

# Big Data in Customer Service

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BACHELOR'S THESIS  
April 2019

Degree Programme in International Business  
Option of Management Consulting

## **ABSTRACT**

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Tampere University of Applied Sciences  
Degree Programme in International Business  
Option of Management Consulting

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Big Data in Customer Service

Bachelor Thesis 24 pages,  
April 2019

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There are two main goals for this thesis. First is to make a handbook of big data. Make big data understandable and the related terminology clear as well as gather all the related information into a concise form. Second is to find ways how usage of big data could be made more efficient now and how it could be improved in the future.

This thesis is mainly built around already existing factual data on big data. Such as books, websites, courses and so on. Data based around contact centre environment was mainly based on a personal work experience as a customer advisor and factual internal information.

The thesis came into the conclusion that big data is a phenomenon in a time when phenomena come and go extremely fast and will likely be replaced with another phenomenon in the future. Also it was shown that currently only a small part of big data's potential can be used and optimal usage can only be reached with development of technology.

Big data is everywhere and it affects everyone. It would be beneficial to research usage and handling of big data in different companies and different fields of business. That would widen the perspective very much compared to only seeing a customer service point of view. Also it would be beneficial and informative to see other systems and views of utilizing big data, as it is likely that some companies can use the potential of data better than others.

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Keywords: thesis, bachelors, business, administration, marketing, sales, bba, dna, big data, bigdata, tampere, lahti, final report, company, customer, contact center

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**ABBREVIATIONS & TERMINOLOGY**

AI	Artificial Intelligence
BBA	Bachelor of Business Administration
BD	Big Data
CC	Contact Centre
DM	Data Mining
EU	European Union
DNA	DNA Oy and/or DNA Welho Oy
GDPR	European Union General Data Protection Regulation
IB	International Business
IOT	Internet of Things
LAMK	Lahti University of Applied Sciences
TAMK	Tampere University of Applied Sciences

# 1 INTRODUCTION

## 1.1 Introduction to the company

The history of DNA starts from 1920's when Finnish landline companies formed a union. That union turned into Finnet 1990's and DNA in 2000's. In the beginning over 40 telephone companies held ownership of DNA.

DNA is a Finnish telecommunications provider. It was founded in 2000 but the company has been in its current form after mergers etc. since 2007. DNA Oy consists of a few subsidiaries: DNA Welho Oy, DNA Kauppa Oy, Huuked Labs Oy and Forte Net-services OOO. DNA Oy and its subsidiaries offer services for both consumers and business customers.

DNA started solely as an operator for mobile phones but has since expanded its business to personal media devices, device sales, cable tv, antenna tv, landline internet, mobile internet, pay television channels, cyber security and more. During the fall of 2016 DNA listed into the Finnish stock exchange. There are many things going on in this field of business but one of the most important projects in the future is the implementation of 5G network.

DNA Oy's market value is currently 2,066 billion euro's and current revenue is 886,1 million euros. DNA also just reached the milestone of 4 million subscriptions.

## 1.2 Introduction to the thesis

This thesis was made for DNA Oy. The thesis is about Big Data (BD). More precisely Big Data in customer service and in a contact centre environment. The responsibilities of a customer advisor include helping customers via phone, via email and via chat. In all the channels of customer contact and service BD is utilized.

The main goal of this thesis was to make a hand book of BD. The second goal of this thesis was to find ways in which the usage of BD could be made more efficient in a customer service environment. BD is a subject that affects everyone working in a contact centre (CC) environment but the phenomenon behind it is not widely known.

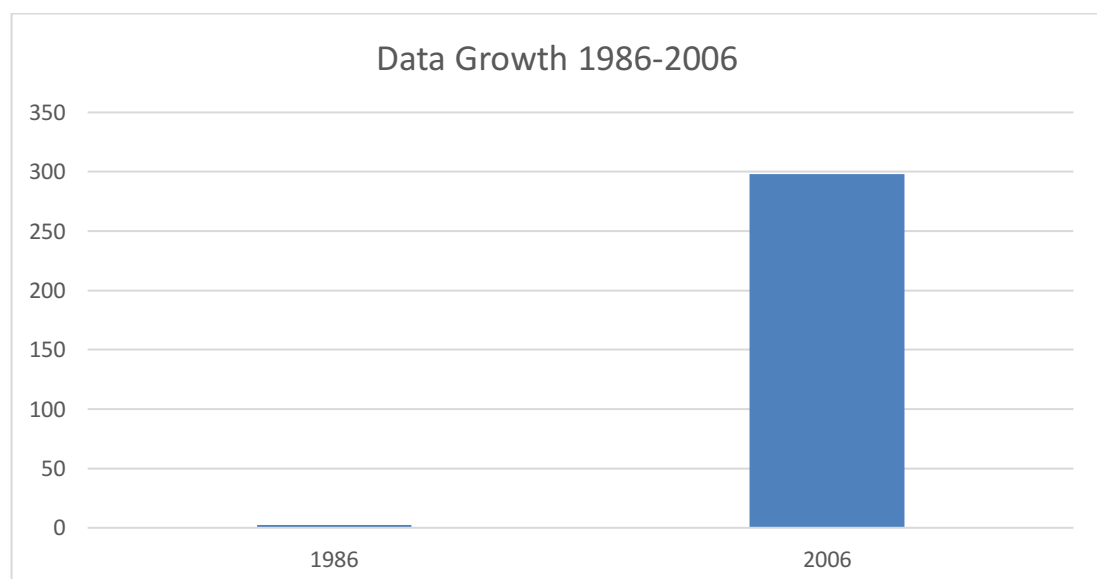
There are not many theses or other research on the topic of BD as it is a quite new phenomenon.

## 2 WHAT IS BIG DATA

Big Data is essentially a huge collection of random and unsorted data collected from different sources. Besides being a collection of data it also includes analysing, collecting, storing, sharing, finding and presenting said data. Both statistics and information technology are important when working with BD. In 1944 a university librarian speculated that in 2040 Yale library “will have 200.000.000 volumes and 6000miles of shelves” and this would lead to the need of “cataloging staff of over six thousand people” (Fremont, 1944). This could be considered as one of the first mentions of exponential growth of data. A US computer scientist John Mashey is often credited as the “father” of the term Big Data. He used it as early as 1990’s (Dean, 2016).

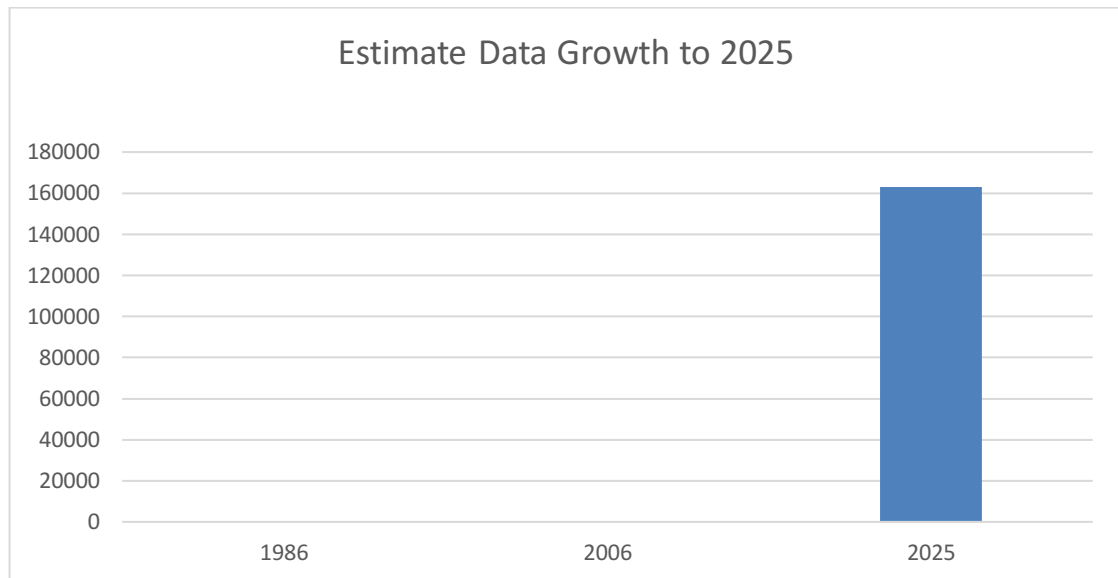
Big Data is a new term in the revolution of information and internet technology in the digital age that started around 2002. BD is the vast unsorted pile of data mankind has never seen before. To give perspective in the 1980’s there was around 2,60 exabytes of data, mostly analog, in 2010’s there was around 300 exabytes of data, mostly digital (1 exabyte = 1 billion gigabytes) (Hilbert, 2011). That is a mind blowing explosive exponential growth TABLE 1 and TABLE 2 demonstrate this vast growth. There is another phenomenon besides Moore’s Law, named after Gordon E. Moore, founder of Intel: Kryder’s Law (Named after Mark Kryder, Vice President of Seagate): The capacity of data storage doubles every 18 months (Luoto, 2016). These two laws demonstrate why and how collecting, storing and analysing BD is even possible.

TABLE 1. Data growth from 1986 to 2006



It is believed that the amount of data in 2025 could reach 175 zettabytes, which is 175.000 exabytes (Seagate, 2018. IDC is their source)

TABLE 2. Data growth estimate from 1986 to 2025



One of the biggest concerns in the field of BD is user privacy. It is more current than ever as European Union (EU) just launched their General Data Protection Regulation (GDPR). That gives the subject of the data full access to all the data collected and stored regarding him or her (EU Commission, Lex Europa). In general people are worried about their privacy and vast largeness of BD can be frightening for the average member of the public without understanding or knowing the key points and terms of BD.

There is no one set definition what is BD and how it is built. There are some factors that are common when handling BD. Commonly BD needs special kind of software and hardware to be handled because it is such a large collection of unsorted data. It would take way too long to sort and analyse BD without it and would be very difficult to turn it into information that is understandable for the one reading it (Hurtwitz, 2013). Tools used to analyse and sort traditional data are too weak and slow for BD. Also for these reasons it is usually automated or handled by a robot or an A.I. As an example it is much easier to read “Will likely watch Formula 1 on TV” than to read a list of hundreds or thousands of hours of TV watching, internet browsing and YouTube watching lists. Unlike data in business in the past BD can be used in many places at the same time. It



has been common in the past that data is from one source and used by one customer and in some cases the data was even guarded like a treasure. But in BD the flows of data go everywhere and there is no distinct owner for the data. The data itself on BD comes from different sources, comes in different forms, can be gathered very quickly and it in general changes very fast. Also it must be taken into consideration how the data is analysed and then given forward. Much like there are different map projections that can fully change, modify or distort what the earth actually is like, the same way the true data can change when BD is sorted and forwarded. This can be a significant risk for big data (Hu, 2016).

There are five principles of BD, the “Five V’s”: Volume, Variety, Velocity, Value and Veracity (Hu, 2016). Volume is for the amount of created and stored data. Variety is for the different types and shapes of information in the data. The data is from several sources, can be in different forms and held by different “authorities” or companies. Velocity is for the speed of the data. It has to be created fast and it has to be handled and analysed really fast. Otherwise the data will “expire” like a carton of milk left in the sun. Value is for the fact that the data has to create and have value, so it does not exist for the sake of existing. Also it has to be able to be utilized and used. Veracity is for the truthfulness of the data. First of all the data has to be truthful and come from the right sources. Besides that the data has to be analysed correctly or it will lead to wrong results. One should also consider the truthfulness and accuracy of the analysed results. This is natural when analysing data but even more so with BD. The Five V’s way of seeing BD is not the only theory and not the absolute truth. There is also a Six V’s theory (Ahmed, 2016) where V for Validity is added where Veracity is more about authenticity and trustworthiness and Validity is for the correct and incorrect data. There is also criticism for the Five/Six V’s where these theories are not seen as a working or good way to analyse BD (Research Gate, 2016). BD is a new phenomenon so the science behind it is just developing. In a few months there might be a totally new theory or way of viewing BD.

BD is usually collected from several sources of information. The collecting phase of BD is one of the most interesting elements of it and one of the things where it differs most from regular data. If in the past the data could be from questionnaires, usage profiling, reviews etc. Now BD can be gathered from almost any source and contains various types of data. Almost anything a person or an organization does can be turned into BD

(Hurtwitz, 2013). Besides the afore mentioned questionnaires, reviews and usage profiling, BD can be also created from social media behaviour and usage, internet browsing history and behaviour, location information, buying behaviour and much more.

The structure of BD can be roughly divided into three different categories (Dedic, 2017). These are structured, semi-structured and unstructured. Unstructured is the most common type of data for BD. The first one is the situation where the data is well organized and clear. This is the way traditional data is most likely structured. It is very likely that it was well planned how the data will be collected and how it will be used. The second one is data with a loose structure. There is no plan how the data will be collected, analysed etc. it was just collected. To be able to analyse and read the data in a beneficial way it has to be re-arranged and it might take considerable amounts of time to find the relevant or needed information from the heap of information. For example the “cookies” or log information from websites could be the second type of data. The third structure of data is when there is no structure at all. This data can be from pretty much any source.

One thing to consider about BD is the useless data. The huge amount of data in the modern world and the trend and greed to collect all possible data creates useless data. Useless data in this case means data that is not meaningful for the current purpose. It might not be useless all the time, just periodically. Because of this there is a need to sort out and pick up the important data from the rest. This process can be called Data Mining (DM). DM in short is tools, calculations and ways of finding the correct and important data from the entirety of data. It is common that what is important and correct data changes rapidly so analysing data has to be swift. BD also updates and changes fast and that is another important reason for fast analysing and handling of BD (Hurtwitz, 2013. Hu, 2016).

There are three phases when using BD. First is Extraction, picking up and collecting the data. Second is Transformation, when the data is turned into a form it can be used by its end users. Third and last phase is Loading. When the data is put into use in the environment it is wanted to be used (Hurtwitz, 2013).

BD can be beneficial for companies, governments, manufacturing, healthcare, sports, media, insurance, information technology, IOT, science and many more.

### 3 WHAT IS ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is an intelligent machine. Machine in this case can be a robot, a computer, a computer software or a combination of these. AI is essential for BD for handling and analysing it as stated before.

Usually when talking about the relationship of AI and BD the AI is in the form of a computer software or a robot. Analysing, sorting, storing, moving and offering relevant data out of BD for the end user.

AI can be present in the very beginning of BD. It most likely is AI that collects the data into BD. After the shards of data has become BD then AI is used by the end user to sort out and find the information that is valuable for them, for example the viewing history of a person, what devices a person has searched or looked at etc. It is likely that after this AI is used to turn this portion of BD into a more simple form. It could be even as simple as “Will likely buy an iPhone 8” or “OnePlus 6” to the end user when analysed and polished well enough.

After the analyser/polisher AI there can be more AI’s that use the best bits and pieces of BD. These AI’s are most likely robots and computer software just like before. These AI’s can do simple tasks autonomously. Making the most of BD they can update information, send messages, make notifications etc. In the future as developments happen these very AI’s are the ones that make the most of BD and release the most manhours for the end user (Hurtwitz, 2013. Hu, 2016. Marttinen, 2018).

#### 4 WHAT IS INTERNET OF THINGS

In short Internet of Things (IOT) means the phenomenon of internet moving into devices, appliances and machines.

This can mean a machine that is connected to internet and receives a blueprint or other instructions through the internet and follows these instructions. Welding, molding, sewing, etc. There are several opportunities for companies and factories to use IOT in their field of business.

There are many products already for consumer and home use that are IOT products. Such as thermostats, surveillance cameras, alarm systems, lights, washing machines etc. Devices that a user can control at home or away from home. There are many options for businesses and for consumers.

IOT is strongly related to BD. There is Industrial BD related to businesses but that is a separate subject. BD can be both collected and used by IOT appliances so it works both ways (Hu, 2016).

## 5 HOW IS BIG DATA GATHERED

When a collection of BD is utilized and used in a company it is difficult, if not impossible to point out where an exact piece of information came from. With BD that is not as relevant as it is with traditional data. More important is that the data is trustworthy and truthful and the data that is picked is relevant. This does not change the fact that there are some things that are typical for BD collection.

Roughly collecting BD can be divided into two different categories: data collected by the company using it and data bought or received from third party.

The data collected by the company itself varies much by the field of business the company is on. No matter what is the field of business and where the data is collected from the collection is automatized and most likely influenced by an AI or a robot. Most companies will likely use their website and webstore as their BD collection platform. From there browsing history, preferences etc can be collected and analysed. Website cookies are strongly related to this as they mostly do the collecting. This data is most likely converted into recommendations of products and services. Companies that have internet or subscription related services can collect usage data easily and this can be converted into preferences of what and how a customer uses. This can be used to profiling and after that to recommendation. Overall customer behaviour is also relatively easy to collect. If a customer buys a new TV every Christmas it is very likely they will buy one this Christmas too etc.

The data gathered by third parties varies and the amount of unnecessary data is bigger. Not all data has to end up to the company using it in the end, it can be used by the third party and it can benefit both parties. As an example: Google and Facebook advertisements. A customer searches a certain phone and its paraphernalia on the internet and the company has them for sale. It is more beneficial for the company and for the third party to put up that advertisement immediately than to start negotiating a business deal and wait for a long time before anything can be done. Shortly put: everything a person uploads, writes, posts etc on the internet can be harvested and then used as data. This is an aspect of BD that is largely not understood. Everything a person does or says online is BD or can be turned into BD. Likes, follows, comments, photos, blogs, playing games, searching for a topic, watching videos, watching streams, streaming etc. the list is vast,

large and grows all the time. There is a phenomenon on the internet, a saying that “if something is free, you are the product” (Forbes, 2012). This is very true with this kind of data collecting. This way of harvesting data also is the key element and source of BD. The information is so miscellaneous that there is plenty for almost every company. After the data is ready it will be sold for the companies utilizing it.

After the data is collected and stored data mining will start. This is the process when the significant data is picked from the entirety of data. There is no reason to take extra storage space and use extra time for data that is not significant, not relevant for the user. Just picking the crème on the top and using it as fast and as soon as possible, before it gets too old (Hurtwitz, 2013. Hu, 2016).

## 6 BENEFITS, RISKS AND CHALLENGES OF BIG DATA

To fully understand the world of BD a risk analysis has to be done. With benefits there are always risks and challenges.

Through this thesis the benefits of BD have been demonstrated extensively. The core idea could be simplified to “making people’s lives easier both work and free time”. For a person their work could be made easier with extended knowledge and faster reaction, maybe even freeing entire tasks for more important matters. On free time it can be better and faster, more automatized service, more accurate and better advertising and so on. With companies it frees hours for more demanding tasks and brings in more revenue with more accurate marketing and higher quality service etc.

Always when data and information are gathered and stored there are risks. For companies only using BD those risks are a little smaller but still relevant. Most likely the biggest risk is the truthfulness of the data. What if according to BD a customer wants an iPhone but they really want a Nokia? What if BD says a red phone but the customer wants a brown one? With companies storing and collecting the BD the risks are much higher. There have been countless hackings of photos, contact information and accounts during the information age. What if someone hacks their way into a large storage of BD and leaks it? What if someone edits the data to make in un-trustful or removes it completely? There are many high risks with devastating consequences. Security is the key. Also the sheer amount of data and BD in the world can be a risk. Storage is cheaper than ever but there is more data than ever. What if there is a shortage of storage and the data “overflows”? Most of BD is irrelevant but what if the company or the World in general runs out of space to store the relevant data? This risk will most likely be solved in the future with better and faster sorting of data and is an unlikely risk. There was a shortage of graphics cards lately because of mining of crypto currencies so there is always a possibility for the worst case scenario (iO-Tech, 2017). The last risk is somewhat related to storage space. If something happens to the computers storing the data where are the backups and are there backups? As stated in the previous risk the amount of data is very large and so is the space needed for storing the backups. Optimization of the data is key: back-up only the absolutely necessary data. The back-ups also require a

separate space in case of a fire or other disaster and there has to be a fast, stable and secure connection between the original computers and the back-up computers to keep them up to date.

As stated before BD is a phenomenon not many people know of and even less people understand what it is and where it comes from. Shortage of knowledge is a “great” way and tool to fear and prejudice as human mind and humankind tends to work that way. With the current GDPR legislation privacy is a very hot topic. These two combined with the sheer accuracy, size and amount of BD can lead to a disaster. Google and Facebook ads make people feel like George Orwell’s 1984 has become true and this can exacerbate people’s fear of their personal information being leaked and sold to unwanted third parties. This is the highest challenge and biggest risk for BD if not addressed correctly but with information and honesty it is easily handled. Some people do not know, understand or accept that whatever they do, say or search on the internet can stay there forever and can be accessed and used easily. People need to be educated on this and people need to accept that the companies that provide them services have very high and deep access to their usage, they can easily profile them etc. Another challenge for BD is the future. BD came into the World really fast, has evolved and changed much and will keep doing this in the future. The World currently moves forward so fast that phenomena and trends come and go. There is BD now but more than likely in a matter of years BD will be evolved into or replaced by some other type of data and information technology (Hurtwitz, 2013. Hu, 2016).



## 7 HOW IS BIG DATA UTILIZED AT CUSTOMER SERVICE NOW

Overall there are two main reasons why BD and AI are used and utilized in CC environment. The first one is to cut time and costs to make customer service more efficient. The number of customers handled in a day in any customer service is huge. If every person can save five seconds every day that is several hours of more work done and more customers served in a matter of days. Also when BD driven AI takes over a simple task for an example updating customer information. That frees personnel from that easy-to-do assembly line job to do something more challenging. In the long run this creates a snow ball effect of BD and AI where more and more tasks are done by machines and those hours are freed for more demanding tasks. This can also be seen as a trend in most of the companies utilizing BD and or AI. The second reason is more typical to customer service and customer relations. Ensuring the best possible, most tailored, humane and accurate service for all the customers. By knowing more about the customers situation, the current products and services, recent purchases, current interests etc. at the moment the customer contacts the customer service or even before the contact happens, the better the offered service can be. If, for an example there is a problem with internet connections with ADSL technology in Hervanta in Tampere. If the service provider has the knowledge of and a customer with ADSL internet from Hervanta calls and the company can combine these two factors the quality of service can be much greater than what it would be without the combination of these two factors. Adding more facts and information from BD can take the quality even further.

The first way BD is utilized is combining a customer's information together. This means that whatever channel the customer uses to contact DNA all of the customer information can be accessed straight away and easily. Shortening the handling times greatly.

The second example is more related to AI. Changes to simple information are made automatically. This removes unnecessary contacts to customer service and frees time to more urgent and difficult matters. It frees man hours to do more challenging tasks and it keeps customer satisfaction high, compared to a situation where the customer should tell all updates and changes to the service provides every time.

The third example is the actual using of BD in a customer situation. This means using

the data collected, like watching history, sports interests, product interests, changes in usage, amount of traffic and everything imaginable is turned as customer referrals and recommendations. This is what truly turns customer service golden. In a situation where customers traffic is much greater than their internet speed it is easy to find a solution that makes the customers life better. If the service provider has knowledge that the customer uses more calls, messages etc. than their current service has it is easy to recommend a better service for the customer.

As a simple rule of thumb the goal of BD and AI usage is to eliminate as many as possible of the simple to do and handle contacts. This opens up room to serve more difficult customer cases and this increases customer satisfaction.

Also a major thing how BD is used now is in the field of marketing. This is not directly related to CC but this has a strong bond with it. People tend to hate newsletters, emails and text messages sent by companies because they are considered spam. Much damage is done but with BD the situation might be fixable and peoples opinions could be changed. In the past marketing and advertisement has been the same for everybody, no matter what the interests, preferences etc of the customer are. With BD this has already changed dramatically. The marketing done to the customer and the adverts sent to the customer can be personalized and customized. This can be as simple as “hey you have these items in your shopping cart, how about a free delivery with them” or “how about a free cover to the product”. But the real BD magic happens when the adverts are about products the customer has browsed before or when they are based on previous behaviour of starting and ending subscriptions, using services in a certain way etc. With this information advertisement can go much deeper: a special price for the TV a customer has been looking at, special prices for covers etc for the phone customer is using, information about channels that have more programs that the customer tends to watch and likes and much more. Customers tend to ask more about these kind of things from the customer service. At that point the key is that the BD information is also available for the customer servant and they have the knowledge about the campaign. Even of the customer contacts the CC for an entirely different reason the customer advisor should have the information about the advert sent to the customer. This is the last and very potential moment to react to the campaign with the customer “Hey, you received this email about this product. Would you still be interested?”. This is both profitable and great customer care. Even more so, customers tend to forget to ask and say things and even forget what

products and subscriptions they have. It is a key point for customer service quality to ask questions. In the best case this BD information and advert combined to a question might lead to a sale or several sales. Profit for the company and excellent service and extra value to the customer.

## 8 HOW COULD THE USAGE OF BIG DATA BE IMPROVED NOW

There are many ways in which BD could be improved with current technology.

It will not be handled what happens in the background. Such as the topics on how information should be picked, how to make sure right information is picked etc. The focus will be on how that formed BD should look like and how it should be able to be used. Like stated before the rule of thumb of freeing man hours for more demanding tasks is used. There are two main principles: Making the work easier for the employees and the customer experience better for the customer. If sales can be boosted that is a positive side note.

Arguably the easiest implementation of BD to be made is recognizing patterns. It is a fact that there are patterns on how people react and do. As an example if a person always ends his Formula watching license at the same time of the year and then re-buys it at another point it is needless to use time on asking how, why and when. The customer advisor should be aware of this process or even better it could be somewhat automated. The servant would already know “its that time of the year” and the contact will most likely be about Formula. Or the process could be automated, with the customers agreement, would automatically end and start the contract at the right time of the year. This would free a lot of hours and would keep satisfaction high. This could also be implemented into automated price checking. It is a little harder process to automatize because prices, situations etc change so much more regularly but a notice of this behaviour would be useful and would add satisfaction. A large amount of hours would be freed with an application like this.

Second thing that takes a lot of time is problem solving. There are many problems that affect the customer and can be easily noticed. Much like the patterns that were mentioned earlier these problems have certain conjunctive factors. Such as not matching numbers, not connected services, not linked services etc. These problems could be easily noticed and fixed before the customer even notices this problem. Needless to say it would raise customer satisfaction very much when a customer problem could be solved before the customer even knows there is a problem. This is a process that would likely be difficult with current technology to automate but even if the fixing would still have to be done by a human, it would free a lot of time and lessen contacts. Even if only 25%

of the problems would be solved fully the difference still would still be noticeable and there would be considerable benefit. Also the knowledge of a bigger universal problem such as a cut cable, fried modem in a block of flats, problems with foreign calls etc. should be connected to customer information. Message and/or email to all customers who are likely to be affected by the problem would again have a desirable effect. Even a notification about “this customer lives on postal code 00100 there is a problem in cable connections within this area” would make somewhat of a difference. This could be almost fully automatized.

People often terminate their contracts. Often terminations are sent through termination forms and some through mail and then they are handled by a human. Usage of this data could be left in the hands of an AI and only cases where there are complications or extra information is needed would be forwarded to a human. Again a very large amount of man hours would be saved for better usage.

## 9 HOW SHOULD BIG DATA USAGE BE IMPROVED IN THE FUTURE

Based on the myriad of ways implementation of BD has already improved customer service and experience there is a lot of future potential.

There are a lot of new methods of contacting customer service. Besides the aforementioned calling, emailing and chatting it goes without saying that changes in the way of contacting will also affect the way how BD, AI etc. should and could be used. Implementing video calls has been a dream since the 1980's and could be easier than ever as all smart phones and all laptops have cameras for video calls (Business Matters, 2015). This would make the contact more personal but could make a lot of things easier to go through and solve.

The most useful future scenario would be knowing the exact reason why a customer contacts the customer service. This would need a combination of BD, AI and IOT and fluent co-operation between them. This scenario has more levels than just knowing the reason of the contact. Like mentioned before it would be great to be able to react to problems in advance. Taking this to the next level would be knowing the reason of the contact before the contact happens. Watching the situation now it is very unlikely that this could ever be 100% accurate but even with a small success rate be useful. Depending on the method of contacting this would give second or even minutes of time to internalize why the customer is making the contact. Example: if a customer is likely to contact to buy a phone and the servant has a few options of what the customer might be interested in there is some time to think what and how to say.

The next idea is built on BD's current usage in predictive problem solving. Solving the problems before the customer knows there ever was a problem. This is already done to some degree as stated before but there is much more that could be done. Of course people in general do not appreciate an always working service as much as a service that gets a problem and is fixed immediately. The point mainly is to keep problems to a minimum.

With regards to customer services that handle technology, trends change all the time and updates happen non-stop. Keeping the customer servant up to date about trends that the customer is interested in is the key. As of current events: OnePlus just released their

newest phone and Apple is about to have a keynote. Not all employees know this, not all of them care about this. But if a customer has followed these events or trends and is clearly interested about these products, this should immediately be wired to the customer's information. This is how it would be possible to make the most out of these trends. Non-product but extremely large trend could be Pokemon Go. A couple of years ago it was the biggest thing ever. Everybody, everywhere wanted to play it. Then those people needed phones that are powerful enough for the game and data subscription fast and large enough to cover the usage. Combining the knowledge of a trend that customer is interested in will increase customer satisfaction and will bring in profit too. (Pelaajalehti 2016, Uusisuomi 2016)

## 10 SUMMARY

In conclusion it has been analysed that BD is currently in use in many places and used in several different processes. But this is just the beginning, a little taste, tip of the iceberg how BD can be used and utilized. Currently people and companies do not use BD as well as they could be using; there is no technology nor experience to take it further at the moment.

The amount of data and the development of technology (AI, IOT, etc) has been accelerating since the 70's. The speed has since declined but much will still happen at a fast rate. Things happen so fast nowadays that it is difficult to keep BD up to date

Usage of BD has already revolutionized the world. It has also dramatically changed the way customer service is handled and how customer is served. There is an even bigger revolution coming. Not only will the way BD is used and seen change and develop. Development and future of AI and IOT will walk hand in hand with BD, supporting each other and filling each others gaps.

BD is a large entirety. It has no accurate beginning, no accurate end. Data will get old faster than ever. Analyzation and fast reaction are key factors. In CC environment it is also important that the data is precise and the customer servant has always at least the same information as the customer and even more if possible.

Reason for BD in CC is to free manhours for more demanding tasks and to maximise the quality of service, whether it is about customer behaviour, viewing preferences or a need for a new device.

BD has many benefits but also risks and challenges. The biggest might just be time it self. Everything moves so fast that in a few years there might be an entirely new data phenomenon.

With more than anything the saying "with great power comes great responsibility" is true with BD. Besides just power there is also great knowledge with BD.



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