others use a wider range of frequencies. Moreover, major part of this pitch range is overlapped, so theoretically males and females can use exactly the same voice pitch. Table 4 illustrates sampled voice pitch range of males and females:

Table 4: The extent to which the pitch ranges of men and women overlap (Graddol and Swan, p. 21). The 'overlapped range (Hz)' column was added by me

Males range (Hz)		Females range (Hz)		Overlapped range (Hz)
Off peak	Peak	Off peak	peak	
77	173	135	350	135-173
76	176	128	332	128-176
77	223	153	237	153-223
76	175	128	348	128-175
77	240	124	345	124-240
78	230	162	303	162-230
78	228	191	290	191-228
77	187	172	243	172-187
77	242	125	320	125-242
75	162	140	337	140-162
77	182	147	340	147-182
74	225	165	352	165-225
		126	338	
		130	335	
		138	352	

The values in table 4 represent the entire pitch range of sampled males and females. Graddol and Swan also measured the dominant average speaking pitch of each sampled person. That would be the parallel frequency for what I define *fundamental dominant voice pitch* in my research. The average values they found are presented in table 5, as follows:

Table 5: The average speaking pitch of a sample of men and women (Graddol and Swan, p. 20).

Males average pitch (Hz)	Females average pitch (Hz)
96	173
100	178
101	181
102	188
105	195
110	200
115	201
117	202
122	205
125	209
129	214
137	217
	227
	230
	232
Mean 113	Mean 203

The figures in table 5 are very important for setting references in my research.

Considering the fact that average voice pitch varies from country to country just like other systematic differences between different ethnic groups i.e. average height, average weight etc. (Majewski, 1972 and Graddol, 1986), I might assume that there may be slight differences in voice pitch of English British speakers and Hebrew speaking Israelis. Hence I decided to set a range around the mean values as my research reference for Israeli speakers: 110-115Hz for males and 190-210Hz for females (these values will be used in my research findings' assessment in chapter 5).

Before approaching the task of data collection I sought a reliable tool to measure voice pitch frequency. I tested a few software-based applications and dedicated laboratory grade equipment. The equipment was precise and reliable, however, these were not suitable because I had to sample the call centres' calls on-site (as described in my ethics commitment; not to file any such calls; not to take outside the organization such

calls and access to them carefully while streaming the records rather than downloading them). I therefore decided to use a common audio capturing and analyzing software package. After looking at a few with the guidance of my academic professional consultant, I decided to adopt Overtone Analyzer Live with a sampling rate of 44 KHz (16 bit) on a single channel (mono) and a frequency resolution of 5.4Hz²⁸. It provided accurate results and had an impressive ability to overcome background noise and cancel echo while isolating speech stream in order to get clear and unbiased results.

Considering its accurate and improved quality performance in comparison to other software solutions I decided to purchase the Overtone Analyzer Live for a reasonable price of about \$100 through the Internet.

Through the Overtone Analyzer Live I discovered an unexpected parameter that I had mistakenly considered until then as a major constraint. In my research proposal I mentioned that mobile telephony voice is filtered and encoded to the spectral range between 300Hz and 3,400Hz, as explained in my Ethical Considerations (chapter 3, sub-chapter 3.1.2) as follows:

“I will have to be careful in analyzing human voice pitch through telephone recordings due to the fact that standard telephone lines are limited to a specific range of frequencies (300Hz-3400Hz)”.

In the Methodology chapter I added:

“Current cellular telephone codec²⁹ can deliver voice frequencies in the spectral range of 300Hz to 3400Hz. This means that a Bass voice is therefore not relevant for this kind of research (below 300Hz)”.

²⁸ Accuracy level which shows the difference in Hz between two frequencies that Overtone Analyzer can distinguish.

²⁹ Codec is an embedded telephone element which decodes analogue voice stream into digital audio through various compression algorithms

When I approached the company's CRM system, where all the call centre's recordings are archived, using Overtone Analyzer, I discovered that there is a wide difference between what I stated above and the real-world data gathered in the field; frequencies below 300Hz could be still traced! Consequently, my research had been dramatically upgraded due to the fact that the 75Hz – 350Hz spectrum is very valuable. The 75Hz – 350Hz range is the dominant spectrum for male and female voice pitch, i.e. approximately 75Hz – 240Hz for males and approximately 125Hz – 350Hz for females.

Moreover, this development has helped to better analyse male and female interactions due to the significant differences between their voice pitch.

The professional explanation for these surprising results is (based on core network and radio engineering colleague and related experts and confirmed by my professional consultant):

Originally telephony standards limited the audio coding to the spectral range 300Hz – 3400Hz. The idea was to block electromagnetic DC³⁰ in order to prevent interference by filtering the frequencies below 300Hz. Since telephony has become mobile and the criticality of electromagnetic induction became marginal, the audio coding spectral range started to vary. So in the case of my company's system, the codec official specifications show that the supported spectral range is 200Hz – 3400Hz. Moreover, 200Hz was not the bottom rate that can be practically measured since the filtering mechanism does not cut off sounds in a specific value (200Hz) at once, but gradually, so sounds below 200Hz can be still traced. Further, the new telecommunication standard focuses on transmitting complete information above 200Hz but it does not prevent the transmission of frequencies below 200Hz. In other words, as long as the

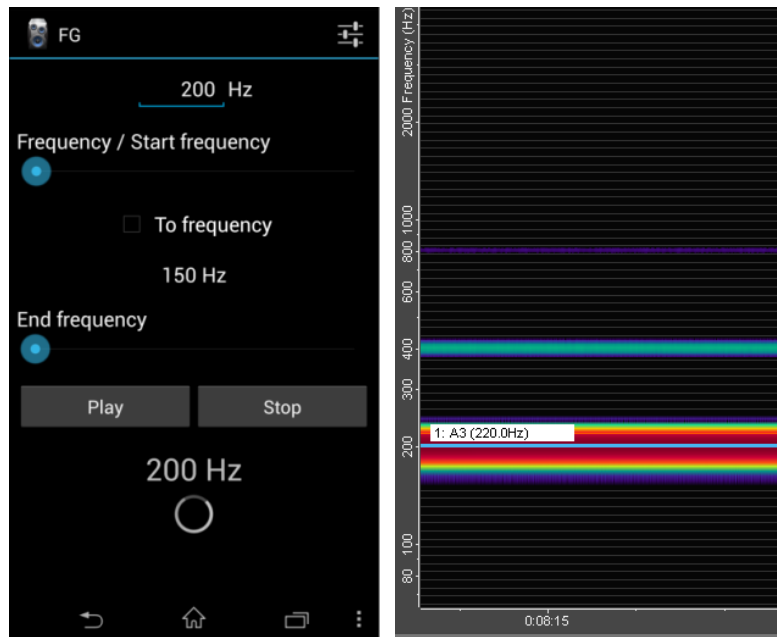
³⁰ Direct Current

voice coder transmits the information above 200Hz fully there is no importance for other spectral values. It also depends on the equipment installed in the core network, so in our case the Nokia-Siemens Media Gateway enables leaking of sounds below 200Hz. I could therefore capture and use those important frequencies (80Hz – 300Hz) for my research as the CRM system has archived those recordings as they were originally encoded.

In order to demonstrate the accuracy of Overtone Analyzer I downloaded a frequency generator application (many of them are available at Google Android Market). The one that I chose was Jose Moaris Frequency Generator. I connected my smartphone into my computer where the Overtone Analyzer was active and I streamed the frequency sounds from the application as described below.

Figure 18 demonstrates a streamed 200Hz input from the Frequency Generator application and the accepted output from Overtone Analyser respectively:

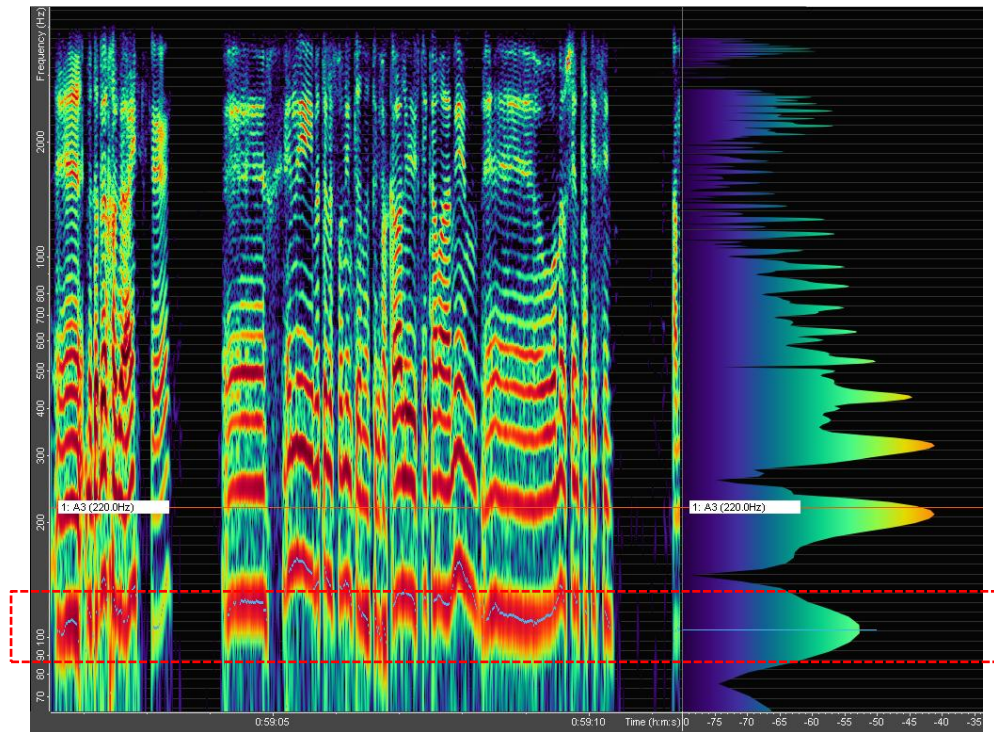
Figure 18: On the left - screen shot of a mobile application that plays a 200Hz tune. On the right - screen shot of the Overtone Analyser accepted result



General comment: the line graphs which appear above the main line represent the resonance frequency (echo frequency described below).

Figure 19 demonstrates a real record of a male customer's voice pitch:

Figure 19: Real recording screen shot demonstrating fundamental frequency of around 100Hz



As we see above the fundamental dominant voice pitch is around 100Hz (marked by a red dotted rectangle in figure 19 image).

4.4.2.2 Voice Acoustic Resonance Frequency (Echo):

Through this parameter I sought to measure the vocal sound's unique 'hue' / 'shadow' / nuance of the speaker. The heard voice is not only the fundamental pitch produced by the larynx alone but also the acoustic product of the entire upper and lower respiratory tract, i.e. vocal tract (Mathieson, 2001, p. 72). The mechanism of acoustic resonance, just like a string of violin, is created by a fundamental vibration of the vocal cords which produces by itself weak and barely audible sounds. The human voice does not produce a single tone but a series of higher frequency tones (Boone et al, 2009). These upper harmonics are normally organized in

a mathematical ratio values (as can be seen in the screen shot illustrations provided above e.g. a 200Hz voice can create harmonic echo at 400Hz, 800Hz and so on up to 2,000Hz and beyond).

In the noble book 'Fermat's Enigma' it is mentioned that Pythagoras and his small group of Greek 'science seekers' were the ones who had discovered 'music' about 2,500 years ago through the harmonic sounds they caught from a smithy's hammer. They realized that knocks on a metal pole in a certain mathematical ratio order create a pleasant sound which was known later on as harmonic sounds (Singh, 1998).

On the other hand, irregular ratio frequencies intensify the spectral noise components and consequently create an unpleasant sound.

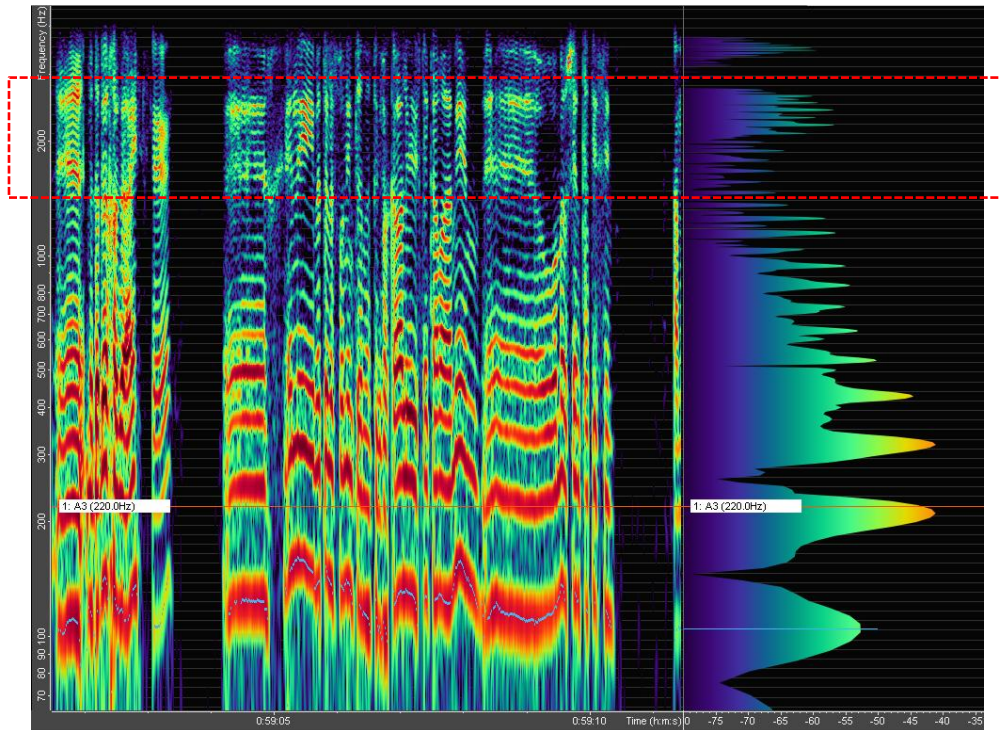
Human voice involves larynx, pharynx, nose and oral cavities and tracts as well as various muscles and the tongue. Since these elements are variable in shape and size the created sound has varying vocal resonance. As a rule of thumb it can be stated that long and wide vocal tracts create lower frequency and vice versa short and narrow vocal tracts create higher frequency resonances which can be sometimes perceived as shrill sounds.

The pitch resonance helps to shape the individual's vocal characteristics. Just like the fact that faces may differ in endless ways, the anatomic and physiological structures lead to enormous numbers of variations in vocal harmonies.

These 'prints' (just like finger prints) create an individual's unique identity and personality such that when we pick up the phone we often immediately recognize the person on the other side of the line. It is rather important to the kind of research that I have sought to conduct; hence I decided to sample the resonance frequency parameter.

Figure 20 demonstrates a real record of high resonance female customer's voice pitch:

Figure 20: Real recording screen shot demonstrating resonance frequency reaching beyond 2000Hz



As we see above, the resonance voice pitch reaches beyond 2000Hz (marked with a red dotted rectangle).

4.4.2.3 Voice Clarity:

Voice clarity is another parameter which is affected inter alia by the resonance frequencies, as described above. I measured the acoustic resonance by the maximum value provided in the Overtone Analyzer software. Although I tried to minimize bias by eliminating Bluetooth hands-free or bad line conversations, some of the records suffered from quality issues which could have been caused by factors like bad reception. However, the records I chose to sample were stable, good quality most of

the time. If there were quality issues during the conversation, those specific parts were excluded from analysis.

Further, I avoided records of customers aged below 18 (these were rare) and above 65. The reason for that was to eliminate common problems in the elderly such as a tremulous or broken voice.

The importance of measuring voice clarity is the understanding of its impact on the conversation's parties from both sides of the line; whether there is a difference between their voices or they share the same voice attributes in terms of clarity.

I categorized the voice intensity into three levels: clear, semi-clear, rough.

Figure 21 demonstrates a real record of a clear voice, where there is a clear spectrum between the harmonic frequencies:

Figure 21: Real recording screen shot demonstrating a clear voice

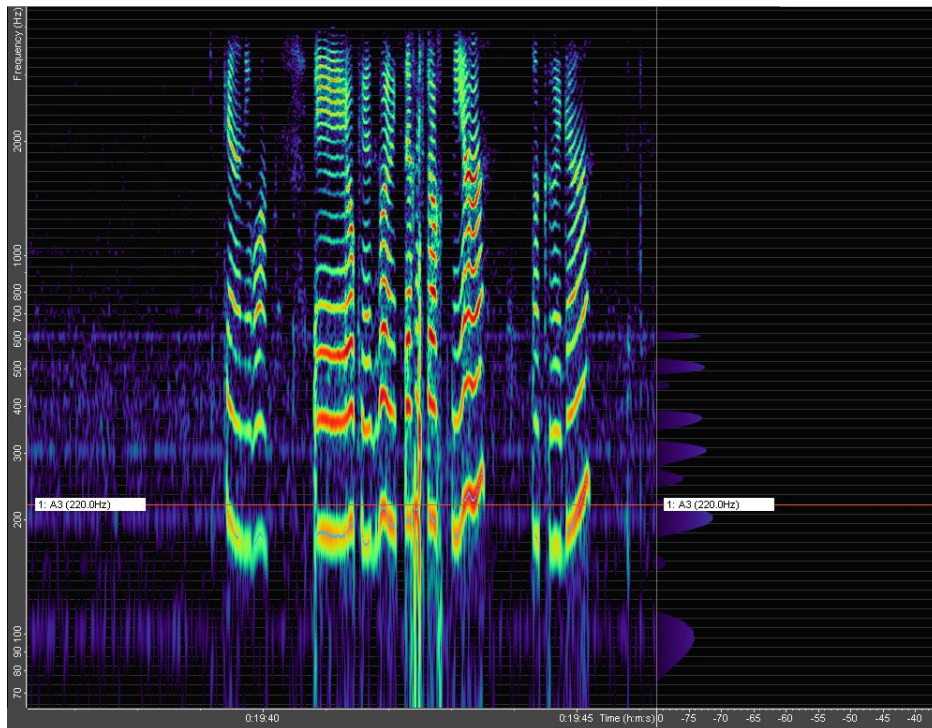
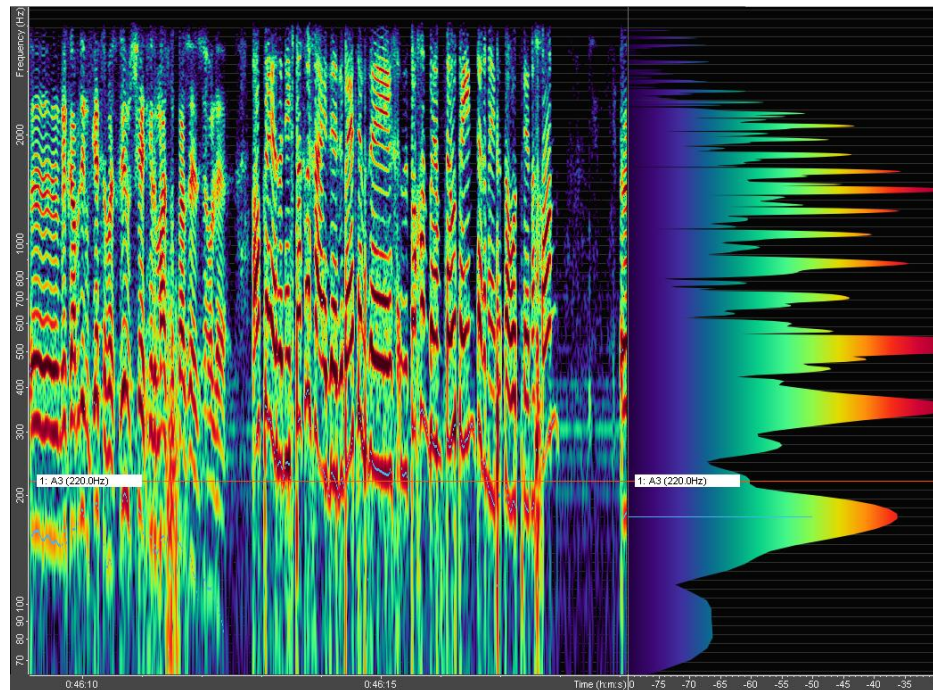


Figure 22 demonstrates a real record of a rough voice, where there is a noisy spectrum between the harmonic frequencies:

Figure 22: Real recording screen shot demonstrating rough / harsh voice



4.4.2.4 Voice Intensity / Amplitude / Loudness / Volume:

Voice intensity means vocal loudness / volume. In figure 15 where voice pitch is represented as wave length (λ), voice intensity is represented as wave height (*amplitude*) of the vocal cord vibrations. It varies from one individual to another.

Voice intensity is determined by the vibrations of the vocal cords and it depends on the energetic effort of the speaker in terms of airflow and pressure. Increased voice loudness is achieved only by increasing airflow which increases the resistance on the vocal cords (Mathieson, 2001, p. 80).

Conversational average speech intensity is valued around 60dB, i.e. quite voice is considered to be around 35-40dB, average intensity is around 60-70 and shouting voice is around 80-90dB (Mathieson, 2001, p.80).

It appears that there is a difference of voice intensity between males and females i.e. men usually talk more loudly than women (Mathieson, 2001, p. 8), however in my research I referred only to the relative voice loudness in each gender e.g. a female voice that I categorized as 'loud' means that it is loud in reference to other female voices.

I categorized the voice intensity into three levels: low, mid, loud. Figure 23 demonstrates a real record of voice intensity:

Figure 23: Screen shot that demonstrates different levels of voice intensity / amplitude



As we see above, the red dotted rectangular boxes represent voice intensity / amplitude from low (on the left side) through mid (in the middle) to loud (on the right side).

4.4.2.5 Speech Rate:

The speech rate parameter was meant to be one of the simplest factors to deal with; however I realized that it is rather controversial. I was looking for supporting evidence through professional literature or academic studies which clearly indicate the average speech rate in Hebrew but unfortunately with no significant success. According to my professional consultant the average speech rate in Hebrew is around 110 WPM (words

per minute). This rate was perfectly reasonable considering the conversation recordings that I sampled. According to my measurements 110 WPM was the average since most of the sampled CSRs and customers spoke at a speech rate of 110 – 120 WPM. However studies I found showed different figures i.e. around 270 WPM in conversation mode amongst 17 years old adolescents (Amir and Grinfeld, p. 233, 2011), which did not make sense.

Goodman (2000, p. 32) indicates that the English speech rate that appeals to most Americans is in the range of 100-150 words per minute.

Since in my research there is no importance given to the formal value of the Hebrew speech rate, but only to the relative differences of speech rate among the sampled population (CSRs and customers), at that stage I omitted the mismatch between the academic and real-world figures. Instead I used my professional consultant's 110WPM as my reference point.

In each recording I sampled a 15 seconds symbolic bit which mostly characterized the speaker. After a transcription of those 15 seconds I counted the words and multiply by four in order to document the WPM rate.

4.4.2.6 Call Possession Rate:

Call possession rate is the factor that indicates which party was more dominant during the conversation. In each conversation I timed through two dedicated time stoppers the talk time of each party.

The importance of this parameter might be related to social domains such as *social dominance* with all its implications.

Although “women are often stereotyped as the ‘overtalkative’ sex” (Graddol and Swann, 1989, p. 70) many studies have shown that men talk more than women in a

variety of contexts. However, the context is crucially important in order to understand the aforementioned thesis, because personal and emotional aspects are involved.

According to Social Dominance Theory (SDT) there are a few social forces which stabilize or counterbalance the social behavioural dynamics within social groups and social interactions. SDT relates these forces to hierarchical elements which are derived from various discriminative inequalities i.e. institutional, individual and behavioural asymmetries (Sidanius and Pratto, 2001). Aspects of those inequalities are a product of Social Dominance Orientation (SDO) which takes into consideration not only the individual's social background but also the individual's desire for relationships with unequal social group. The SDO contains among other elements the gender aspect (Sidanius and Pratto, 2001).

The model suggests that males have a higher Social Dominance Orientation; hence they locate themselves in a higher hierarchical position and consequently tend to be more dominant than females (Sidanius and Pratto, 2001). However other studies show that interaction dominance is not only sourced from social status but from gender differences per se. O'Barr and Atkins (1980) examined the question whether differences between men's and women's speech reflect dominance and power differences. In their study they claimed that women are inherently less powerful than men. Consequently women take less powerful positions in mixed-sex interactions irrespective of their social status and hierarchy. However this research is 30 years old and I could not find additional support for this theory so it has to be further explored in order to find out how this kind of relationship works.

Beyond those factors I documented additional factors that are related to the conversation in general:

4.4.2.7 Call Duration:

Call duration is the technical data I gathered in order to keep the research unbiased. I selected only conversation records not exceeding five minutes (the target duration given to the CSRs) and not less than one minute.

4.4.2.8 Call Silence Rate:

The call duration minus the total call possession rate (CSR and customer) gave me the call silence rate (Call duration minus total call possession rate equals call silence rate).

This information might indicate the efficiency levels of service providers and the differences between same-gender conversations versus mixed-gender conversations.

4.4.2.9 Conversation Subject:

This refers to documentation of the context around which the conversation was conducted.

4.4.3 Research Methodology in Practice – Confirmation of Findings and Complementary Triangulation

This stage of the research aimed to provide additional evidence and cross examination.

In the first parameter – *conversation results* – I rated the quality of solution provided by the CSR to the customer. The rating/grade is a combination of my subjective judgment and the CSRs' perception, as raised in a focus group process.

In addition, the focus group process aimed to yield cross reference data and further qualitative insights.

In the second parameter – *customer satisfaction grade* – the customers themselves were asked to rate their satisfaction level following their service calls.

After the data collection stage I conducted an immediate survey. The survey included telephone interviews to those customers who were sampled in the auditory observation records.

4.4.3.1 Conversation Results:

This parameter is one of the main pillars on which this whole research stands. It is contextual rather than technical. Before checking all the technical measurements described above, I listened carefully to the whole conversation and consulted the members of the focus groups (specified below). I rated each conversation to determine the extent to which the customer's problem was resolved. The three options were:

Yes – for a clear, full resolution,

Partially – for partial resolution of the customer’s problem,

No – for a clear non-resolution.

The focus group process aimed to supply cross examination to the technical data and my subjective evaluation. Initially, this was intended to be two sessions, but due to technical constraints there was one session with seven customer service representatives and team leaders.

These representatives were asked to refer to the recordings that I sampled and provide their own interpretation. I explained to them that this session is part of my research study.

The focus group discussion explored these questions (as mentioned in the Methodology chapter):

- What do you think of the outcome of the interaction - positive/negative?
- Do you think the customer is satisfied with the service level provided?
- What are the key attributes and dynamics of the interaction that affected the conversation results – for good and for bad?
- Do you think you can personally apply some of these key attributes and conversation dynamics in future interactions?

The focus group process and insights are elaborated in depth in sub-chapter 5.2.

4.4.3.2 Customer Satisfaction Ranking:

Customer satisfaction is a function of the service evaluation of the customers in relation to their expectations. The customer satisfaction index must be routinely followed and highly prioritized by any organization which seeks to invest in its customers (Goldschmidt, 2008, p. 29).

My research seeks to discover whether there are additional ‘silent’ parameters that affect ‘customer evaluation’ beyond the actual service that the customer received in practice.

Customer satisfaction is one of those crucial parameters to ensure organization growth through customer loyalty (which retains a healthy market share) and customer satisfaction. In fact, customer satisfaction and customer loyalty are positively and directly related. High quality service leads to customer satisfaction, and customer satisfaction leads to customer loyalty (Srivastava and Rai, 2013). Online service (which may work in parallel to customer call centres) shows the same results, i.e. good customer service has a significant effect on customer satisfaction (Dipta and Nugroho, 2013).

This was confirmed in several studies, which showed/demonstrated that service quality has a positive impact on customer satisfaction (Hu et al, 2009). One specific study in the Taiwanese mobile industry indicated clearly that “when telecom companies provide good service quality, perceived value and customer satisfaction can be enhanced” (Kuo et al, 2009).

The customer satisfaction level is also one of the main pillars on which the whole research stands. It is based on a single subjective answer given in a survey by those 40 customers who were sampled in my auditory observation of the conversation recordings. It aims to measure the customers' satisfaction rating and compare this to my objective evaluation this (see *conversation results* above).

In order to keep the research simple and clear I asked a single question:

“Following your service call yesterday, how satisfied were you with the service you received from the customer service representative?”

The customer could choose one of these answers:

3 – ‘Very satisfied’ (excellent service),

2 – ‘Partially satisfied’ (fair service),

1 – ‘Not satisfied’ (poor service).

The time slot between the actual recording time and the survey interview was up to 24 hours. It was important to follow up the customers when their experience was still fresh in their minds.

The sample survey was originally supposed to be conducted through the Service Division's daily procedural survey. However it was not available at the time I was sampling the auditory records due to a change in policy. As a result, I conducted the sample survey myself.

4.4.3.3 Correlation:

This parameter was a derivative of the two parameters measured above – *customer satisfaction grade* in relation to *conversation results*. The optional results for this parameter could be as shown in table 6:

Table 6: Correlation between interaction results and customer satisfaction rate

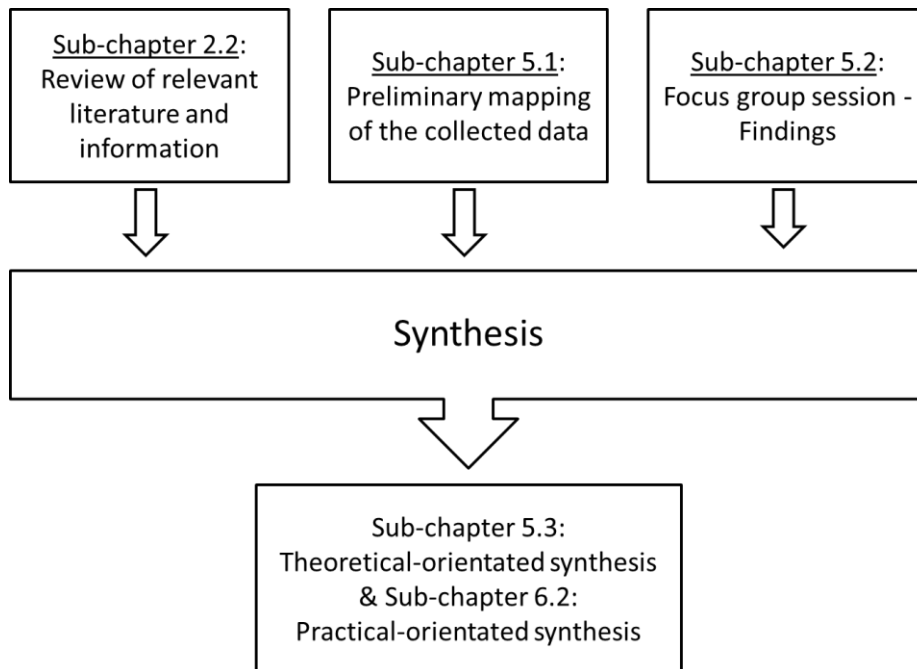
Conversation results: <i>Problem solved?</i>	Customer satisfaction grade: <i>How satisfied?</i>	Correlation
Full solution	Very satisfied	Correlated
Full solution	Partially satisfied	Under-rated
Full solution	Not satisfied	Under-rated
Partial solution	Very satisfied	Over-rated
Partial solution	Partially satisfied	Correlated
Partial solution	Not satisfied	Under-rated
Non solution	Very satisfied	Over-rated
Non solution	Partially satisfied	Over-rated
Non solution	Not satisfied	Correlated

Chapter 5: Project Findings

This chapter consists of three parts. The first subchapter (5.1) is a bold forthright report of the results of my observations. It maps the immediate findings based on the figures that were found in the records, without relating them into broader contexts. The second subchapter (5.2) is an informative description of the focus group that I conducted. It displays some qualitative findings that suggest new directions for further exploration. The third subchapter (5.3) is an interpretation of the ‘dry’ findings displayed in subchapters 5.1 and 5.2. It synthesizes these findings into broader contexts relying on theoretical academic literature.

In sub-chapter 6.2 I interpret and model the insights of sub-chapter 5.3 in order to develop a better understanding of the implications of the insights on the industry and in order to generate potential new operational practices to be implemented in TC.

Figure 24: The synthesis process



5.1 Preliminary Mapping of the Collected Data

The sampled records were divided into four different groups:

Conversations between male CSRs and male customers

Conversations between male CSRs and female customers

Conversations between female CSRs and male customers

Conversations between female CSRs and female customers, as follows:

5.1.1 Male CSR to Male Customer Interactions

Table 7 below presents the measured data of male CSRs, as follows:

Table 7: Collected data from male CSRs in male to male interactions

Rec.		CSR					
		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
1	Male to Male						
1.1	convers.#1	130	1,700	Clear	Mid	Rapid	27%
1.2	convers.#2	130	900	Clear	Low	Average	20%
1.3	convers.#3	60	1,200	Clear	Loud	Average	39%
1.4	convers.#4	130	1,900	Rough	Loud	Slow	37%
1.5	convers.#5	120	1,900	Semi	Low	Average	49%
1.6	convers.#6	110	2,200	Semi	Mid	Average	34%
1.7	convers.#7	70	1,600	Semi	Mid	Average	60%
1.8	convers.#8	120	2,500	Rough	Mid	Average	21%
1.9	convers.#9	120	2,000	Semi	Mid	Rapid	59%
1.10	convers.#10	100	1,500	Semi	Mid	Average	37%
	Average	109	1,740				38%

Table 8 below presents the measured data of male customers, as follows:

Table 8: Collected data from male customers in male to male interactions

Rec.		Customer					
		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
1	Male to Male						
1.1	convers.#1	160	2,500	Clear	Loud	Slow	43%
1.2	convers.#2	110	1,200	Semi	Mid	Average	37%
1.3	convers.#3	100	2,200	Semi	Mid	Average	40%
1.4	convers.#4	180	2,500	Rough	Mid	Average	32%
1.5	convers.#5	80	1,800	Clear	Loud	Slow	45%
1.6	convers.#6	100	700	Semi	Low	Slow	40%
1.7	convers.#7	110	2,500	Rough	Loud	Average	33%
1.8	convers.#8	100	2,500	Rough	Mid	Average	47%
1.9	convers.#9	180	1,500	Clear	Low	Slow	33%
1.10	convers.#10	80	1,000	Clear	Mid	Slow	28%
	Average	120	1,840				38%

Table 9 below presents additional conversation-related data, as follows:

Table 9: General records details and results documentation in male to male interactions

Rec.		Additional details			Call results		
		Silence rate	Call duration (m)	Conversation subject	Problem solved	Customer satisfaction (1 = poor, 2 = fair, 3 = excellent)	Correlation: Problem Solving / Satisfaction
1	Male to Male						
1.1	convers.#1	30%	1.51	Number portability	Yes	3	Correlated
1.2	convers.#2	43%	2.15	Payment procedures	Yes	3	Correlated
1.3	convers.#3	21%	3.35	Voice mail	No	1	Correlated
1.4	convers.#4	31%	3.43	Internet info	Yes	3	Correlated
1.5	convers.#5	6%	1.18	Roaming info	Partially	3	Over-rated
1.6	convers.#6	26%	3.45	Internet info	Yes	3	Correlated
1.7	convers.#7	7%	4.16	Coverage	Yes	3	Correlated
1.8	convers.#8	33%	3.09	Internet info	Yes	3	Correlated
1.9	convers.#9	8%	4.09	Content	No	1	Correlated
1.10	convers.#10	36%	4.05	SIM	Yes	3	Correlated
	Average	24%	3.21			2.6	

5.1.1.1 Preliminary Findings:

The first sampled group consists of ten conversation recordings between male CSRs and male customers. The main insight that arises from these records is the fact that in nine out of ten interactions there was a full correlation between the actual results of the interaction and the customers' satisfaction rate. In this group it is clearly indicated that when male customers were provided with a good solution they are consequently satisfied and vice versa, when they are provided with an inadequate solution they are accordingly not satisfied. The only uncorrelated case (one in ten) was when a male CSR provided a partial solution and the male customer was still satisfied.

From these results it appears that male-customers' approach towards the service of a male CSR is straight forward, i.e. the customers' personal response depends on the CSR's professional level.

5.1.1.2 Dominant Voice Pitch:

In chapter 4 (sub-chapter 4.4.2.1), when I described the methodological implementation of the data collection, I set 110Hz as a reference value since in previous studies this value represented the average fundamental dominant voice pitch of males.

If 110Hz is taken as an average frequency value of male's voice pitch then it can be seen that four in ten male CSRs have a voice pitch which is below 110Hz and six have a voice pitch which is above 110Hz.

When male customers' values are analyzed there is an opposite situation: six in ten male CSRs have a voice pitch which is below 110Hz and four have a voice pitch which is above 110Hz.

This situation does not deliver any significant conclusion. However the average voice pitch of male CSRs was lower than the average voice pitch of male customers i.e. 109Hz in comparison to 120Hz respectively. It might imply that male CSRs are self-trained to transmit ‘dominance’ or ‘confidence’. In this chapter (sub-chapter 5.3.1 below), I will discuss the link between voice pitch and transmission of hidden desirable personal image.

5.1.1.3 Resonance Frequency:

The resonance frequency (echo) which reflects the voice harmonic footprint shows that male customers reach slightly higher values than male CSRs; their average resonance frequency is around 1,840Hz in comparison to 1,740Hz respectively. No meaningful findings were indicated.

5.1.1.4 Pitch Clarity:

The spread of voice clarity values does not indicate any significance. Amongst male CSRs three in ten CSRs had a clear voice, five had a semi-clear voice and two of them had a rough voice. Amongst male customers, four in ten customers had a clear voice, three had a semi-clear voice and three had a rough voice. No meaningful findings were indicated.

5.1.1.5 Voice Amplitude / Intensity:

The spread of voice intensity values is quite similar between male customers and male CSRs, where most of the speakers used a mid-level of voice intensity (five in ten and six in ten respectively). No meaningful findings were indicated.

5.1.1.6 Speech Rate:

The speech rate analysis shows that male CSRs tend to speak either at a rapid (2) or average (7) speech rate. Only one in ten spoke slowly. On the other end of the interaction male customers tend to speak either at a slow (5) or average (5) speech rate. None of them spoke rapidly.

This might be related to the fact that CSRs tend to feel more comfortable in this interactional environment, whereas customers find it difficult to describe their problem or even for more personal reason, they may feel unconfident. In sub-chapter 5.3.2 below I discuss more in depth the possible link between speech rate and image reflection.

5.1.1.7 Call Possession Rate:

An equal average possession rate between male CSRs and male customers is observed i.e. 38% - 38% respectively. In five records male CSRs were more dominant than male customers, possessing most of the conversation time. In five other records male customers were more dominant than male CSRs, possessing most of the conversation time. These results indicate that there is no significant dominance by either of the interaction parties.

5.1.1.8 Silence Rate:

The average silence rate in the ten sampled interactions is 24%; however the spread range is rather wide. The lowest observed silence rate was 6% and the highest one was 43%. No meaningful findings were indicated.

5.1.2 Male CSR to Female Customer Interactions

Table 10 below presents the measured data of Male CSRs, as follows:

Table 10: Collected data from male CSRs in male to female interactions

		CSR					
Rec.		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
2	Male to Female						
2.1	convers.#1	140	1,800	Rough	Low	Average	31%
2.2	convers.#2	120	1,600	Clear	Mid	Average	47%
2.3	convers.#3	90	1,500	Rough	Loud	Average	42%
2.4	convers.#4	130	1,600	Semi	Mid	Average	34%
2.5	convers.#5	110	2,500	Rough	Mid	Slow	63%
2.6	convers.#6	100	1,800	Rough	Mid	Average	27%
2.7	convers.#7	90	1,700	Rough	Mid	Average	26%
2.8	convers.#8	140	1,500	Clear	Mid	Average	58%
2.9	convers.#9	120	2,500	Rough	Mid	Average	44%
2.10	convers.#10	110	1,700	Semi	Mid	Rapid	38%
	Average	115	1,820				41%

Table 11 below presents the measured data of female customers, as follows:

Table 11: Collected data from male customers in male to female interactions

Rec.		Customer					
		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch Clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
2	Male to Female						
2.1	convers.#1	190	2,200	Rough	Low	Slow	53%
2.2	convers.#2	210	1,900	Semi	Mid	Rapid	39%
2.3	convers.#3	300	2,500	Clear	Low	Average	21%
2.4	convers.#4	150	2,000	Semi	Mid	Slow	32%
2.5	convers.#5	220	2,500	Rough	Loud	Average	25%
2.6	convers.#6	170	2,000	Rough	Loud	Slow	25%
2.7	convers.#7	180	2,500	Rough	Low	Slow	54%
2.8	convers.#8	200	2,500	Semi	Low	Average	40%
2.9	convers.#9	200	1,800	Clear	Low	Slow	32%
2.10	convers.#10	190	2,500	Rough	Loud	Average	36%
	Average	201	2,240				36%

Table 12 below presents additional conversation-related data, as follows:

Table 12: General records details and results documentation in male to female interactions

Rec.		Additional details			Call results		
		Silence rate	Call duration (m)	Conversation subject	Problem solved	Customer satisfaction (1 = poor, 2 = fair, 3 = excellent)	Correlation: Problem Solving / Satisfaction
2	Male to Female						
2.1	convers.#1	16%	2.41	Tariff info	Yes	2	Under-rated
2.2	convers.#2	13%	1.29	Bluetooth	No	3	Over-rated
2.3	convers.#3	37%	4.1	Coverage	Partially	3	Over-rated
2.4	convers.#4	33%	4.2	Internet info	Yes	2	Under-rated
2.5	convers.#5	12%	3.02	Email	Partially	3	Over-rated
2.6	convers.#6	48%	3.54	Internet info	Yes	2	Under-rated
2.7	convers.#7	20%	3.03	Tariff info	Yes	3	Correlated
2.8	convers.#8	2%	2.02	Handset	No	1	Correlated
2.9	convers.#9	24%	4.59	Internet info	No	2	Over-rated
2.10	convers.#10	25%	3.13	Internet info	No	2	Over-rated
	Average	23%	3.29			2.3	

5.1.2.1 Preliminary Findings:

The second sampled group consists of ten conversation recordings between male CSRs and female customers. The main insight arising from these records is the exceptional lack of correlation between the actual results of the interactions and the customers' satisfaction rate. Eight in ten interactions were rated as non-correlated – either over-rated (5) or under-rated (3). There are a few possible parameters that might contribute a clue for this unbalanced situation, i.e. male CSR's and female customer's voice pitch and the difference between them, male CSR's and female customer's speech rate and the mismatch between them, and the possession rate between the two conversation parties.

From these results it seems that female customer's satisfaction rate is not entirely driven by male CSR's level of service and it is influenced by sub-factors, as will be discussed in sub-chapters 5.3.1, 5.3.2, and 5.3.3 below.

5.1.2.2 Dominant Voice Pitch:

The average frequency of voice pitch of male CSRs is significantly and naturally lower than that of female customers, (115Hz and 201Hz respectively). Five in ten male CSRs had a voice pitch of 110Hz or lower and five of them had a voice pitch which is above 110Hz.

Amongst female customers five in ten speakers had a voice pitch of 190Hz or lower and five of them had a voice pitch which is above 190Hz.

In chapter 4 (sub-chapter 4.4.2.1), when I described the methodological implementation of the data collection, I set 190Hz as a reference value since in previous studies values around 200Hz represented the average fundamental dominant voice pitch of females.

From these results it appears that female customers with relatively low voice pitch (190Hz and below) do not tend to be less likely to be satisfied by male CSRs with close-gap voice pitch (up to 70Hz difference between them and male CSRs with voice pitch of 120Hz or higher). Three in five low voice pitch female customers showed under-rated satisfaction. The fourth had an interaction with a low voice pitch male CSR (90Hz difference, 180Hz-90Hz) and the fifth one was not able to under-rate the interaction satisfaction since the interaction results were poor and her given rate correlated. The above insights are formulated below as follows:

If $F_0F_{cu} \leq 190\text{Hz}$ and $F_0M_{cs} \geq 120\text{Hz}$ then $SRF_{cu} = \text{under-rated}$.

Where:

F_0M_{cs} is Fundamental voice pitch of Male CSR

F_0F_{cu} is Fundamental voice pitch of Female Customer

SRF_{cu} is Satisfaction Rate of Female Customer

This is another angle to some socio-biology theories which deal with the relations between males' fundamental voice pitch and females' consequent satisfaction rate (as I describe in depth in sub-chapter 5.3.1 below).

Four in five over-rated interactions involved high-pitched female customers (200Hz and beyond) and wide-gapped lower male CSR's voice pitch (from 80Hz up to 210Hz difference). The fifth over-rating female customer had a 190Hz pitch however the pitch difference from the male CSR was only 80Hz.

Again, this is another case of the relation between males' voice pitch and females' consequent satisfaction rate (as described in depth in sub-chapter 5.3.1 below).

The above insights are formulated below as follows:

If $F_0Mcs - F_0Fcu \geq 80\text{Hz}$ and $F_0Fcu \geq 200\text{Hz}$ then $SRFcu = \text{over-rated}$.

Where:

F_0Mcs is Fundamental voice pitch of Male CSR

F_0Fcu is Fundamental voice pitch of Female Customer

$SRFcu$ is Satisfaction Rate of Female Customer

5.1.2.3 Resonance Voice Pitch:

The resonance pitch of male CSRs is significantly lower than that of female customers (the average resonance pitch is 1,820Hz and 2,240Hz respectively). Among the male CSRs only two in ten speakers had a resonance pitch which is higher than 2,000Hz, while among female customers eight in ten speakers had a resonance pitch which is higher than 2,000Hz. No meaningful findings were indicated.

5.1.2.4 Pitch Clarity:

The spread of voice clarity among male CSRs shows the following results: two in ten CSRs had a clear voice, two had a semi-clear voice and six had a rough voice. The spread of voice clarity among female customers looks quite similar; two in ten customers had a clear voice, three had a semi-clear voice and five of them had a rough voice. No meaningful findings were indicated.

5.1.2.5 Voice Amplitude / Intensity:

The spread of voice intensity values is rather different when comparing male CSRs to female customers. Apart from two in ten CSRs (one had a high-intensity voice and the other had a low-intensity voice) all the other eight had a mid-level voice intensity. Among female customers there was a different spread; three out ten customers had a high-intensity voice, two had mid-level voice intensity and the other five had low-intensity voices. No meaningful findings were indicated.

5.1.2.6 Speech Rate:

All the interactions that were under-rated satisfaction-wise (3/3) were from female customers who had a slow speech rate. In all of these cases the male CSRs had an average speech rate.

Two other interactions in which female customers had a slow speech rate showed correlated and over-rated satisfaction rates.

It is possible that slow-speaking female customers tend to feel nervous and frustrated when a male CSR talks at a more rapid speech rate? Is it possibly due to the female customer not understanding and suffering from information loss? Is it necessarily related to gender identity or it is a general effect of 'slow speakers'? These questions will be discussed in sub-chapter 5.3.2 below.

Incidentally, we might assume that the male CSRs feel frustrated as well due to the fact that they do not meet their KPI31 targets. (This is triangulated later on in sub-chapter 5.2 in the focus group session).

The above insights are formulated below as follows:

³¹ KPI – Key Performance Index which means business quantitative targets. In the CSR's case it is up to five minutes per call.

If $SR_{Fcu} < \bar{x} SR$ and $SR_{Mcs} \geq \bar{x} SR$ then probability of under-rated SR_{Fcu} increases.

Where:

SR_{Fcu} is Speech Rate of Female Customer

SR_{Mcs} is Speech Rate of Male CSR

$\bar{x} SR$ is Average Speech Rate

SR_{Fcu} is Satisfaction Rate of Female Customer

5.1.2.7 Call Possession Rate:

In eight out of ten sampled interactions male CSRs showed dominance in call possession rate. Male CSRs held 41% of conversation share in aggregate, in comparison with 36% of female customers (the remaining percentage is silent time). It might be related to gender control or social dominance in general (as discussed in sub-chapter 5.3.3 below).

Moreover, all over-rated satisfaction interactions (5 in 5) were characterized by dominant call possession by male CSRs. It might only be an expression to the CSR's effort to provide good service or alternatively, it might be related to a deeper element which is linked to social dominance theory, as will be discussed in sub-chapter 5.3.3 below. The above insights are formulated below as follows:

If $PR_{Mcs} > PR_{Fcu}$ then probability of over-rated SR_{Fcu} increases.

Where:

PRM_{CS} is call Possession Rate of Male CSR

PRF_{CU} is call Possession Rate of Female Customer

SRF_{CU} is Satisfaction Rate of Female customer

5.1.2.8 Silence Rate:

The average silence rate in all of the ten sampled interactions is 23%; however the spread is rather wide. The lowest observed silence rate was 2% and the highest one was 48%. No meaningful findings were indicated.

5.1.3 Female CSR to Male Customer Interactions

Table 13 below presents the measured data of female CSRs, as follows:

Table 13: Collected data from female CSRs in female to male interactions

		CSR					
Rec.		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch Clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
3	Female to Male						
3.1	convers.#1	190	1,600	Clear	Mid	Slow	42%
3.2	convers.#2	200	2,500	Semi	Mid	Average	25%
3.3	convers.#3	200	2,500	Clear	Low	Average	22%
3.4	convers.#4	250	2,000	Semi	Mid	Rapid	29%
3.5	convers.#5	150	2,500	Rough	Loud	Rapid	17%
3.6	convers.#6	180	2,000	Semi	Low	Average	37%
3.7	convers.#7	190	2,500	Semi	Low	Rapid	31%
3.8	convers.#8	150	2,500	Rough	Mid	Average	62%
3.9	convers.#9	150	2,500	Rough	Mid	Average	26%
3.10	convers.#10	150	2,000	Rough	Mid	Rapid	35%
	Average	181	2,260				33%

Table 14 below presents the measured data of male customers, as follows:

Table 14: Collected data from male customers in female to male interactions

		Customer					
Rec.		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch Clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
3	Female to Male						
3.1	convers.#1	110	1,800	Rough	Mid	Average	47%
3.2	convers.#2	130	1,700	Rough	Mid	Slow	38%
3.3	convers.#3	180	1,800	Semi	Loud	Slow	23%
3.4	convers.#4	120	1,200	Rough	Loud	Average	47%
3.5	convers.#5	150	2,500	Semi	Loud	Average	41%
3.6	convers.#6	150	1,700	Semi	Loud	Slow	32%
3.7	convers.#7	150	2,500	Clear	Loud	Average	50%
3.8	convers.#8	170	900	Clear	Low	Average	27%
3.9	convers.#9	80	1,800	Rough	Loud	Average	60%
3.10	convers.#10	110	1,700	Semi	Low	Slow	36%
	Average	135	1,760				40%

Table 15 below presents additional conversation-related data, as follows:

Table 15: General records details and results documentation in female to male interactions

Rec.		Additional details			Call results		
		Silence rate	Call duration (m)	Conversation subject	Problem solved	Customer satisfaction (1 = poor, 2 = fair, 3 = excellent)	Correlation: Problem Solving / Satisfaction
3	Female to Male						
3.1	convers.#1	11%	3.13	Billing invoice	Partially	2	correlated
3.2	convers.#2	38%	2.34	Billing invoice	No	3	over-rated
3.3	convers.#3	55%	1.54	Data consumption	No	3	over-rated
3.4	convers.#4	24%	2.43	Billing invoice	No	2	over-rated
3.5	convers.#5	42%	3.17	SMS content	Yes	2	under-rated
3.6	convers.#6	31%	4.5	Handset	Partially	3	over-rated
3.7	convers.#7	20%	3.4	Call forward	Yes	3	correlated
3.8	convers.#8	11%	3.23	Billing	Partially	2	correlated
3.9	convers.#9	14%	3.49	Roaming info	Partially	2	correlated
3.10	convers.#10	28%	4.57	Internet info	No	3	over-rated
	Average	27%	3.43			2.5	

5.1.3.1 Preliminary Findings:

The third sampled group consists of ten conversation recordings between female CSRs and male customers. These records may again point to an unbalanced situation between the actual results of the interaction and the customers' satisfaction rate. Only four in ten interactions correlated. The other six interactions were not correlated, i.e. either over-rated (5) or under-rated (1). The parameters involved in this unbalanced situation relate to female CSR's voice intensity (amplitude) as well as voice clarity, and call possession rate between the two conversation parties.

By these results it again appears that male customer's satisfaction rate is not entirely driven by the female CSR's service level and it is influenced by sub-factors, as will be discussed below.

5.1.3.2 Dominant Voice Pitch:

The average frequency of female CSRs' voice pitch is significantly and naturally higher than that of male customers (181Hz and 135Hz respectively). Seven in ten female CSRs had a voice pitch of 190Hz or lower and only three of them had a voice pitch above 190Hz.

Among male customers three in ten speakers had a voice pitch of 110Hz or lower and seven of them had a voice pitch higher than 110Hz.

It seems that male customers tend to use a higher pitch (135Hz on average) than male CSRs (110Hz on average). Also, there is a difference between male customers' pitch in all-male interactions (135Hz on average) and male customers' pitch in mixed-gender interactions (120Hz on average). Is it possible that males try not to 'transmit' image perception through voice pitch adaptation when their conversation partner is a knowledgeable female authoritative person? In sub-chapters 5.3.1 and 5.3.3 below I

will discuss the link between sub-speaking characteristics and social hierarchy positioning.

5.1.3.3 Resonance Voice Pitch:

Clearly female CSRs resonance pitch is significantly higher than male customer's. The average resonance pitch is 2,260Hz and 1,760Hz respectively. Among the female CSRs there were nine in ten speakers who had a resonance pitch which is higher than 2,000Hz, where among the male customers there were only two speakers with a resonance pitch which is above 2,000Hz. No meaningful findings were indicated.

5.1.3.4 Voice Amplitude / Intensity:

The only interaction in which a female CSR spoke loudly (high amplitude voice) was the only case in which her partner (male customer) expressed under-rated satisfaction. In all other nine sampled interactions male customers reacted to female CSRs in a correlated or over-rated manner.

Is it possible that male customers' satisfaction rate is influenced negatively by the female CSR's voice loudness? In sub-chapter 5.3.4 below I will try to discuss the link between amplitude and transmission of hidden personal characteristics.

The above insights are formulated below as follows:

If $VIF_{CS} = \text{'high'}$, then probability of under-rated SRM_{CU} increases.

Where:

VIF_{CS} is Female CSR Voice Intensity

SRM_{CU} is Satisfaction rate of Male Customer

5.1.3.5 Pitch Clarity:

The spread of voice amplitude among female CSRs shows that two in ten CSRs had a clear voice, four had a semi-clear voice and four of them had a rough voice. The spread of voice amplitude among male customers looks exactly the same; two in ten customers had a clear voice, four had a semi-clear voice and four of them had a rough voice.

Four in five over-rated interactions involved female CSRs who spoke in a clear or semi-clear voice.

A clear voice is characterized by clear octaves and it sounds more pleasant. Is it possible that male customers' satisfaction rate is influenced positively by females' voice-softness? In sub-chapter 5.3.4 below I will try to discuss the link between amplitude and transmission of hidden personal characteristics.

The above insights are formulated below as follows:

If VCF_{CS} = 'clear' or 'semi-clear', then probability of over-rated SRM_{CU} increases.

Where:

VCF_{CS} is Voice Clarity of Female CSR

SRM_{CU} is Satisfaction rate of Male Customer

5.1.3.6 Speech Rate:

Female CSRs spoke at either a rapid (4) or average (5) speech rate. Only one in ten spoke slowly. Their interaction partners (male customers) spoke either at a slow (4) or average (6) speech rate. None of them spoke rapidly.

No meaningful findings related to speech rate were found.

5.1.3.7 Call Possession:

In seven of the ten sampled interactions male customers showed dominance in call possession rate. In aggregate male customers held 40% of conversation share in comparison to 33% of female CSRs.

Again, it might be related to the broader domain of social dominance, as I discuss in sub-chapter 5.3.3 below.

5.1.3.8 Silence Rate:

The average silence rate in the ten sampled interactions was 27%; however the spread is rather wide. The lowest observed silence rate was 11% and the highest was 55%. No meaningful findings were indicated.

5.1.4 Female CSR to Female Customer Interactions

Table 16 below presents the measured data of female CSRs, as follows:

Table 16: Collected data from female CSRs in female to female interactions

		CSR					
Rec.		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch Clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
4	Female to Female						
4.1	convers.#1	180	2,000	Rough	Low	Rapid	35%
4.2	convers.#2	180	1,800	Clear	Low	Slow	31%
4.3	convers.#3	170	1,800	Semi	Low	Average	32%
4.4	convers.#4	190	1,900	Rough	Loud	Rapid	38%
4.5	convers.#5	180	2,500	Clear	Low	Average	41%
4.6	convers.#6	150	2,500	Rough	Loud	Rapid	44%
4.7	convers.#7	200	2,500	Clear	Average	Average	38%
4.8	convers.#8	160	2,500	Clear	Loud	Rapid	43%
4.9	convers.#9	150	2,500	Rough	Mid	Rapid	34%
4.10	convers.#10	180	2,500	Semi	Low	Rapid	61%
	Average	174	2,250				40%

Table 17 below presents the measured data of female customers, as follows:

Table 17: Collected data from female customers in female to female interactions

Rec.		Customer					
		Dominant voice pitch (Hz)	Resonance frequency (Hz)	Pitch Clarity	Voice intensity	Speech rate (+/-110w/m)	Call possession rate
4	Female to Female						
4.1	convers.#1	210	2,000	Semi	Loud	Average	45%
4.2	convers.#2	160	2,300	Rough	Loud	Slow	49%
4.3	convers.#3	180	1,600	Rough	Loud	Slow	50%
4.4	convers.#4	200	1,700	Clear	Low	Average	41%
4.5	convers.#5	190	2,500	Semi	Mid	Slow	37%
4.6	convers.#6	180	2,200	Clear	Loud	Average	29%
4.7	convers.#7	200	2,500	Semi	Loud	Rapid	41%
4.8	convers.#8	190	2,200	Rough	Mid	Average	41%
4.9	convers.#9	150	2,500	Rough	Loud	Slow	56%
4.10	convers.#10	180	2,500	Semi	Mid	Slow	35%
	Average	184	2,200				42%

Table 18 below presents additional conversation-related data, as follows:

Table 18: General records details and results documentation in female to female interactions

Rec.		Additional details			Call results		
		Silence rate	Call duration (m)	Conversation subject	Problem solved	Customer satisfaction (1 = poor, 2 = fair, 3 = excellent)	Correlation: Problem Solving / Satisfaction
4	Female to Female						
4.1	convers.#1	20%	2.28	Data consumption	Partially	2	Correlated
4.2	convers.#2	20%	4.59	Internet info	Partially	1	Under-rated
4.3	convers.#3	19%	4.42	Billing invoice	Yes	1	Under-rated
4.4	convers.#4	21%	2.07	Handset	No	1	Correlated
4.5	convers.#5	22%	3.4	Coverage	Yes	3	Correlated
4.6	convers.#6	27%	4.15	Roaming info	Yes	3	Correlated
4.7	convers.#7	21%	3.01	RBT service	Partially	3	Over-rated
4.8	convers.#8	16%	3.22	Billing invoice	Partially	2	Correlated
4.9	convers.#9	9%	2.5	Handset	No	1	Correlated
4.10	convers.#10	4%	2.06	Internet info	Yes	2	Under-rated
	Average	18%	3.35			1.9	

5.1.4.1 Preliminary Findings:

The fourth sampled group consists of ten conversation recordings between female CSRs and female customers. The sampled records suggest a more balanced situation between the actual results of the interaction and customers' satisfaction rate than in the mixed-gender interactions. Six in ten interactions correlated whereas the other four interactions were not correlated. They were either over-rated (1) or under-rated (3). The only significant parameter that was clearly involved in the non-correlated situation is the female CSR's voice intensity (amplitude).

Also, by these records we can see that the average satisfaction rate of female customers is significantly lower than the other three types of interaction (male to male, male to female, female to male, which were 1.9/3 compared with 2.6/3, 2.3/3 and 2.5/3 respectively).

In addition, silence time was significantly shorter between the female customer and female CSR than the other three types of interaction (male to male, male to female, female to male, which were 18% compared with 24%, 23% and 27% respectively).

5.1.4.2 Dominant Voice Pitch:

The average frequency of voice pitch amongst female CSRs and female customers is rather similar, i.e. 174Hz and 184Hz respectively. Nine in ten female CSRs had a voice pitch of 190Hz or lower and only one had a voice pitch above 190Hz.

Amongst the female customers seven in ten speakers had a voice pitch of 190Hz or lower and three of them had a voice pitch which is above 190Hz.

It seems that female CSRs tend to use lower pitch (174Hz and 181Hz on average) than female customers (184Hz and 201Hz on average). There is also a difference between

voice pitch of female customers in all-female interactions (184Hz on average) and of female customers in mixed-gender interactions (201Hz on average). Is it possible that females try to ‘transmit’ image perception through higher voice pitch adaptation in mixed-gender interactions? In sub-chapter 5.3.1 below I will discuss the relation between male and female voice pitch and its derivative image perception.

5.1.4.3 Resonance Voice Pitch:

On average female CSRs resonance pitch on average is the same as that of female customers (2,250Hz and 2,200Hz respectively). Among female CSRs there were three speakers who had a resonance pitch lower than 2,000Hz, where among the female customers there were two speakers with a resonance pitch below 2,000Hz. No meaningful findings were indicated.

5.1.4.4 Voice Amplitude / Intensity:

All the under-rated interactions (3 out of 3) were featured by a female CSR’s low-intensity voice. I noticed during the auditory observations that two out of three female customers expressed impatience, frustration and irritation. It might imply that the satisfaction rate of female customers’ is influenced negatively by female CSRs’ low-intensity voice. It may transmit ‘indifference’ or ‘apathetic’ approach (cross-indicated in the focus groups). Voice intensity and its impact are discussed in sub-chapter 5.3.4 below.

The above insights are formulated below as follows:

If $VIF_{CS} = \text{'low'}$, then probability of under-rated SRF_{CU} increases.

Where:

VIF_{CS} is Voice Intensity of Female CSR

SRF_{CU} is Satisfaction Rate of Female Customer

5.1.4.5 Pitch Clarity:

The spread of voice clarity among female CSRs shows that four in ten CSRs had a clear voice, two a semi-clear voice and four a rough voice. The spread of voice clarity among female customers looks slightly different; two in ten customers had a clear voice, four had a semi-clear voice and four of them a rough voice. No meaningful findings were indicated.

5.1.4.6 Speech Rate:

Female CSRs spoke either at a rapid (6) or average (3) speech rate. Only one in ten spoke slowly. Their interaction partner (female customers) spoke either at a slow (5) or average (4) speech rate. Only one in ten spoke rapidly.

No meaningful findings related to speech rate were found.

5.1.4.7 Call Possession Rate:

On average there is a fairly balanced call possession rate between the female CSRs and the female customers 40%-42% respectively. In six out of ten records female customers were more dominant than female CSRs, possessing most of the conversation time. In four records female CSRs were more dominant than female customers. No meaningful findings were indicated.

5.1.4.8 Silence Rate:

The average silence rate in all of the sampled interactions is 18% and the spread is not as wide as in the other three interaction groups above. The lowest observed silence rate was 4% and the highest was 27%.

Furthermore, the average (18%) is significantly lower than all the other interaction groups, but the sample variance (S^2 – will be elaborated in sub-chapter 5.3.5 below) is significantly lower than all the other sample variances mentioned above. This shows more consistency in silence rate in female interactions. Silence aspects are discussed in sub-chapter 5.3.5 below.

5.2 Focus Group Session - Findings

I conducted one focus group consisting of seven call centre team leaders. They referred to the recorded conversations and interpreted the conversation outcomes. They also provided general insights, raising these during the session.

The purpose of this focus group session was to provide the following contributions:

- Cross-checking my interpretation of the auditory observation from first source of judgment (namely, the CSRs themselves).
- Strengthening the research reliability by operating additional research methodology and getting additional evidence to confirm the findings.
- Gaining more insights that have been hidden and were not taken into consideration in my main research.

Unexpectedly, the CSRs – who I considered ‘first source of judgment’ research agents from whom I hoped to get a better vision of the sampled conversations – had unfortunately failed to deliver an objective analysis of the situation. They were fortified in their own professional position and could not shift their judgment beyond technical facts. I believe that CSRs have become almost ‘robotic’ due to their daily training sessions over a long period of time and the eroding work environment confronting them with hundreds of interactions per shift.

Their answers were fairly consistent and mostly defensive (this may be for their own job security concerns). Their answers were mainly driven by corporate results rather than customer experience, for example, the company KPIs require short conversations. Moreover, when I asked them to assess the sampled conversations, the immediate

'robotic' reaction was even more pronounced. When the conversation results were technically positive the customer's personal experience was hardly seen as a factor ("the customer's problem was solved, hence the customer must be satisfied"). When the conversation results were poor (the problem was not entirely solved) they blamed the system ("inadequate IT support", "too many faults in the engineering network", lack of database information" and "customers' long waiting time causing an unstable interaction environment from the outset). A small number of them attributed the problem to the customers (calling them "angry", "impatient", "do not listen" or "do not understand").

When I asked the CSRs to evaluate the quality of service they provided the customers, subjectively and probably expectedly, they ranked highly their performance leaving very little room for self-criticism.

I believe that this reaction is driven by job security motivations, as mentioned before; CSRs are so enthusiastic to justify their actions to the point that they could not judge their own actions objectively. I can relate this phenomenon to the 'Johari Window Effect' in which the CSR suffers from a 'blind spot' and provides imbalanced self-assessment in comparison to feedback from the official professional surrounding. The Johari Window model was designed some 60 years ago by Joseph Luft and Harrington Ingham to give people a greater awareness of their personalities by seeing themselves through the eyes of others. It has been widely applied as a managerial tool to improve communication skills in organizations (Wright, 2009, p. 139-143).

When we played the conversation recordings to the CSRs, they seemed to be quite embarrassed, which would further explain their biased responses.

When the focus group turned towards a more general and open discussion then participants became more cooperative and less biased.

They complained about the built-in contradictions. On one hand they have to meet a strict set of targets (e.g. conversation duration up to 5 minutes) an aggregated shift consulting percentage (up to 6%), hold-time per conversation (15 seconds) and more. On the other hand they have to personally accommodate the customer with 'empathy', 'identification', 'friendliness' and small talk when the customer waits on the line for a few good minutes.

I asked the CSRs to consider what, in their long experience, are the key attributes and dynamics that positively affect the conversation results. The CSRs raised a few possible elements:

- "Professional attitude" which is consistently focused on meeting the mission target, namely providing a full solution to the customer.
- "Service orientated approach" through which the CSRs maintain a positive approach even when they have to say "no".
- "Developing a service language" such as reflecting patience, understanding, courtesy and respect even though the CSRs have to deal with similar applications over and over again in the same shift.
- "Team spirit" in which CSRs enrich one each other's knowledge by sharing information and granting mutual support.

When I asked the CSRs what verbal elements might negatively affect the results of the conversation, they agreed that "an indifferent voice" has a very bad effect on the customer's experience; "an apathetic non-caring CSR is the worst option for a customer who asks for help". They all suggested avoiding this situation by paying attention to the customer and "keeping the conversation alive".

It seems impossible to use the rankings of the focus group participants as an alternative monitoring tool to my subjective judgment or the grades that the customers themselves gave in the one-question survey.

I therefore chose to exclude the CSRs' biased rankings of call results in order to keep the research more objective despite having planned to use this methodology. Nonetheless, a few general important insights were raised by the focus group participants and they contributed a great deal in better understanding the potential impact of voice dynamics on interaction results.

5.3 Overall Research Analysis and Synthesis

This section seeks to develop further discussion on potential meanings that were raised in the preliminary research findings above and synthesize them into broader contexts:

5.3.1 The Link between Voice Pitch, Dominance and Perceived Image

The paradigm that voice can affect our choices and decisions has been supported from many angles. It is spread throughout various domains: socio-biology studies, brain research, decision-making analysis, behaviouristic economy and marketing.

Human beings can catch sounds in the spectral range from 20Hz to 20KHz. 20Hz is known as *the absolute threshold*. However human being might still subconsciously sense sub-threshold sounds and this can affect their behaviour. This phenomenon is called *subliminal* or *sub-threshold stimulus* (Geva, 1994 p. 88).

According to Webber's Law the important factor that can make the difference between impact and no-impact is the *delta* that we manage to create beyond the threshold values (Geva, 1994 p. 564).

Ohala (1983, 1984), through his Darwinist approach, claimed that there is a *frequency code* which indicates male dominance. Just like animals, human beings send signals of aggression, dominance and confidence through the use of a low-pitched voice which indicates 'a confident aggressor or a dominant individual', where a high pitched voice

indicates a submissive or subordinated individual. Ohala related low-pitched voice to the desire to provide an impression of large body size just like animals do (there is a correlation between body mass and the massive, thick vibration of the vocal cords). Also, Ohala related the high-pitched voice to an infant's cry. He believes that even today a low-pitched voice can functionally help males in a competitive environment to attract a mate and to gain dominance over other males.

In a social experiment Coleman (1973) asked a group of listeners to rank 20 different voice types according to the speaker's masculinity or femininity. The masculinity results were significantly correlated with a low-pitched voice, and vice versa; the femininity results were significantly correlated with a high-pitched voice.

Furthermore, Smith (1985) discovered a strong correlation between listeners' perceived image of masculinity / femininity. Listeners were asked to rank speakers based on their voice recordings and the speakers' self-assessed identity. The research results were applicable for both genders.

Two different tests tried to explore the effect of the voice pitch of mature males on listeners' impressions (Winstan, 1973, cited by Freedman, 1979, p. 105); one is based on visual cards and the other on auditory episodes. In the auditory test the researchers taped two different male voice types: high-pitched and one octave lower-pitched. Both actors were of the same age. It was clear that the low-pitched voice was found more attractive and interesting by adolescent girls. Furthermore, both males and females considered the low-pitched voice more impressive and indicating a dominant status.

Many later studies confirm the research results mentioned above and the relevance of voice spectral features to perceptions of image and likability.

In the last few years there has been a growing interest in the field of voice pitch impact. Here are some evidential academic studies that support my research results:

Collins and Missing (2001) investigated the relation between vocal attractiveness in women as judged by men. The results indicated that women with a higher voice pitch are assessed as being more attractive than women with lower voices.

Puts (2004) tested the hypothesis that female choice for good genes influenced the evolution of male voice pitch. The results indicated that “low voice pitch is preferred mainly in short term mating contexts rather than in long term committed” one.

Moreover, “this effect is greatest when women are in the fertile phase of their ovulatory cycles”. Andrew et al (2004) examined “the relationship between voice pitch, dominance and male mating success”. The results indicated that “a masculine low pitched voice increases the ratings of men's physical and social dominance”. Moreover, the research showed that “men who believe they are physically dominant to their competitor lower their voice when addressing him, whereas men who believe they are less dominant raise it”.

Zuckerman et al (2002) examined the effects of attractiveness and maturity of face and voice on interpersonal impressions. Beyond the fact that higher attractiveness, both facial and vocal, resulted in making a more positive impression, facial attractiveness mainly influenced the interpersonal dimensions whereas vocal attractiveness mainly influenced the more personal dimensions.

The thesis that males with lowered voice pitch (‘masculinized voice’) were judged by females as more attractive than males with raised pitch (‘feminized voice’) has been confirmed again in the last few years (Feinberg et al, 2008, and Jones et al, 2010).

Weiss and Burkhardt (2010) conducted a few practitioner studies through Deutsche Telekom laboratories (which is rather similar to my research). They verified that the stereotype of male low fundamental pitch ('a dark voice' in their language) and likability perception is fully and positively correlated. They also discovered that females' likability is more complicated and consists of two parameters: low fundamental pitch ('darker') but also highly resonant or harmonic - more energy is spread across the spectrum.

This finding is rather interesting because it has not been entirely supported in my research; however, my research indicates that female's likability tends to be highly perceived when her voice is not aggressive but rather low volume (low amplitude) and not rough (not hoarse or creaky). I believe that both conclusions are linked since they correlate female's attractiveness / likability with soft features of voice, such as low pitch, resonant / harmony, low volume and clarity. I think that William Shakespeare put it best:

“Her voice was ever soft, gentle and low, an excellent thing in woman.”
(King Lear, Act 5, Scene 3)

The impact of a female's fundamental voice pitch on male's perception remains questionable since on one hand some studies suggest that 'dark' low pitch is accepted more positively by males (Weiss and Burkhardt, 2010), where other studies claim that males are more attracted to female with high voice pitch (Collins & Missing, 2003, and Jones et al, 2010). Borkowska and Pawlowski (2011) presented very interesting research results that accommodate both options: women's low voice pitch is perceived as being more dominant by men, but at the same time women's high pitch is perceived more attractive by men.

Either way, my research shows clearly that female customers tend to use a higher fundamental pitch when they speak with male CSRs (201Hz on average) rather than with female CSRs (184Hz). This might involve adaptation of female customers' voice features by altering their voices when they speak to a male CSR. This assumption is consistent with an innovative study (Vukovic et al, 2010) which indicates that women prefer men with lower voice pitch but the researchers have displayed an additional important finding: they found out that women's own voice pitch was adapted and was positively associated with their preference strength for low pitched men, i.e. when women were attracted to low-pitched men, they raised their own voice pitch.

So although voice, as previously quoted, is created in a complex manner by physical and biological phenomena which are beyond voluntary control, there are several researchers who had shown that social adaptation can be made.

“It would be surprising if people did not use their voices to project a culturally desirable image”. (Graddol and Swan, 1989 p. 26-27)

There is evidence that even infants adapt their voice pitch according to the social situation. Philip Lieberman (1976) provided limited evidence for this when he reported about two observations of infants who reached babbling age varying their voice pitch according to whether their mother or father was present. One of them, a 10-month old boy babbled at 390Hz when he was facing his mother but dropped to 340Hz when he was facing his father. According to Lieberman it shows that children are aware of the fact that fathers speak in a lower frequency pitch than mothers.

There are more salient factors in voice analysis, apart from voice pitch, which might affect a listener's impressions, such as a harsh or breathy voice types or voice loudness. While men can aspire to voice features which signal quite a few desirable 'masculine' connotations such as largeness, sexual experience and authority, women

might face a conflict and compromise between voice signals of authority and competence and desirable 'feminine' connotations such as sexuality.

Margaret Thatcher's communication advisers testified that in her early days they trained Thatcher's voice pitch aggressively (they managed to reduce her voice pitch by 46Hz) in order to gain an image of a powerful and competent politician. It was influential in Thatcher's rising career and including becoming the British prime minister. However, maybe Thatcher had sacrificed her perceived femininity (Graddol and Swan, 1989).

In this context Graddol and Swan refer particularly to women who act as telephonists, receptionists, secretaries, shop assistants and cash till operators in supermarkets who get routine training in voice and speech; feminine voice attributes are considered to better reflect courtesy and clarity than an 'unfeminine' voice. This remark is rather relevant to my practitioner research findings and their potential applications in customer care and telesales call centres' activities.

The case of Margaret Thatcher has been confirmed in later years. Klofstad et al (2012) indicated that men and women elect female leaders with low voice pitch because they probably perceive it to be more competent, stronger and more trustworthy. The same voting behaviour results were displayed for male leaders (Klofstad et al, 2012, and Tigue et al, 2012) i.e. both men and women tend to prefer male leaders with low voice pitch as it is perceived attractive (for women) and competent and strong (for men).

This issue of varying spectral range of the CSR's pitch frequencies is a parameter that I have not included in this research. This might be important for the understanding of the impact of CSR's voice pitch on customer experience, i.e. peak-fundamental frequency and off-peak-fundamental frequency during the interaction with the customer. A monotonic (one-tone) frequency might be perceived by the customer as boring or even apathetic. On the other hand, using a broad range of fundamental

frequencies might be considered by the customer more alive and expressive (Goodman, 2000, p.32). This issue might be important to explore in future studies as a less obvious, hidden force, that impact customer satisfaction.

Summary:

Relatively high-pitched female customers (fundamental pitch of 200Hz or higher) have positive perceptions of male CSRs who have a fundamental voice pitch of at least 80Hz lower than their own voice.

Relatively high-pitched male CSRs (fundamental pitch of 120Hz or higher) are not perceived as likable by relatively low-pitched female customers (fundamental pitch of 190Hz or lower).

These results indicate that a male's fundamental pitch is relevant to female perceptions. However, my conclusion not only aligns with many other studies as mentioned above, but also provides a new view that has never been explored before: the difference between the fundamental voice pitch of the interaction parties does matter, for good (service) and bad (service)!

The main insight here is that absolute voice pitch is important for the understanding of image perception and customer satisfaction, and relative voice pitch can enlighten the impact of voice pitch on image perception in a richer way.

5.3.2 The Link between Speech Rate and Emotional Perception

In general, in all the sampled groups we can clearly see that CSRs tend to speak either at a rapid or average speech rate (13/40 and 23/40 respectively). Only four in forty CSRs spoke slowly. The interaction partners (male and female customers) tend to speak either at a slow or average speech rate (19/40 and 19/40 respectively). Only two of the forty spoke rapidly. Table 19 below provides a more detailed look at the speech rate distribution:

Table 19: A distribution of speech rate levels by number of CSRs and customers

	<i>CSR</i>					<i>Customer</i>				
	<i>Group A (M-M)</i>	<i>Group B (M-F)</i>	<i>Group C (F-M)</i>	<i>Group D (F-F)</i>	<i>Total</i>	<i>Group A (M-M)</i>	<i>Group B (M-F)</i>	<i>Group C (F-M)</i>	<i>Group D (F-F)</i>	<i>Total</i>
Rapid	2	1	4	6	13	0	1	0	1	2
Average	7	8	5	3	23	5	4	6	4	19
Slow	1	1	1	1	4	5	5	4	5	19

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Table 19 shows that female CSRs (groups C and D) tend to speak more rapidly than male CSRs (groups A and B - ten compared to three respectively). Customers' speech rate distribution shows no significant difference between males and females.

Whether this is because CSRs wish to meet their KPI targets (as indicated in the focus group session) or that they feel comfortable speaking rapidly, it should be remembered that in one case out of the four interaction types the impact was negative, namely when fast-talking male CSRs interacted with slow-talking female customers (group B), the female customers felt uncomfortable and frustrated (as I personally observed while I was listening to the conversation recordings).

The above findings are important because they are not derived from absolute values of speech rate but from relative ones. Communicating in average values of speech rate usually makes the speaker feel comfortable, however if the conversational partner is not in the same range then this rule is not valid and adjustments in speech rate must be made (Goodman, 2000, p. 32).

An experiment at Colombia University (Apple et al, 1979) investigated voice pitch and speech rate together. A male speaker read interview questions and was rated by the audience. The researchers altered the recordings in such a way that voice pitch was raised or lowered by 20% or was left the same. They did the same with the speech rate, speeding it up or slowing it down by 30% or leaving it at its normal speed. The results indicated clearly that listeners attributed different personal characteristics to the 'speakers' according to their various forms. The research conclusions showed the following insights:

- Speakers with high-pitched voice were judged less truthful, less empathic, less 'potent' (smaller, thinner, faster) and more nervous.
- Slow-talking speakers were judged less truthful, less fluent, less persuasive, and were seen as more 'passive' (slower, colder, weaker) but more 'potent'.
- The researchers mentioned that this phenomenon also depends on the particular context in which they were said.

The first finding of the study described voice pitch and its derivative perceptions - is not surprising and supports my conclusions in sub-chapter 5.3.1 above.

The second insight is rather important because as we can see in table 19 above, 90% of the CSRs do not speak slowly (36 in 40). It means that even if the research finding is

correct - that slow speakers are less truthful and less persuasive - the male and female CSRs are 'protected' from negative perceptions since they do not speak slowly. It might also indicate that the CSRs, by speaking at an average or rapid speech rate, are perceived as more truthful and more persuasive, which is good for any company's service representatives.

In my research I found that when slow-speaking female customers speak to faster-speaking male CSRs, this situation might lead to frustration and sometimes anger for the female customers (as I personally observed while I was listening to the conversation recordings).

If we consider both research findings (those of Apple et al and mine respectively) that a) slow speakers are judged untruthful and b) slow-speaking female customers get frustrated with more rapid-speaking male CSRs, we are left with an unanswered question:

If male CSRs slow down their speech rate when they interact with slow-speaking female customers in order to eliminate frustration from the female customer's side, will this generate a new problem related to the CSR's truthfulness and persuasion perception? This question remains unsolved, but it would be an interesting extension of the research in the future.

Summary:

A high speech rate is generally good for CSRs since it has positive connotations like truthfulness. However my research reflects one situation in which a relatively high speech rate in male CSRs causes slower-speaking female customers discomfort and dissatisfaction.

Therefore the main insight – is that an absolute value of speech rate is important for understanding the speaker’s image perception; but the relative value of speech rate can more richly enlighten us on the effect of speech rate between conversation parties (This, once again indicates the importance of my research that sampled relative speech attributes from both sides of the conversation, as indicated in sub-chapter 5.3.1 above regarding voice pitch).

5.3.3 The Link between Conversation Possession Rate and Social Dominance

According to Social Dominance Theory (SDT) there are a few social forces which stabilize or counterbalance social behavioural dynamics within social groups and social interactions. SDT relates these forces to hierarchical elements derived from various discriminative inequalities such as institutional, individual and behavioural asymmetries (Sidanius and Pratto, 1999). Some of those inequalities are a product of Social Dominance Orientation (SDO) which takes into consideration not only the individual’s social background but also the individual’s desire for a relationship with an unequal social group. The SDO contains - among other elements - the gender aspect (Sidanius and Pratto, 1999).

The model suggests that males have a higher social dominance orientation; hence they locate themselves in a higher hierarchical position and consequently tend to be more dominant than females (Sidanius and Pratto, 1999). Further, other researchers (Eagly and Wood, 1991, cited by Ridgeway, 1992) who investigated behavioural sex differences indicated through their Social Role Theory that women are expected to be ‘friendly’, ‘unselfish’, ‘concerned with others’, and ‘emotionally expressive’, where men are expected to be ‘independent’, ‘masterful’, ‘assertive’, and ‘instrumentally competent’. Since people behave consistently with those gender role expectations, the

stereotypes strengthen women's social orientation of being less dominant than men in group interaction.

The question is how this social dominance is interpreted in terms of speech.

Giles (1980) distinguishes between speech features such as voice pitch and intonation, which signal gender identity (masculinity and femininity), and speech features, such as accent and vocabulary, which signal social identity. The first half of Giles' concept that deals with vocal parameters has been confirmed through a great deal of research and study (Collins and Missing, 2001, Puts, 2004, Weiss and Burkhardt, 2010, Vukovic et al, 2010, Jones et al, 2011, Borkowska and Pawlowski 2011, Klofstad et al, 2012, Tigue et al, 2012). The second half of Giles' concept has been also confirmed through several studies which point out that linguistic patterns might suggest cultural belonging in addition to gender social dominance (Tannen, 1993). There are many verbal strategies individuals use to influence or to try to alter the behaviour of their partner in a relationship, such as speech tempo and amount of talk (Dunbar and Burgoon, 2005). Moreover, length of talk (which is what I measured in this research as 'conversation possession rate') was found to be an important factor in identifying the most dominant person in a group meeting (Hung et al, 2007).

Language factors related to accent, dialect and pronunciation might affect listener's social perception of the speaker. According to quite a few researchers (Trudgill, Giles and Powesland, Edwards, Olwen and Elyan, cited by Graddol and Swan 1989) these sub-language factors are rooted in geographically-based and socially-classed societies. Accents, dialect and pronunciation may signal that the speaker belongs to a certain socio-economic group, e.g. working class or a higher socio-economic community, and consequently he or she will be perceived accordingly. A high-prestige BBC accent gives the impression that a speaker is more intelligent; a speaker with certain regional accents may be perceived as more socially attractive, more trustworthy, sincere and likable; males with a working class accent were regarded as more masculine.

All of these effects are hardly relevant to the Israeli case since the young state of Israel has been a 'melting pot' for the second generations of all the immigrants, so there are no significant differences in Hebrew speech forms among Israeli Jews who were born in Israel.

Leet-Pellegrini (1980) conducted an important experiment which measured the amount of talk between two speakers along these parameters: gender and expertise (which are very relevant to my research). One hundred and forty students were asked to discuss the effect of certain TV programs. In each pair of conversation parties one of the participants had access to enriching information prior to the conversation in order to become more 'expert' than his partner. The results were very interesting:

- Men talked more than women.
- 'Experts' talked more than 'non-experts'.
- Male 'experts' talked more than female 'experts', especially in relation to female partners.

The most relevant measured parameter in my research which can potentially answer this question is conversation possession rate. The following results presented in table 20 can support part of the SDT/SDO theory, in particular where the context involves two-speaker interactions in which one partner is an expert (CSR). Some of the findings can also enlighten the question of gender dominance. The measured interactions' possession rates are as follows:

Table 20: Interactions' possession rates of CSRs / customers by groups

		CSR					Customer				
		Group A (M-M)	Group B (M-F)	Group C (F-M)	Group D (F-F)	Average	Group A (M-M)	Group B (M-F)	Group C (F-M)	Group D (F-F)	Average
		27%	31%	42%	35%	34%	43%	53%	47%	45%	47%
		20%	47%	25%	31%	31%	37%	39%	38%	49%	41%
		39%	42%	22%	32%	34%	40%	21%	23%	50%	33%
		37%	34%	29%	38%	34%	32%	32%	47%	41%	38%
		49%	63%	17%	41%	43%	45%	25%	41%	37%	37%
		34%	27%	37%	44%	36%	40%	25%	32%	29%	31%
		60%	26%	31%	38%	39%	33%	54%	50%	41%	44%
		21%	58%	62%	43%	46%	47%	40%	27%	41%	39%
		59%	44%	26%	34%	41%	33%	32%	60%	56%	45%
		37%	38%	35%	61%	43%	28%	36%	36%	35%	34%
Mean		38%	41%	33%	40%	38%	38%	36%	40%	42%	39%

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Some of Leet-Pellegrini's conclusions can be clearly supported by the figures in table 20 above, as they give signposts and indications through the following arguments:

A. The first conclusion, which claims that men talk more than women, is reflected strongly in my research results, even beyond the *expert / non-expert* issue. In group B male CSRs held on average 41% of the conversation time compared with 36% in female customers. Moreover, in eight out of ten conversations male CSRs had a higher possession rate than female customers. In group C we can see that female CSRs held on average only 33% of the conversation time compared with 40% in their male customers. Furthermore, in eight out of ten conversations male CSRs had a higher possession rate than female customers. By these results we can claim that males spoke more than females, regardless of their position in the interaction (i.e. the CSRs being experts and customers being non-experts).

This finding is also strongly supported by Tannen (1993, p.288) who reviewed 24

different studies that measured the amount of talk in formal tasks contexts between the years 1958 and 1991. Thirteen of those 24 studies indicated clearly that overall men talk more than women and only one of those 24 studies clearly showed the opposite i.e. overall, women talk more than man. The other ten studies did not show any significant difference between the amounts of talk between genders.

- B. Leet-Pellegrini's second conclusion - that experts talk more than non-experts - was not reflected at all in three of the four cases represented in table 20 above. In group A (male CSRs to male customers) the possession rate was equal (38% to each side), in group C (female CSRs to male customers) and group D (female CSRs to female customers) the non-expert customers held a higher possession rates than the expert CSRs (40%-33% and 42%-40% respectively). From this research, it can be concluded that gender impact on call possession rate is stronger than the expertise position of the speaker.
- C. Leet-Pellegrini's third conclusion - that male experts talk more than female experts especially in relation to female partners, is reflected strongly in my research results. If we look at the CSRs' behaviour presented in table 20, then male experts (group B) had a higher possession rate than female experts (group C) - 41% compared with 33% respectively - in six in ten interactions. Leet-Pellegrini's remark "especially in relation to female partners" is demonstrated very well in group B where male CSRs had the highest average possession rate of all other groups (41%).

These studies show that image perception and social dominance can be affected not only by voice and speech parameters, to which I referred in my research, but also to other speech-related parameters not measured in my research. These include language forms and dialects.

It appears that the lack of different language forms in Hebrew minimizes my research bias and focuses on clear voice and speech dynamics. However, if we take other social dominance theories into consideration then we might understand the non-correlation

between male CSRs and the satisfaction level of female customers (only 20% of the interactions correlated).

Summary:

In general, male-to-male and female-to-female interactions are significantly more balanced than mixed gender interactions in terms of call possession. In mixed-gender interactions males – whether they are CSRs or customers – usually talk more than females. Male CSRs (experts) held the highest conversations’ possession rate throughout the research when their conversation partners were female customers (non-expert). In this case female customers tend to over-rate male CSRs.

5.3.4 Image Perceptions of Voice Amplitude and Voice Clarity

Table 21 below shows that where voice amplitude is concerned a mirror image is seen between CSRs and customers; CSRs do not often use a high level of voice intensity (7/40) and most of them use a mid-level or low-level of voice intensity (33/40).

On the contrary, customers as a whole do not use low-level voice intensity (10/40) and most of them use high-level or mid-level of voice intensity (30/40). I do not consider this finding essential since the conversation environments are not equal: CSRs talk through professional headsets while seated in a dedicated (cozy) work station; customers talk through a small mobile device and sometimes the environment is not ideal (it may be noisy), so they probably feel that they have to raise their voices.

Table 21: A distribution of voice amplitude levels by number of CSRs and customers

	<i>CSR</i>					<i>Customer</i>				
	Group	Group	Group	Group	Total	Group	Group	Group	Group	Total
	A (M-M)	B (M-F)	C (F-M)	D (F-F)		A (M-M)	B (M-F)	C (F-M)	D (F-F)	
High-level	2	1	1	3	7	3	3	6	6	18
Mid-level	6	8	6	2	22	5	2	2	3	12
Low-level	2	1	3	5	11	2	5	2	1	10

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Loud voices attract attention. They are used for commanding, calling, warning or expressing anger, so they cannot be ignored by the listener, whereas quite voices transmits ‘appropriate behaviour’ to the listener (Mathieson, 2001, p. 8).

However, in a research that sought to find indicators of vocal symbols on emotional states, it was found out that the combination of low voice pitch and low-level voice intensity indicates boredom or grief and sadness (Scherer and Oswald, 1979, cited by Hinton, Nicholas and Ohala 1994).

This finding is a supporting evidence for my research results that female customers were not satisfied when female CSRs used low-level voice intensity (as far as voice pitch is concerned, all those CSRs had a below-average pitch i.e. 160-180Hz). The customers felt frustrated because they probably expected an attitude of caring and involvement rather than what Scherer and Oswald define as ‘boredom’ or ‘grief’.

On the other hand, Mathieson’s assumption above still can be valid since my research findings (as well as Scherer and Oswald’s) might be related only to the combination of low-level voice intensity and low voice pitch, although it is unlikely because voice amplitude and voice pitch are closely related because of the voice pressure and the vocal cords which are common to both (Mathieson, 2001, p. 80).

Another alternative for better communication results is to avoid a flat voice. Varying voice amplitude better captures the customer’s attention and is probably more

influential (Goodman, 2000, p. 33). In my research this element does not appear to be relevant since all my sampled recordings demonstrated flat-voiced CSRs. This is definitely an issue that is worthwhile adding to the CSRs' training schemes.

Summary:

Male customers over-rated female CSRs who spoke in a clear or semi-clear voice (not hoarse or creaky) and under-rated female CSRs who spoke loudly with a high-amplitude voice.

In addition, female customers were not satisfied when female CSRs used low-level voice intensity combined with low voice pitch.

5.3.5 Aspects of the Impact of Silence Rates

Table 22 below shows that there is no significant difference between groups A, B and C (an average silence rate of 24.2%, 23.1% and 27.3% respectively). Group D (average silence rate of 17.9%), which contains the interactions between female CSRs and female customers, looks significantly different compared to the others; the silence rate in all-female interactions is lower than all the other combinations.

Table 22: Interactions' silence rates by groups

	Group A (M-M)	Group B (M-F)	Group C (F-M)	Group D (F-F)
	30.0%	16.1%	10.9%	19.6%
	43.0%	13.5%	37.7%	20.0%
	21.0%	36.8%	55.3%	18.8%
	31.4%	33.5%	23.9%	21.0%
	6.4%	12.1%	42.1%	21.8%
	26.0%	47.9%	30.7%	27.1%
	7.4%	20.2%	19.5%	21.0%
	32.8%	1.6%	11.3%	16.3%
	8.0%	23.7%	13.5%	9.4%
	35.5%	25.4%	28.3%	3.6%
Mean	24.2%	23.1%	27.3%	17.9%
S.D.	0.130	0.135	0.146	0.067

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Since the sample is statistically small I gathered groups A, B and C and compared their silence rate to that of group D. The aggregated Standard Deviation (S.D.) of groups A, B and C is 0.134, where the S.D. of group D is 0.067. By using SPSS analytics software I found that the value of group D is significantly lower than the aggregated values of groups A, B and C, which means that silence rate in all-female interactions is significantly lower than all the optional interactions, as shown in table 23 below:

Table 23: Standard deviation difference test between Group D's average silence rate and Groups A,B,C

	Groups A-C (M-M, M-F, F-M)	Group D (F-F)	F	Two-tailed T-test
Mean	24.9%	17.9%	5.890	.038
S.D.	0.134	0.067		

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

In addition and in order to further support the above conclusion we can also see that the average call duration of female-female pairs is shorter: 3.21 minutes per call in comparison with 3.35 minutes, 3.43 minutes and 3.29 minutes in male-male, male-female and female-male interactions respectively.

These two facts – a lower silence rate and the shorter duration of interactions – might indicate a greater efficiency of interactions between female CSRs and female customers; however, I could not find a clear-cut solid theoretical support for this finding.

Ridgeway (1992, p. 110-112) reports on an experiment that tested sex difference in performance. The test group was split into two gender-based sub-groups i.e. one all-male and one all-female. The test tasks were divided into two different work types: task-orientated activity and social-orientated activity. In the first type of work where the solution required a high level of active task-related behaviour, the performance of the all-male group was more effective than the all-female group. In the second type of work, where the solution required a high level of social interaction behaviour, the performance of the all-female group was higher than the all-male group.

Ridgeway emphasizes the implications of this finding in real-life work groups, namely that women's interaction style clearly results in higher productivity in an all-female group. This might be a valuable contribution in tasks which require high levels of positive social behaviour.

This finding might match my research results if I could equivalent a voice-based interaction between a female CSR and a female customer to a social-orientated task in an all-female group.

Summary:

In all-female interactions the silence rate was lower than in all other gender combinations (M-M, M-F, F-M). Also there is a clear indication that the average call duration in all-female interaction is shorter than in all the other combinations (M-M, M-F, F-M). I am not sure that these two findings can explicitly indicate a greater efficiency in all-female interactions although Ridgeway’s research might strengthen this finding. It might be worthwhile to investigate this point in future research.

5.3.6 Insights related to In-Gender and Mixed-Gender Interactions’ Results

In-gender and mixed-gender interactions produce different results under similar test conditions. Table 24 below maps all the interactions in terms of two parameters: customer satisfaction rate and the correlation between the satisfaction rate and the actual interaction results.

Table 24: Correlation between interaction results and customer satisfaction

Group A (M - M)		Group B (M - F)		Group C (F - M)		Group D (F - F)	
Satisfaction	Correlation	Satisfaction	Correlation	Satisfaction	Correlation	Satisfaction	Correlation
3	correlated	2	under-rated	2	correlated	2	correlated
3	correlated	3	over-rated	3	over-rated	1	under-rated
1	correlated	3	over-rated	3	over-rated	1	under-rated
3	correlated	2	under-rated	2	over-rated	1	correlated
3	over-rated	3	over-rated	2	under-rated	3	correlated
3	correlated	2	under-rated	3	over-rated	3	correlated
3	correlated	3	correlated	3	correlated	3	over-rated
3	correlated	1	over-rated	2	correlated	2	correlated
1	correlated	2	over-rated	2	correlated	1	correlated
3	correlated	2	over-rated	3	over-rated	2	under-rated
2.6		2.3		2.5		1.9	

Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Table 24 highlights various interesting points:

Male customers seemed to be more satisfied than female customers - whether their interaction was held by a male CSR or by female CSR (an average satisfaction rate of 2.6/3 and 2.5/3 respectively, a grand average satisfaction rate of $2.55/3 = 85\%$). These figures are significantly higher than the average satisfaction rate of female customers, which was 2.3/3 in interactions with male CSRs and 1.9/3 in interactions with female CSRs a grand average satisfaction rate of $2.1/3 = 70\%$.

Moreover, out of 20 interactions, male customers under-rated only once in comparison to six under-rated interactions in aggregate between female customers and male CSRs or female CSRs.

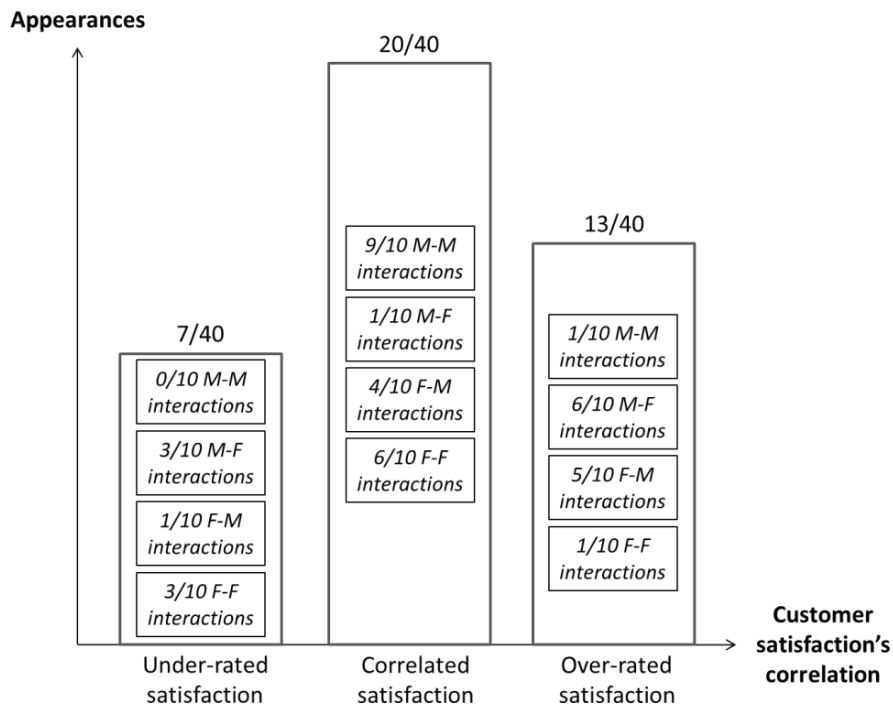
Moreover, in all-male interactions (male CSR to male customer) the male customer's approach was straightforward towards the male CSR's service; when a male customer's query had been fully answered he expressed satisfaction. When his query had been partially answered he stated that he was partially satisfied and when his query had not been answered adequately he said he was not satisfied.

In mixed-gender interactions it was more complicated than in-gender interactions. In male-to-male interactions nine out of ten (90%) observations ended up with a straightforward satisfaction rate amongst customers (this correlated to the actual service results provided by the CSR). In the mixed-gender situation it was much less balanced. In male-to-female interactions only two out ten (20%) interactions showed correlation between satisfaction rate and actual service results. Five of them were over-rated and three were under-rated. In female-to-male interactions only four out ten (40%) interactions showed a correlation between satisfaction rate and actual service results. Five of them were over-rated and only one under-rated.

In all-female interactions the results show more balance than in mixed-gender interactions, however it is still not as balanced as in all-male interactions. Six in ten interactions (60%) showed a correlation between satisfaction rate and actual service results. Three in ten interactions were under-rated and only one interaction was over-rated.

Figure 25 below demonstrates a distribution of customer satisfaction's correlation i.e. actual customer service level verses satisfaction rate that was given by the customer. My research findings show that only half of the instances correlate (20/40) and this was mainly in same-gender interactions. The hidden irrational forces that operate during voice-based interaction affect 13/40 for good (over-rated correlation) and 7/40 for bad (under-rated correlation), most of them being in mixed-gender interactions.

Figure 25: Distribution of customer satisfaction as functions of actual service level



Key: M-M = Male to Male, M-F = Male to Female, F-M = Female to Male, F-F = Female to Female.

Summary:

In all-male interactions the satisfaction rate of male customers is balanced and straightforward (90% correlated with the interaction results).

Male customers in general (in male-to-male and female-to-male interactions) are more satisfied, leading to an average satisfaction rate of $2.55/3 = 85\%$.

In mixed-gender interactions there are unbalanced satisfaction rates; only 30% on average correlated with the interaction results. Most of them over-rated.

In female-to-female interactions as a whole female customers are less satisfied, with an average satisfaction rate of $1.9/3 = 70\%$.

5.3.7 Further Qualitative Insights Derived from the Focus Group Interview of the CSRs

The focus group session raised a few important issues which can be considered key success points in customer interactions in general.

Customer satisfaction and loyalty are directly linked to how much trust the customer has in the organization (Yulin et al, 2014). Gaining trust and respect from customers in call centres involves a few threshold terms before we consider advanced voice and speech-related techniques. Ukens (2007, p. 51-52) counts the following factors as crucial when we provide service: caring, knowledgeable about the company's products, being accurate, knowing where to find answers, being positive and empathic, using polite language, providing creative alternatives when it is impossible to provide exactly what the customer wants and treating customers equally and fairly.

Knapp (2011, p. 37, 58) identifies further factors which positively affect customer satisfaction in service interactions: answering the phone with a smiling face, gathering the facts and approaching each incident in a methodological way, speaking clearly,

using clear terms, taking ownership of the interaction. According to Knapp an effective service interaction necessarily involves a CSR who is an active listener who obtains the information, understands and processes it correctly, listens not only to the words but to subtext messages as well, indicates that he is still there listening and reflects what has been said.

It is important to create an active listening cultural environment since it also provides the CSR with the confidence that he/she “is not rushing off to solve the wrong problem”, as occurs quite often when the CSR does not listen carefully (Goodman, 2000, p.46).

Additional important parameters that positively affect the customer experience consist of articulation – ar-ti-cu-la-tion and not ar-ti-cla-tion – it makes the whole conversation clearer and consequently takes less time. Furthermore, rich vocabulary and correct grammar are essential, i.e. the use of the right word enhances customer expectations, and the use of correct grammar reflects better credibility (the CSR’s and the company’s) so that customers feel more confident that they are in the right hands (Goodman, 2000, p. 30-35).

Some of the above parameters are related to the organizational eco system i.e. an effective knowledge management system can help provide fast and correct answers, or a remote control diagnostic system can ‘take over’ the customer device and provide more direct and less tedious service. In my focus group, when CSRs talked about a ‘professional attitude’ they linked the quality of the provided solution to the effectiveness of the information system.

However, many of the parameters mentioned by Ukens, Knapp and Goodman are related to the personal attitude of the CSR and this requires the organization to invest in relevant training. This kind of investment can help CSRs to be more focused, positive, understanding, respectful, accurate and fluent.

The focus group CSRs mentioned one extra factor which is the 'team spirit' through which they enrich each other in real time and grant mutual support online. Occasionally it is linked to the whole organizational spirit and culture. Goodman (2000, p. 130) even suggests a profile for exceptional CSRs, i.e. "natural-born CSRs with service IQ". These human beings have the fundamental desire to help other people. They also have a need for social interactions in their jobs and they enjoy communicating on the phone. Good CSRs like to be busy and handle hundreds of calls in a row. In addition, they are able to identify emotions. lastly, they are capable of balancing their employer's requirements with the customer's expectations for the good of both parties.

When recruiting CSRs it is effective to run a behavioural simulation in order to provide an overarching view of the candidate's various personal dimensions. A special look must be given to the potential link between the candidate's personality and his/her service orientation. An effective way to spot this kind of CSR was suggested by Hogan, Hogan and Busch research (cited by Goldschmidt, 2008, p. 131) through three elements:

- The willingness to treat customers kindly and politely.
- The capability to diagnose customer needs and adjust their own behaviour accordingly.
- The ability to communicate with the customer professionally.

The above academic insights take us back to the highlights that rose in the CSR focus group: to maintain a 'service-oriented approach' and to have a 'professional attitude'.

Summary:

A CSRs' personal attitude can make a big difference to customer satisfaction. It involves a 'professional attitude' by which the CSR is consistently focused on meeting the customer's needs, a 'service-orientated approach' through which the CSRs maintains an ongoing positive approach, 'developing a service language' through

which the customer feels understood, effectively dealt with and respected, and ‘team spirit’ through which CSRs enrich one other’s knowledge by sharing information and granting mutual support online.

5.3.8 Conclusion and Modeling

In my research I have identified a few important parameters that might affect customer satisfaction either positively or negatively during a voice interaction. Tables 25 and 26 below map those highlighted parameters, splitting them into male CSR interactions with male and female customers, and female CSR interactions with male and female customers.

Table 25: Summary of male CSRs interactions' findings

<i>Parameter (in interactions with male CSR)</i>	<i>Possible effect on male customers</i>	<i>Possible effect on female customers</i>
Fundamental voice pitch	Not found.	A. Relative difference of at least 80Hz between high-pitched female customers (fundamental pitch of 200Hz or higher) and male CSRs voice pitch creates good grounds for improved customer satisfaction. B. High-pitched male CSRs (fundamental pitch of 120Hz or higher) creates bad grounds for customer satisfaction by relatively low-pitched female customers (fundamental pitch of 190Hz or lower).
Resonance frequency	Not found.	Not found.
Voice clarity	Not found.	Not found.
Voice intensity	Not found.	Not found.
Speech rate	Not found.	Rapid speech rate of male CSRs creates dissatisfaction amongst female customers with a lower speech rate.
Call possession	Not found.	Dominant call possession of male CSRs may lead to a greater satisfaction rate of female customers.
Silence rate	Not found.	Not found.
Call duration	Not found.	Not found.
Correlation between call results and customer's reported satisfaction	High correlation between conversation results and male customers' satisfaction rate (9/10).	Poor correlation between conversation results and female customers' satisfaction rate (2/10).

Table 26: Summary of female CSRs interactions' findings

<i>Parameter (in interactions with female CSR)</i>	<i>Possible effect on male customers</i>	<i>Possible effect on female customers</i>
Fundamental voice pitch	Not found.	Not found.
Resonance frequency	Not found.	Not found.
Voice clarity	Male customers over-rated female CSRs who spoke in a clear or semi-clear voice.	Not found.
Voice intensity	Male customers under-rated female CSRs who spoke loudly using a high-amplitude voice.	Female customers under-rated female CSRs who had a low-level voice amplitude combined with low voice pitch.
Speech rate	Not found.	Not found.
Call possession	Not found.	Not found.
Silence rate	Not found.	Silence rate seems to be lower than other interaction combinations.
Call duration	Not found.	Average interaction duration seems to be shorter than other interaction combinations.
Correlation between call results and customer satisfaction	Low correlation between conversation results and male customers' satisfaction rate (4/10).	Moderate correlation between conversation results and female customers' satisfaction rate (6/10).

5.3.9 More Relevant General Insights based on my Research and Academic References

- A. Varying voice fundamental pitch during the conversation may result in a better customer experience in comparison to monotonic pitch. (This was not checked in my research).
- B. Varying voice intensity (volume) during the conversation may be more effective as this holds the customer's attention. (This was not checked in my research).
- C. Rapid speech rate reflects more reliability and truthfulness.
- D. Generally, male and female CSRs talk faster than male and female customers.
- E. Men talk more than women when they are in a task-orientated group.
- F. Generally, both male and female CSRs spoke with low or mid-level voice intensity (33/40), whereas both male and female customers spoke in a loud voice (30/40).
- G. For improved interaction customer satisfaction it always helps to adopt a 'professional attitude' which is consistently focused on meeting the mission target, namely providing a full solution to the customer, to take a 'service-orientated approach', to 'develop a service language' such as reflecting patience, understanding, courtesy and respect, and to keep a 'team spirit' in which CSRs enrich one other's knowledge by sharing information and granting mutual support. (This is based on my focus session with the CSRs).
- H. Additional parameters for improved customer satisfaction: being knowledgeable and accurate, being methodological, knowing where to find answers, providing creative alternatives, treating customers equally and fairly, answering with a smile,

using polite language, speaking clearly, paying heed to articulation, vocabulary and grammar, and lastly, being an active listener. These skills and attitudes are heavily reliant on an organization's level of investment in training.

5.3.10 Splitting the research findings into positive hidden forces and negative hidden forces that affect voice-based interaction

Effective matches (i.e. positive hidden forces affecting) for customer satisfaction:

- High-pitched female customers with a fundamental pitch of 200Hz or higher and low-pitched male CSRs with at least a relative difference of 80Hz.
- Male customers and female CSRs who has clear or semi-clear voices.
- Male CSRs who are dominant in terms of call possession during an interaction with female customers.
- CSRs who vary their voice fundamental pitch and voice intensity.
- CSRs who have a professional approach i.e. focused, knowledgeable, accurate and creative.
- CSRs who demonstrate personal conversational capabilities i.e. kind, polite, clear, using proper articulation, vocabulary and grammar.

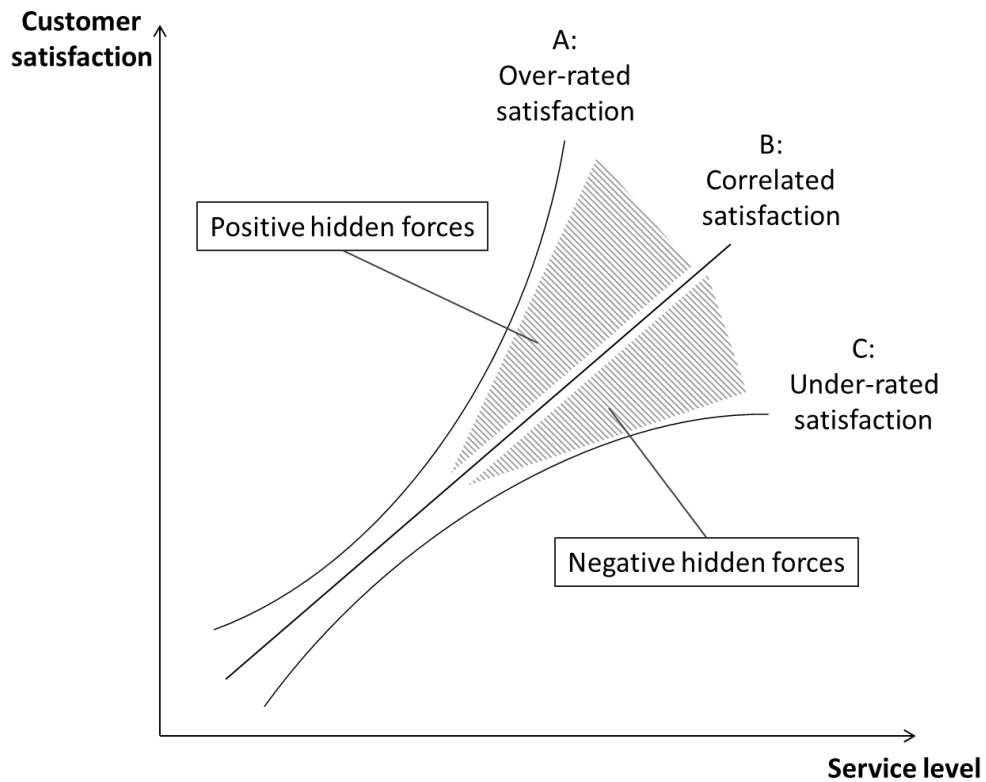
Poor matches: (i.e. negative hidden forces affecting) for customer satisfaction:

- High-pitched male CSRs with a fundamental pitch of 120Hz or higher and relatively low-pitched female customers with a fundamental pitch of 190Hz or lower.
- Male CSRs with a rapid speech rate and female customers with a lower speech rate (although in general it appears that a person with a rapid speech rate is perceived as more reliable and truthful).
- Male customers and female CSRs with loud high-amplitude voice.

- Female customers and female CSRs with low-level voice amplitude combined with low voice pitch.

Figure 26 illustrates customer satisfaction as a function of actual service level. My research suggests that this model is not always correlated (only 20/40 and mainly in same-gender interactions). There are hidden irrational forces that work during voice-based interaction, creating a curved satisfaction rate i.e. the hidden positive and negative forces - as specified above - can affect customer satisfaction (positively in curve A, and negatively in curve C).

Figure 26: A hidden forces model of customer satisfaction as functions of actual service level



The straight linear line (curve B) shows rational behaviour where customer satisfaction is fully correlated with the service level provided by the CSR, i.e. good service creates high-level of customer satisfaction and vice versa, a poor service level results in low-level customer satisfaction.

Positive hidden forces can potentially raise the linear line and create improved customer satisfaction even when the service level is not ideal, as shown in curve A. Negative hidden forces can potentially lower the linear line and create degraded customer satisfaction even when the service level is good, as shown in curve C.

Chapter 6: Conclusions and Recommendations

6.1 Conclusions – Brief Review of the Research

This practitioner research has been built on my progressive work in the field of consumer behaviour analysis. The approach that I took in this research was to integrate my ongoing development into one consumer behaviour's practitioner project; hence I have reviewed two former projects that I conducted during the years 2008-2010 as two case studies, prior to approaching my research. These two case studies dealt with consumer behaviour from two different aspects and were implemented in practice in TC where they had a measurable value for the company. They are used as the foundation of my DProf practitioner research and contribute to the understanding of the broad picture of consumer behaviour.

The first case study explored the impact of *Geographical Communities* on TC's market growth and consumer behaviour in terms of product features adaptation.

The study findings indicated a moderate negative correlation (coefficient $r = -0.19$) between TC's penetration rate and settlements' social decile displaying high social cohesiveness. Another finding indicated a moderately strong positive correlation (coefficient $r = 0.37$) between the grade of the settlement's social cohesiveness and the adoption of services for internal use inside the community.

These significant findings drove TC to adapt its marketing strategy through focusing on geographical 'islands' of high social cohesiveness rather than allocating expensive

resources across-the-board. The following years showed improved business results in the targeted regions.

The second case study explored the impact of mobile social networking on its group members' consumer behaviour in terms of customer churn rate.

This study, which deals with the social layer of consumer behaviour aimed to better understand whether members of customer groups who are featured as social networking (most of their interactions are made inside the group) behave in the same manner in terms of customer loyalty i.e. churn rate. The study findings indicated that *TC Community* customers (who telecommunicate inside the TC network. Accounted 67% of the sampled population) are far more loyal to TC than *Outsiders* customers (who telecommunicate outside the TC network. Accounted 33% of the sampled population). *TC Community*'s annual churn rate was around 3% where the *Outsiders*' annual churn rate was reaching to nearly 18%.

The study results were further developed into a practical work plan in TC consisting of the rational to take a differential approach for each segment.

My DProf practitioner research comes after exploring these two behavioural case studies which dealt with the physical-geographical layer and the social layer of consumer behaviour. In my practitioner research I sought to explore the impact of the socio-biological layer - voice and speech - on interpersonal consumer behaviour in voice-based interactions.

In this research I tried to find out if and how voice and speech dynamics affect customer satisfaction in voice-based interactions, knowing that a high rate of customer satisfaction positively influences customer loyalty and consequently business results

(Goldschmidt, 2008, Hu et al, 2009, Kuo et al, 2009, Srivastava and Rai, 2013, Dipta and Nugroho, 2013).

Through this research I sought to examine the parameters related to voice dynamics (voice fundamental frequency pitch, resonance frequency, voice clarity, voice amplitude / intensity, speech rate, call possession rate) of CSRs and consumers that might affect voice-based interactions?

The practical meanings of such results can lead to new innovative ways to improve TC call centres' functioning through various adaptations and adjustments following the research findings.

The research methodology is based on a qualitative survey approach followed by triangulation in order to cross-check the research findings from several angles and reduce subjectivity. My dependent variable in this research was the customer satisfaction rate.

The main projected activities were to conduct a qualitative survey through which I ran 40 auditory observations: ten sampled call centre recordings from each of the following combinations: Male CSRs to male customers, male CSRs to female customers, female CSRs to male customers, and female CSRs to female customers.

The triangulation phase included two main activities: a qualitative focus group session in order to reduce subjectivity and collect more front-line insights, and a quantitative survey through which I sampled all 40 customers and asked one question: 'Following your service call yesterday, how satisfied were you with the service you received from the customer service representative?' Their answers helped me learn to what extent there was correlation between the actual provided service, and the reported satisfaction rate of customers.

The research findings are as follows:

In voice-based interactions between male CSRs and male customers:

No significant findings. High correlation was found between the actual conversation results and the male customers' satisfaction rate (9/10).

In voice-based interactions between male CSRs and female customers:

A. Relative difference of at least 80Hz between high-pitched female customers (fundamental pitch of 200Hz or higher) and male CSRs voice pitch brings about improved customer satisfaction. Formulation of this finding:

If $F_0Mcs - F_0Fcu \geq 80\text{Hz}$ and $F_0Fcu \geq 200\text{Hz}$ then $SRFcu = \text{over-rated}$.

Where:

F_0Mcs is Fundamental voice pitch of Male CSR

F_0Fcu is Fundamental voice pitch of Female Customer

$SRFcu$ is Satisfaction Rate of Female Customer

B. High-pitched male CSRs (fundamental pitch of 120Hz or higher) brings about poor customer satisfaction by relatively low-pitched female customers (fundamental pitch of 190Hz or lower). Formulation of this finding:

If $F_0Fcu \leq 190\text{Hz}$ and $F_0Mcs \geq 120\text{Hz}$ then $SRFcu = \text{under-rated}$.

Where:

F_0Mcs is Fundamental voice pitch of Male CSR

F_0Fcu is Fundamental voice pitch of Female Customer

$SRFcu$ is Satisfaction Rate of Female Customer

C. Rapid speech rate of male CSRs leads to dissatisfaction amongst female customers with a lower speech rate. Formulation of this finding:

If $SRFcu < \bar{x} SR$ and $SRMcs \geq \bar{x} SR$ then probability of under-rated $SRFcu$ increases.

Where:

$SRFcu$ is Speech Rate of Female Customer

$SRMcs$ is Speech Rate of Male CSR

$\bar{x} SR$ is Average Speech Rate

$SRFcu$ is Satisfaction Rate of Female Customer

D. Dominant call possession of male CSRs may lead to a greater satisfaction rate in female customers. It might only be an expression to the CSR's effort to provide good service or, alternatively, it might be related to a deeper element which is linked to social dominance theory. Formulation of this finding:

If $PRM_{CS} > PRF_{CU}$ then probability of over-rated SRF_{CU} increases.

Where:

PRM_{CS} is call Possession Rate of Male CSR

PRF_{CU} is call Possession Rate of Female Customer

SRF_{CU} is Satisfaction Rate of Female customer

- E. A poor correlation was found between conversation results and female customers' satisfaction rate (1/10).

In voice-based interactions between female CSRs and male customers:

- F. Male customers gave good ratings to female CSRs who spoke in a clear or semi-clear voice. Formulation of this finding:

If $VCF_{CS} = \text{'clear' or 'semi-clear'}$, then probability of over-rated SRM_{CU} increases.

Where:

VCF_{CS} is Voice Clarity of Female CSR

SRM_{CU} is Satisfaction rate of Male Customer

- G. Male customers gave poor ratings to female CSRs who spoke loudly using a high-amplitude voice. Formulation of this finding:

If $VIF_{CS} = 'high'$, then probability of under-rated SRM_{CU} increases.

Where:

VIF_{CS} is Female CSR Voice Intensity

SRM_{CU} is Satisfaction rate of Male Customer

H. A low correlation was found between conversation results and male customers' satisfaction rate (4/10).

In voice-based interactions between female CSRs and female customers:

I. Female customers gave poor ratings to female CSRs who had a low-level voice amplitude combined with low voice pitch. Formulation of this finding:

If $VIF_{CS} = 'low'$, then probability of under-rated SRF_{CU} increases.

Where:

VIF_{CS} is Voice Intensity of Female CSR

SRF_{CU} is Satisfaction Rate of Female Customer

J. The silence rate seems to be lower than other interaction combinations (17.9% compared with average of 24.9%), and average interaction duration seems to be shorter than other interaction combinations (3.21 minutes per call compared with an average of 3.36). This information might indicate greater efficiency in all-female interactions.

K. A moderate correlation was found between conversation results and female customers' satisfaction rate (6/10).

More general findings:

More relevant general insights rose through the focus group session and the academic references I used:

L. Varying voice fundamental pitch during the conversation may result in a better customer experience as opposed to monotonic pitch (This was not checked in my research. It deserves further exploration).

M. Varying voice intensity (loudness) during the conversation may create more influential grounds in the interaction as the customer's attention is maintained (Not checked in my research. It needs to be further explored).

N. Rapid speech rate reflects more reliability and truthfulness in general.

O. For improved customer satisfaction the CSR has to adopt a professional attitude, which is consistently focused on meeting the mission target, to take a service orientated approach, to develop a service language through understanding, courtesy and respect as well as to keep team spirit in which CSRs enrich one another's knowledge.

P. For improved customer satisfaction the organization has to invest in supporting systems and trainings. It creates CSRs who are knowledgeable and accurate, methodological, efficient, creative, fair, answering willingly, speak clearly, paying attention to articulation, vocabulary and grammar, and being active listeners.

6.2 Recommendations – Practical Implementation of the Research Findings

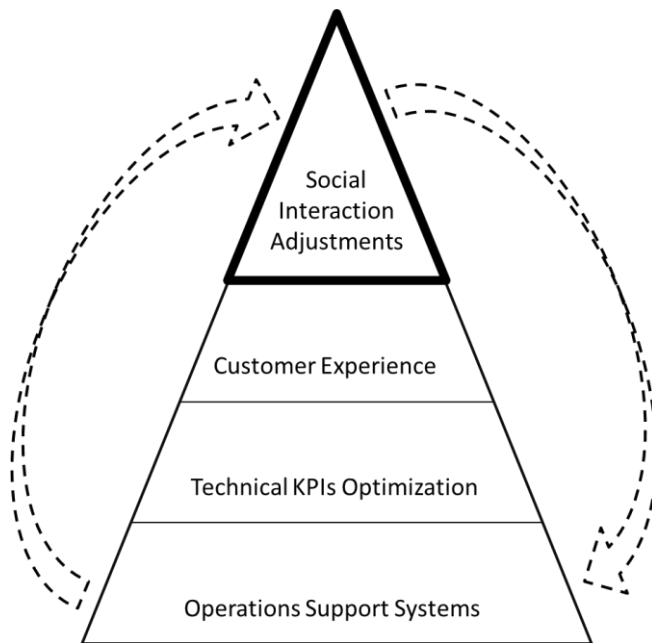
6.2.1 Potential New Models for Improved Understanding of Customer Service

The domain of customer service and its consequent customer satisfaction has been investigated in many ways and from various aspects (Goodman, 2000; Eisner, 2001; Goldschmidt, 2008; Knapp, 2011; and others). Figure 27 illustrates the elements on which customer service is built. The lowest level of the pyramid represents the technological operating infrastructure which supports customer relations. It consists of systems such as CRM, TCI, IVR, internet online access, recording and archiving application, knowledge intranet system etc. The level above (second level) represents the optimization management tools that are used to consistently improve the service performance, for example: the theory of queuing, KPI current reports and benchmarks, average waiting time, call answering rate, average call duration, recalls rate etc. The following level (third level) represents customer experience through which the customer feels more welcome and better treated by a series of actions. These are personal and technological gestures. Examples of these are: queuing number announcements, customized music while waiting, give-away vouchers, caring attitude, supporting value added services for customer-leasing. The organization would also

benefit in various ways. Examples of this would be: call back system that keeps the customer's cue, customized popups directing the CSRs how to act and what to offer ('scenario manager'), tailor-made price quotes, social networks services, etc.

These three layers are mentioned by Rosenes (2013) as key factors for optimal customer service management. Within TC all three of these layers are rather advanced and heavy investments are made in the service support infrastructure, performance optimization tools and customer experience solutions (technical and procedural). Also, training schemes are implemented in order to help the CSRs to become more welcoming and better 'active users'.

Figure 27: New dimension in customer service and the consequent customer satisfaction



My research contributes a new dimension in understanding the service perception of customers, which has not been previously explored: the CSR-customer interactional hidden information – related to voice and speech dynamics – that might affect customer experience, positively or negatively. This fourth level provides the opportunity to make personal adjustments between the CSR and the customer in order

to improve the customer experience and consequently get better service perception rates.

Some of the adjustments e.g. speech rate, can be applied by updating CSRs' policies coupled with relevant training. Other adjustments e.g. voice fundamental pitch might be integrated via machines and software-based applications.

The new dimension of *Social Interaction Adjustments* affects all the layers of the pyramid that are below. It requires updating of customer experience procedures (third level) through CSRs' training and application of new value added services. It requires updated optimization and monitoring management of KPIs (second level), where it brings new domains and in a higher resolution. It also requires investments in new modules of the operations system such as online popups to the CSRs for real time directions.

All of these three levels provide feedback to the *Social Interaction Adjustments* layer and create an on-going optimization system for the service policy and procedures.

Following the above described research findings, I have devised a model through which TC call centre will be able to change the way in which it functions, in order to respond better to various situations. This way there is a great chance to improve the customer service experience in voice-based interactions and consequently in customer satisfaction.

In figure 29 I distinguished between two different sets of activities that may affect the customer service quality either positively (*positive hidden forces*) or negatively (*negative hidden forces*). These two sets of activities are:

- The CSR's personal attributes.
- The organization's culture and the support surroundings in which the CSR operates.

The personal-orientated factors contain characteristics that are related to the CSR's individual characteristics, e.g. voice fundamental pitch, speech rate, voice amplitude, pitch clarity.

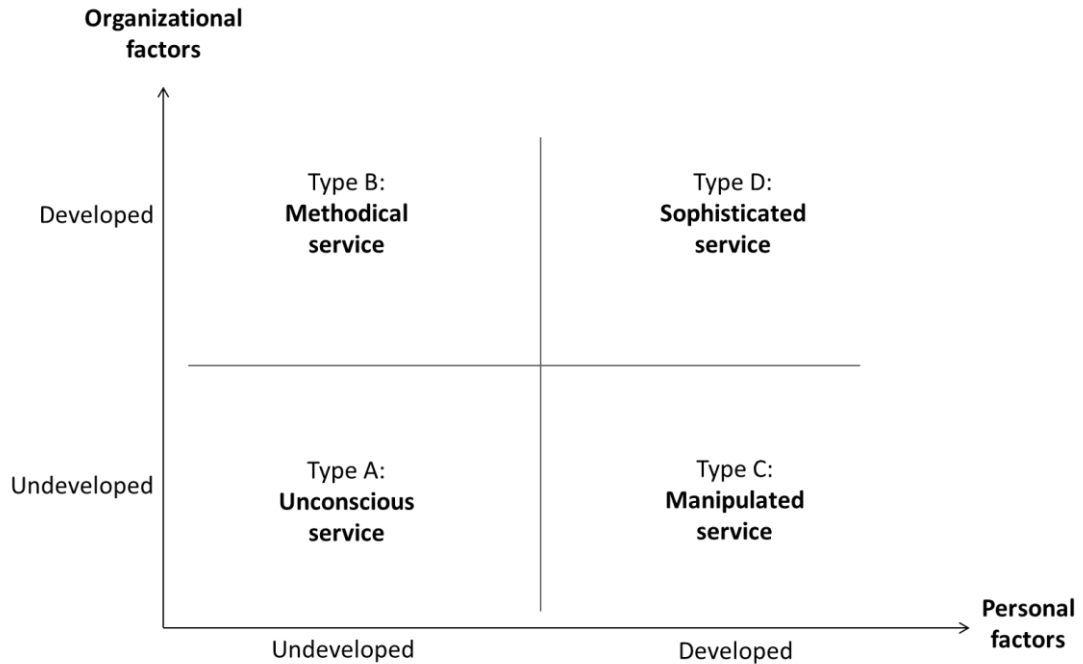
Organizational-orientated factors contain characteristics that CSRs can acquire through organizational routines, trainings, awareness etc., e.g. kindness, a positive attitude, knowledge, clear, active-listener, using rich language.

This is beyond the organization duty to provide threshold means to provide reasonable customer care service, e.g. short waiting time, information accessibility, reliable supporting systems, and even entry-level value-added services such as callback system³².

Figure 28 suggests a model which maps various service organizations as a function of their operative service orientation. I setup a positioning map consisted of Y axis that represents the organizational-orientated factors and X axes that represents the CSR's personal-orientated factors.

³² Call centre Callback system is a platform that is operated when the call centre's waiting time becomes longer than the normal. In this case the system offers the customer to disconnect while the system keeps his/her cue. When the customer's cue arrives the system calls the customer back automatically.

Figure 28: Positioning map of service orientation by organization type



In this model we can identify four types of organizations: Type A represents an organization which is unaware of its customers' surroundings and does not develop its CSRs' professional capabilities either organizationally or individually. I call this kind of service *Unconscious*. Type B represents organizations that manage their service 'by the book'. They maintain cultural and operational procedures in order to provide a high quality of customer service through CSRs training, monitoring and awareness development, i.e. knowledge management, service-oriented attitude and language practicing. I call this service organization - *Methodical*. Type C is a quite rare option since the organization does not take any responsibility for the service quality, so the CSRs aim at creating an un-frustrating environment for the customers. It can be done by using their personal charm in order to ease the painful process that the customer experiences. I call this kind of relationship between the CSR and the customer - *Manipulating*. Type D is the ultimately ideal service in which both the organization and the CSRs are involved. The organization provides all the necessary means to make the customer experience successful i.e. the CSRs are trained to provide quick and accurate solutions, they are positive and cooperative, they are active listeners, they are clear, they are kind and polite, and use proper language. On the other hand, the CSRs

are also aware of the personal key success factors and implement them in practice in order to improve customer experience i.e. voice pitch, voice amplitude, speech rate etc.

This model aims to reflect the positioning of service organizations according to their business and operations approach. In addition, this model shows how these organizations can improve their positions and become better service providers.

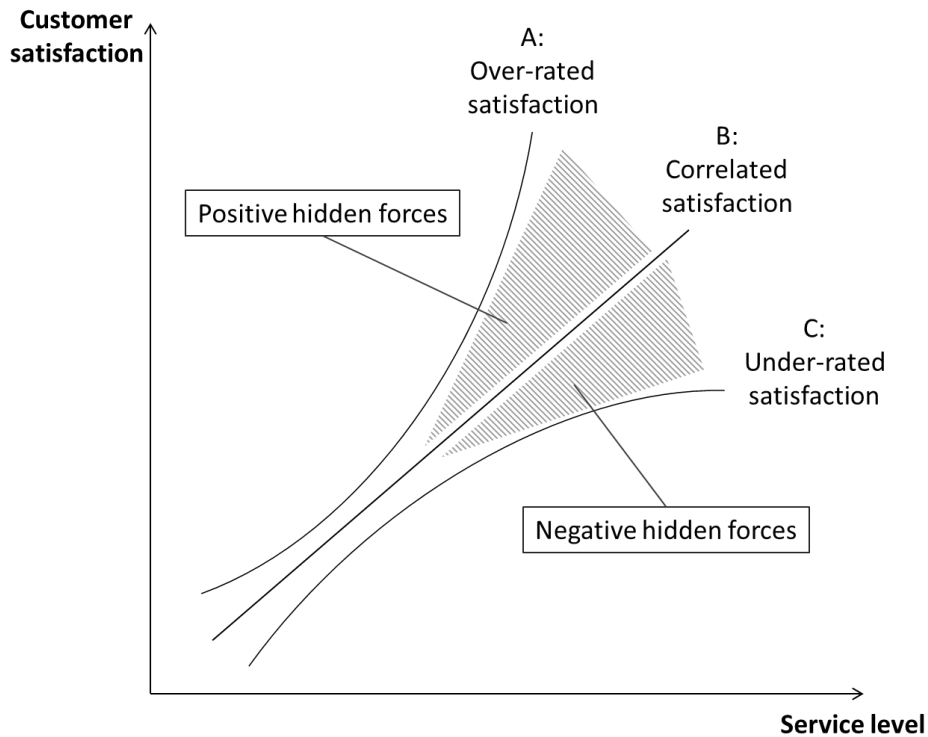
TC is a typical *type B methodical organization* that heavily invests in call centre management tools³³, business support systems (BSS)³⁴ and consistent training schemes. Since my research has concentrated more on the personal attributes of the CSRs, naturally my recommendations are focused on this, and how they can contribute to the organization for improved customer satisfaction. In the terms of figure 28 my recommendations suggests practical ways for transitioning TC from the top left corner (*type B methodical service organization*) to the top right corner (*type D sophisticated service organization*).

My recommendations below highlight the development opportunities for TC to apply in practice, and the derivative risks that TC must avoid. These opportunities and risks are derivatives of the *positive hidden forces* and the *negative hidden forces* as indicated earlier and appear in figure 29 below.

³³ Call centre management tools include key performance dashboard, alert system, off-balancing routines, recommendation platform, recording system and others.

³⁴ BSS service-related systems include a modern Customer Relations Management system (CRM), Interactive Voice Response (IVR), Computer Telephony Integration (CTI), Internet interface for chat and social networks sessions and others.

Figure 29: A hidden forces model of customer satisfaction as functions of actual service level



The gray zones in figure 29 are the areas of opportunity where actions must be taken, either in strengthening existing patterns or in correcting procedures. My recommended actions are presented below as part of a list of ideas to be implemented in TC service's employee and technological infrastructure.

6.2.2 Recommendations for Potential New Operational Directions Resulting from the Research

My operational recommendations include several ideas for implementation. Some of these involve CRM-related technological developments but others are not complicated and can be realized immediately through in-house actions without investing significant resources.

6.2.2.1 Real Time Automatic Matchup Router for Incoming Service Calls:

Based on the match and mismatch combinations mentioned earlier one can develop a routing system that directs each of the incoming calls to the most suitable CSR, as follows:

- Incoming service call is accepted at the call centre.
- The customer is required to provide his/her own voice sample through details for which he/she is asked, e.g. name, ID number and full address.
- The system algorithm calculates in real time, based on the customer's voice sample (voice fundamental pitch frequency, voice amplitude, voice clarity), the best matching available CSR for him/her, i.e. the CSR who has vocal attributes that can likely create a better match with the customer in order to enhance the chances for improved customer satisfaction.
- The call is forwarded accordingly.

This kind of algorithm may look like this:

Table 27: Situation/Reaction for real time automatic matchup router for incoming service calls

<i>Situation</i>	<i>Reaction</i>
Calling customer is a female with fundamental voice pitch of 200Hz or higher.	Forward the call to a male CSR with a fundamental pitch that at least 80Hz lower than the calling female customer. This match offers better chances of customer satisfaction.
Calling customer is a female with fundamental voice pitch of 190Hz or lower.	Do not forward the call to a male CSR with fundamental pitch of 120Hz or higher. This pairing could reduce chances of customer satisfaction.
Calling customer is a female and the call centre's waiting time is too long.	Forward the call to female CSR as this combination shows the best productivity in terms of call duration. This way the match router can be used as an overload balancer.

The task of developing such a real-time analysis system is manageable. As mentioned in chapter 5 (sub-chapter 5.3.1), in a practitioner research conducted in Deutsche Telekom Laboratories by Weiss and Burkhardt (2010), they pointed out the relevance of voice spectral features for the perception of male and female's image and likability that presumably positively affect customer satisfaction. Consequently they created a software -based tool that can predict the rating of likability. They set a few spectral parameters as key factors in obtaining automatic classifications of rating.

TC can definitely develop a similar conceptual platform and apply it in its call centre.

6.2.2.2 Voice Pitch Adjustment Application:

If developing a real-time automatic matchup system (as mentioned in clause 6.2.2.1 above) is expensive or complicated to implement, then a development of voice

automatic tuner that adjusts CSRs voice frequencies can be more accessible. This application is already in commercial use in the audio industry and known as *Spectrum Analyzer*. Some of those software-based applications are offered for free on the internet. This system adjusts input frequency in order to manipulatively create better voice harmony, clearer acoustics, or a more desirable pitch. It is widely used in music studios. It can be also used in TC call centres as a manipulation tool to adjust male CSRs voice pitch according to the female customer's voice profile. One could possibly promote this initiative is by means of cooperation with call centre or CRM major producers; however this feature cannot be enabled without a full understanding and collaboration of the user organization.

In addition to the situation-reaction cases demonstrated in table 27 the spectrum analyzer can deal with various more real-time cases, as follows:

Table 28: Situation/Reaction for voice pitch adjustment application

<i>Situation</i>	<i>Reaction</i>
Calling male customer is routed to a female CSR who does not have a clear (harmonic) voice.	The Spectrum Analyser application can manipulate the voice of the female CSR by adjusting resonance frequencies and create more harmonic sounds. Male customers tend to react more positively to female CSRs with a clear voice.
Calling male customer is routed to a female CSR who has a loud high amplitude voice.	The spectrum analyser application can manipulate the voice of the female CSR by lowering her voice amplitude. Male customers tend to react more negatively to female CSRs with a high amplitude voice.
Calling female customer is routed to a female CSR who has a low amplitude voice.	The spectrum analyser application can manipulate the voice of the female CSR by enhancing her voice amplitude. Female customers tend to react more negatively to female CSRs with a low amplitude voice.

6.2.2.3 ‘Rhythmus’ Speech Rate Application:

The *rhythmus* application measures the speech rate of customers, and indicate in real time to the CSR, that he/she needs to adjust her/his speech rate accordingly. The following situation-reaction case demonstrates how my research findings can be implemented:

Table 29: Situation/Reaction for a ‘Rhythmus’ speech rate application

<i>Situation</i>	<i>Reaction</i>
Calling customer is a female with a relatively slow speech rate.	The Rhythmus application advises the male CSR to adjust his speech rate to the customer’s, in order to prevent customer frustration.

The rhythmus application option is the most complicated alternative for development since it involves speech pathology practices and knowledge, however it is still obtainable.

6.2.2.4 Real Time Recommendations' Popups for the CSRs' Attention:

Another application that can be adopted for implementing my research findings is a real-time recommendation popups platform that attract the CSR's attention in order to adjust her/his approaches. Most of the situations described above can be conveyed to the CSRs in real-time and the application can popup an ad-hoc recommendation for the CSR to implement, as follows:

Table 30: Situation/Reaction for real time recommendations' popups for the CSRs' attention

<i>Situation</i>	<i>Recommendation popup:</i>
Calling customer is a female with a relatively slow speech rate, and she is routed to a male CSR.	'Speak slowly please'.
Calling male customer is routed to a female CSR.	'Do not use a loud voice please'.
Calling female customer is routed to a female CSR.	'Speak loudly please'.
Calling female customer is routed to a male CSR.	'Take an active role by keeping dominant call possession please'.

This kind of real-time recommendation popups platform is already active for upsell and cross-sell activities³⁵. In order to implement adjustment recommendations for the

³⁵ Real time recommendation popups for upsell and cross-sell activities are based on the customer consuming profile and no real time analyzing process is needed.

CSRs in real-time requires a real-time analysis module that processes the customer voice and speech attributes and provides the CSR with the relevant consequent tips to apply during the conversation.

6.2.2.5 General Highlights in the Routine Training of the CSRs:

Part of these research findings do not need technologically advanced systems and can be procedurally applied for the benefit of the organization through teaching, tutoring, training and routinely monitoring, as follows:

- Rapid speech rate creates higher satisfaction as it is perceived as being more reliable and truthful. Special attention must be paid when male CSRs interact with slow-speaking female customers. In this case the CSRs' speech rate must be adjusted to the female customer's rate.
- Male customers prefer a female CSR with a low-volume voice; however a low-volume female CSR might have a negative effect on the satisfaction rate of female customers. CSRs – males and females – need to be aware of that.
- Male CSRs who are more active and hold a dominant call possession rate achieve a greater satisfaction rate in female customers.
- CSRs who vary their voice fundamental pitch and voice intensity sound more alive and may achieve a higher customer satisfaction rate (this was not checked in my research but mentioned in the literature – Goodman 2000, and deserves further exploration).
- Adopting a service-oriented approach consistently focused on the customer helps to gain customer satisfaction. This approach includes a positive attitude and a use of 'service language' that reflects patience, understanding, courtesy, respect, fairness and politeness. The CSR is requested to be an 'active listener'.
- Adopting a professional approach that requires that the CSR to be knowledgeable, accurate, methodical, knowing where to find answers, providing creative

alternatives, speaking clearly, and paying attention to articulation, vocabulary and grammar.

- Keeping team spirit up so that CSRs enrich one each other's knowledge by sharing information and offering mutual support.

6.2.2.6 Application in Practice:

I intend to suggest applying the above recommendations immediately in TC outsourced call centres.

In general, most of the mentioned technologies required to develop such applications are mature and commercial. According to the Gartner Hype Cycle 2012 model (which deals with the life cycle of emerging new technologies from their triggering and incubation stages up to their enlightenment and productivity stages <http://www.wired.com/2012/10/gartner-hype-cycle-2012/>), the domains of predictive analytics and speech recognition are mostly mature and ready for commercial use (The Guardian, cited by Ha'aretz, 2012). I believe that the combination of the two domains is relatively simple for implementation, so the solutions that I mentioned above are manageable and have the potential to yield tangible benefits for the organization.

Once this research is approved and becomes official I will advance these conceptual ideas either inside TC or with external partners who deal with customer care solutions.

Below are examples of possible options:

- Outsourcing call centres from which TC buys service, such as Tikshuv, Babcom, and Bipper. I have contacts with goodwill and mutually beneficial interests at each of these service providers. Each one of these organizations has an R&D division

that invests in new technologies in order to launch innovative solutions that can provide added value to the customer organizations. First, it creates significant differentiation and competitive edge over their rivals, but more importantly, it creates customer loyalty through stickiness. Once the customer adopts and likes the idea, they will keep working with that provider and even be willing to pay extra fees.

I can approach one of these partners and ask them to adopt some of my recommendations and test them over time.

- Israeli Hi-Tech corporations that are involved in R&D for call centre and CRM solutions, such as Nice, Comverse, and Amdocs. I have contacts within these companies whom I can approach. Since they allocate massive budgets for R&D, the door for new technological solutions is always open.

Nice for example is a company that develops value-added solutions for call centres and CRM platforms. Among others Nice has a product range called *Customer Interaction Management*. One of that suite's solutions is called *the Voice of the Customer (VoC)*. This solution follows the customer's behavioural patterns and learns to predict the customer's desired needs in order to provide him/her with an optimized solution. I believe that part of my recommendations would suit the Nice strategy by analyzing the customer's personal-biological attributes and adjust the provided solution beyond its current algorithms.

Amdocs also offers a Value Added Services suite called *Customer Management*. In this product range there is a product called *Proactive Insight Using Predictive Analytics*. This product aims to provide a differentiated service per customer and improve her/his experience. Comverse offers the *Active Customer Management* suite in which there are various real-time tools that analyse the customer profile and help the CSR enhance customer experience.

All of these divisions are profoundly relevant to my research and can become potential partners, interested in accommodating my recommendations.

6.2.2.7 Dissemination:

Another important issue to deal with is dissemination of this research. I hope to find a route to publish my findings in a professional journal. There are many journals – both printed and online – that dedicate their agenda to customer experience and customer satisfaction. Magazines such as *Journal of Relationship Marketing* and *Journal of Customer Service* deal consistently with studies that contribute knowledge to these domains. I believe that my research provides innovative ways to affect the customer experience and at the same time yielding significant contribution to the organization.

I hope to get the support of Middlesex University in finding candidate journals in order to share this knowledge through a published article.

For further research to the present study, I recommend conducting a wider trial of my findings in order to analyse and understand the interactions between CSRs and customers in greater depth. Furthermore, I would recommend focusing on single findings from the A–P list above and explore each one of these through a quantitative research, in order to heighten the certainty of these findings. For example: One of my findings points out that the average or rapid speech of a male CSR has a negative impact on female customers who speak slowly. This finding contradicts professional literature which points out that rapid speech rate is always perceived as positive i.e. more trusty and reliable (Apple et al, 1979).

In addition, during the research I found out that I sampled only dominant values of voice fundamental pitch and voice intensity. However, when I was modeling my research findings I discovered that the range of the pitch frequencies could be very important i.e. peak fundamental frequency and off-peak fundamental frequency. This data, that I have not collected, might be crucially important in further understanding the impact of voice pitch on customer experience. For example, a monotonic one-tone

frequency voice might be perceived by the customer as boring or even apathetic, while a customer may find a broad range of fundamental frequencies as sounding more alive and expressive (Goodman, 2000, p.32). I would strongly recommend checking this insight in future research.

Chapter 7: My Reflections

When I started this journey, more than four years ago, my work environment was rather different from today. Dramatic market developments have occurred in the Israeli macro and micro economy in general, and the mobile market and TC most specifically. The following table sums up the significant areas of change.

Table 31: Recent trends and indicators that reflect the industry recent change

	Then	Now
Mobile market positioning	Niche player	Mass market game changer
Global strategy of the stakeholders' portfolio	Technological innovation orientated	Service provisioning orientated
Organizational structure	Stand-alone company	Merged company
Organizational culture	Classic corporate: Methodical, long-term planning process management	'Startup': Flexible, agile and adaptive to new environments, quick-execution management
Main strategic approach	Long term investment in new intellectual properties	Long term investment in physical infrastructure's companies
Industry main characteristics	Non-competitive, huge profit margins, rules the regulators	Aggressively competitive, massively shrinking profits, heavily regulated
Industry financial implication on TC	Profit	Loss
Israel's macro economics	Consistent growth, high rate of employment	Recessional climate, high rate of unemployment
Israel's political situation	Challenging but solid	Challenging and hectically blurry

As the above indicators reveal, the last few years were managed in a very pressurized and demanding environment. The transition from being a niche company, sailing in a

very peaceful ocean, (a very well-coordinated market), TC has become one of the catalysts, driving the market into a Red Ocean³⁶. TC dropped the prices by the unprecedented rate of 80%! Consequently, industry revenue was cut by 70% - unlike anything the Israeli market had ever done before. 60% of employees in the industry were dismissed, which drastically reduced the employment rates right down in the mobile sector.

The unstable environment which did not match the stakeholders' expectations steered the company into a stormy winter that included massive cuts in operational expenses including personnel. During that period TC replaced no fewer than four CEOs - a very clear indication of the turbulent times experienced in both market and the company.

One of the most dramatic decisions made in that period was to migrate most of our call centres to outsourcing services. For this purpose TC recruited two companies with expertise in call centre management. The impact of such a decision on the potential implementation of my project was crucial. In that situation the access to the 'nerve centre' of the call centres has become quite limited. My original plan was to install in practice a few 'sensor boxes' equipped with my research insights in order to improve customer satisfaction rates. This now became extremely challenging and actually impossible. The meaning of this change in my business environment was very clear: I could not implement my plans as projected originally.

The changing climate inside and outside the organization has created a complex environment that required careful management of my project. On one hand, I needed to keep the logistics processes running i.e. real time records of auditory observations, focus groups, information analysis. On the other hand, I had to adopt a non-intrusive approach i.e. no PoCs (Proof of Concept) in production environments, no implementation of new applications, no change in existing procedures and policies.

³⁶ Red Ocean is a phrase that was coined by Kim and Mauborgne (2005) and refers to traditional competition-based strategies e.g. a price war.

These organizational and commercial sensitivities put me in a situation where I had to use my limited resources wisely so as to meet the expectations of both frameworks – academic and work-based. This limitation has shortened my strides in practically implementing my developed model in-house. This situation was unexpected and it changed my prior assumptions as an insider-researcher who sought to integrate academic process onto the production floor. My organizational position was dramatically affected too in terms of independence as TC has become part of a global group rather than a local stand-alone corporate which is authorized to run ‘startup lab’ routines.

In this kind of environment it has been rather challenging to allocate R&D budgets in order to develop an automatic call router that would match the most suitable CSR to a specific customer. Furthermore, even if I had spent these resources it would have still been impossible to organize a proof-of-concept process and explain the defocus that caused to the entire staff in the call centre, i.e. coordination with other bodies in the organization, installation of software, integration to existing systems, CSRs trainings, feedback collection from users, system adjustments, KPI management and more.

From this point of view, it was rather disappointing that I could not put into practice any of my research results. Nevertheless, I believe that when the research is complete and officially approved by the university, the view of TC stakeholders might change. This research holds valuable insights backed with theory which may well make a substantial contribution to the company. Alternatively, my project findings which can offer new directions can perfectly fit into those outsourcing call centre companies that consistently look for ways to differentiate and create a significant competitive edge over their rivals. In this sense, I believe that implementing part of my research conclusions in a call centre can attract business customers to prefer the more innovative call centre over others since it enhances the likelihood for improved customer satisfaction.

In a wider look on my professional community, I have already contacted key persons in potential companies in order to test their enthusiasm to invest resources and adopt my insights from theory to practice. They showed a keen interest but in a commitment to avoid a conflict of interest, I delayed the discussion around the actual implementation until this project is completed.

I believe that my research is completely unique, since access to the call centre recordings is extremely limited if not impossible to obtain. It is not available in any open website. For example, when conducting a Google search for 'samples of call centre recordings' there is no significant result. This situation turns my DProf into a classic practitioner research, while I was using rare real-world data.

This dual-pillar structure which consists of work-based data and supportive theoretical literature has profound importance to the classic research community, while also strengthening the position of the practitioner research community. I feel that my research contributes significantly practical findings and insights, making it very attractive to both organizational adoption and dissemination.

In this sense, I am very happy and proud to be part of the growing community of practitioner researchers. As a dynamic insider researcher, who took a hybrid methodological approach, combining theoretical knowledge and practical real-world data, I had the opportunity to provide a better understanding and more useful practical actions implementable and yielding better performance to service orientated organizations.

When I approached the project I debated with myself as to whether I should include previous studies that I conducted in recent years. As I progressed, I felt that a great synergy could be created by founding my DProf proposed research with two case studies. Together they demonstrate the boost in my practitioner research work. The

two case studies and the DProf research deal with social aspects of the decision-making process and consumer behaviour, i.e. geographical-based, social-based and personal-interactional-based.

The synthesis process was fascinating, especially when I could link a specific finding to previous studies and cross-reference it with official literature. Through this project I came across important literature sources that helped me significantly in supplying background reviews and supporting evidence for my research outcomes. This literature also enabled me to better understand the whole subject of consumer behaviour and customer experience (I'm loathing to admit that I also learned several important techniques in books' referencing...).

I have emphasized the ethical considerations of my research, in this project. I paid special attention to participants' confidentiality and their privacy. I also kept all the collected data and its analysis authentic by not leaving methodological biases and subjective interpretative insights without full clarifications. Finally, I emphasize how important transparency is, for colleagues at work.

With reference to this and my chosen methodology, I am still debating with myself whether as to the number of observations that I sampled. Possibly, I should have sampled more than 40 records.

While collecting data for this research I encountered a surprising finding: the telephony filtered encoding spectral range which was meant to be between 300Hz and 3,400Hz was unexpectedly showing frequencies way below 300Hz. This fact happened to significantly upgrade the research as well as my personal learning as it was completely different from the accepted paradigm of my professional community. In order to validate this discovery I consulted with several colleagues and external experts from the telecom community. Their explanations were based on extensive professional experience and it gave me the feeling that these discussions were very

fruitful for both sides. It has definitely made my journey valuable not only for the academic research community but also to some of the professional community from the telecom industry.

Furthermore, towards the end of my writing I found more surprising information (Goodman, 2000) that may have affected my research, had I come across it earlier: measuring *range* of voice pitch frequencies or speech rate or voice amplitude rather than *dominant* voice pitch frequency or *average* speech rate or *average* voice amplitude. This could yield more significant insights. At this stage, I think that I shall leave it as a lead for the next practitioner researchers to explore.

There are a few ways in which I can deepen my future engagement with the critical professional community. The first one is through local target organizations which deal with call centres. This is the ideal environment to implement the derivative conclusions of my research. Furthermore, in such an environment my research would evolve, thrive and provide even better understanding than it does currently. The engagement might be direct (applying to call centre service providers, such as Tikshuv or Babcom) or indirect (applying to hi-tech companies which develop advanced solutions for call centres, such as Nice or Comverse). A second optional way is through dissemination and publication of my research findings in relevant journals with knowledge agendas in the fields of consumer behaviour and customer experience (for example *Journal of Relationship Marketing* and *Journal of Customer Service*). This option is rather important for spotting potential partners with whom I will be able to deepen my research insights in the future. I intend soon to correspond with potential magazines in order to further explore this option. A third alternative is through academia which will probably show interest in this research. I have already approached a few academics who seem to be very relevant for further contact (Prof. Dana Yagil from Haifa University and Dr. Hana Medler from Tel-Aviv Jafa College). Both are senior researchers in the field of customer service. Through this kind of engagement there is a fair chance to distribute my research results within more relevant critical communities.

Israel today is an R&D nation with very developed hi-tech industries – telecom, computing, chipsets, cyber, bio-tech, chemistry and more. My vision is to fit the practitioner research into the Israeli academic and create a practitioner research centre in a local university, where working students will be able to merge their real-world environment with academic theories and create new knowledge for both industries and academic institutions. A joint venture with Middlesex University could be a perfect match since it brings its pioneering experience in this domain.

In addition, I would love to visit Middlesex University in order to share my unusual journey as a practitioner researcher in general and my research interesting findings, with other DProf students.

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