



# Cart Abandonment Optimization Through A/B Testing

Danijel Jovanovic

2019 Laurea



Laurea University of Applied Sciences

## Cart Abandonment Optimization Through A/B Testing

Danijel Jovanovic  
Business Information Technology  
Bachelor's/Master's Thesis  
May, 2019

Danijel Jovanovic

Cart Abandonment Optimization Through A/B Testing

2019

2019

Pages

22

---

The main objective of this thesis project was to improve the cart abandonment rate on a website by testing different solutions and monitoring the results. The knowledge base comes from performing the A/B tests using the A/B testing methodology alongside with hypothesis building processes. The beneficiary of the project is Company X where the project was conducted.

Methods used are raw data gathering through analytics tools and performance monitoring to get the current state overview, and forming a hypothesis using market knowledge and practical knowledge to implement the tests.

The desired result is to lower the cart abandonment rate and use the data from the tests to make recommendations on implementing the tested solutions for Company X to implement in the future, as well as main learnings from the undertaking which were that using the A/B testing method to work with primary data and make the website/solution relevant to the customer base.

Keywords: website optimisation, hypothesis, online payment, cart abandonment

## Table of Contents

1	Introduction .....	5
2	Digital Marketing .....	6
2.1	The five A's .....	6
2.2	Industry archetypes.....	7
2.2.1	The win-win principle .....	8
3	AB Testing or Split Testing.....	9
3.1.1	AB Testing framework.....	10
3.2	What is a hypothesis?.....	11
3.2.1	Methodology .....	12
4	Conducting the AB Tests .....	13
4.1	Framework for the tests .....	13
4.1.1	Klarna as a payment platform .....	13
4.1.2	Cart Abandonment emails .....	14
4.2	Further analysis and hypothesis .....	15
4.2.1	Analysis .....	15
4.2.2	Hypothesis decision .....	16
5	Results of the test.....	17
5.1	Payment platform test .....	17
5.2	Cart abandonment email test results .....	17
5.3	Overview of results .....	18

## 1 Introduction

Today, one of the most popular things we use the internet for is online shopping. The main reason is that online shopping is convenient and allows users to purchase anything from anywhere.

However, in modern times where every business has an online presence and in a matter of seconds customers can make a decision to make a purchase from any competitor that meets their needs, a business needs to optimise their website to make the best customer experience possible.

By working with data, businesses can understand better what they need to work on and improve - in other words, optimise their site to be more customer friendly. All sites collect data on how customers behave and what they buy and using this data whole websites or single pages can be modified or optimised to provide a better customer experience that will result in a conversion.

In this thesis, we will look at the processes of A/B testing or Split testing. This is a feature that optimisers can utilise to test whether the proposed hypothesis is a good choice or not and at the same time gather data to support the results and the need for the proposed changes.

Additionally, doing a current state analysis may reveal problems or things that were unknown to the business and immediately find quick wins to fix issues that can improve site performance or customer conversion.

The main undertaking of this project was to find and test solutions that will decrease the cart abandonment level and report the results of the tests.

## 2 Digital Marketing

According to Philip Kotler, the customer path should be redefined to the five A's principles — awareness, appeal, ask, acting and advocating — which reflects the connectivity among customers. The principle, known as “Marketing 4.0” ultimately aims to drive customers from awareness to advocacy.

### 2.1 The five A's

In the shifting customer buying path in the connected world, the five A's are a framework marketing model to describe the customer shopping process in the form of a funnel.

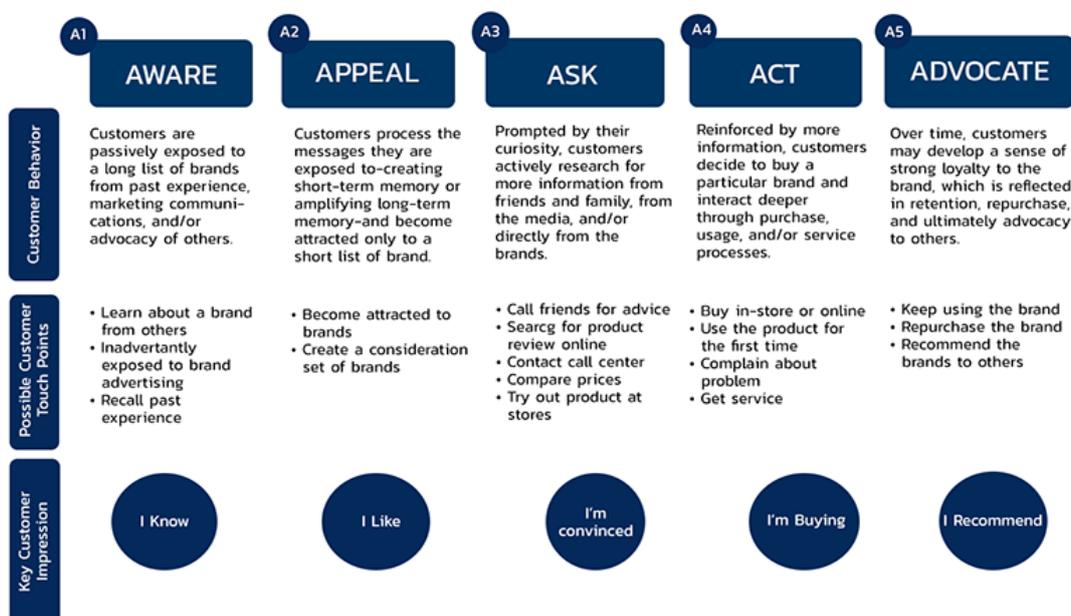


Figure 1 - Mapping the customer path

These stages of the principles can be treated like a shopping funnel, and the number of customers that proceed through each stages of the funnel gradually decreases. For example, a company may place an advert on the front page of a popular website. With on site analytics, it can be seen how many visitors have seen the advert. From that point, only a certain percentage will continue to click on the advert and proceed to the appeal stage. From there, more customers will drop out during the ask stage, and only a certain percentage of customers will convert and proceed to make their purchase. After this stage, the percentage further decreases during the advocate stage.

## 2.2 Industry archetypes

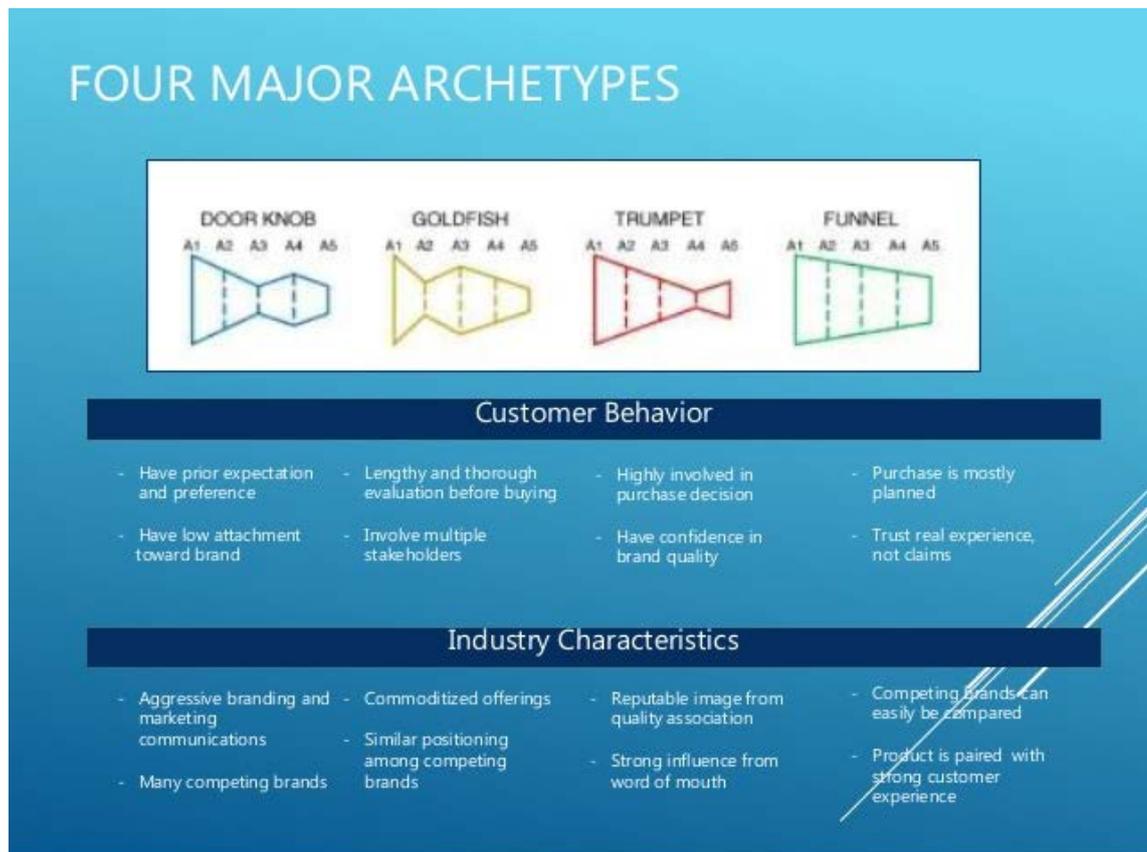


Figure 2 Four major archetypes

The above image shows the 4 major archetypes as revealed in Kotler's Marketing 4.0. The purpose of the models is to illustrate the kind of challenges that companies face in the customer journey and the way that customers behave in the pre-purchase, purchase and post purchase journey.

At the case company, the funnel is the archetype that customers fit into. The purchase is mostly planned due to the nature of the goods - which is home furnishing. Customers tend to trust the real experience and trust in the quality of the products.

The Funnel archetype illustrates the challenges in the purchase journey and identifies opportunities where website optimisation has the potential to improve the online customer purchase journey. All archetypes aim to become optimal and strive to become a bow tie archetype; for a Funnel archetype this means optimising commitment and affinity - or looking at Figure 1, Act and Advocate more.

### 2.2.1 The win-win principle

The win-win principle would mean a situation where both parties, in this case business and consumer, would have a mutual benefit. Growth can be accelerated by having a convenient shopping experience, and this can be achieved with a deep understanding of customer shopping behaviour and using these insights to steer the business in a smart way.

Site speed is an important metric to follow on a commercial website. Users who do not receive the page they requested without delay tend to leave the site or reload the page. Google pushes companies to improve site speed and these sites are indexed higher on the search engines pages - aside from paid search.

There has been a global shift in customer shopping behaviour. Before the internet and e-commerce, customers could only buy what they could find locally in their area, but with companies like Amazon becoming huge retailers, more and more people are searching for their goods online and are no longer limited to their local market availability. Thus, retail has been undergoing big changes in the last 30 years. Customers can search for goods from all over the world in an online market place and effortlessly make a purchase without leaving their home.

With this change, customers can compare products from competitors much more easily than from visiting physical stores. If a customer visits a website and does not find what meets their needs, they can search for the products elsewhere with a few clicks. As technology and devices become cheaper and more available, customers are at the same time becoming more tech savvy - and can find products more relevant to their needs. Historically, companies have spent thousands of euros to reach their customers through TV adverts and radio, and the ROI has not always paid back. Today, with targeted marketing, companies can provide much more relevant ads to suit the needs of their customers based on what they are searching for.

Internal research conducted within the case company showed that the current customer buying journey is a five-stage obstacle course - like that of the marketing 4.0 principles. The buying journey goes as follows; discovery, shop, buy, enjoy, repeat.

On discovery, optimising a website poorly - like having too many adverts both relevant and irrelevant are a poor customer experience because customers don't want advertisements that scream at them to buy goods or services; customers will buy when they are ready to make the purchase. This is relevant to all businesses that operate with online advertising, because working smartly with data can reduce marketing costs and improve the total revenue.

On shopping, customers prefer an easy checkout solution. This is looked at in more detail further into the topic.

On buying, customers simply want to make that purchase and move on with other things in their lives. Anything that is done wrong during this step is a lost sale, a lost customer and a wasted investment.

On enjoying, customers expect the business to be there whenever and however they want, which means that if you as a business is not available in this way, it could mean losing money on the sale generated from the customer.

On repeat, customers have chosen the brand and the products for specific reasons which fills their needs and purposes. They want the experience, and they want it to be great, every single time. If these customer relationships are not maintained, other competitors will step in and get the sale from that customer.

Optimising and choosing the relevant options for customers based on data can thus have a big impact to the daily business operations, and a very significant change in customer experience.

### 3 AB Testing or Split Testing

AB Testing is a method of comparing two versions of a certain webpage to determine which one performs better. AB testing is essentially a test where two or more variants of a page are shown to users at random, and statistical analysis is used to determine which variation performs better on the predefined key performance indicators (KPI's).

During the test, the selected page is modified either in very small ways such as header changes or immense ways such as redesigning of the whole page. The website gets visitation as normal, however the page in question will have a split audience. Usually half of the traffic will be randomly shown the control page and the other half will see the variant, but these parameters can be specifically defined otherwise.

Visitor engagement with each experience is measured and collected for analysis. Through analysis it can be determined what kind of change there was in visitor behaviour, indicating a positive or negative result.

AB testing allows you to make specific changes to user experiences while collecting primary data on the results. The data allows the construction of a hypotheses, and to learn better why certain elements of user experiences impact user behaviour. AB testing should be used consistently to continually improve elements of a website or the customer experience in general.

Testing one change at a time supports which changes influence visitor behaviour and which ones do not. Over time, a combination of the effect of multiple positive changes from experiments can be implemented to a single page or the whole site to improve the overall conversion of the platform that the company provides to its customers.

### 3.1.1 AB Testing framework

AB testing has no standard, but in this thesis, we use the following framework which is in use at the case company.

**Data Collection:** Current state analytics will provide insight into where to begin optimizing. It is beneficial to begin with high traffic areas of the site, as that allows gathering of data faster. Additionally, pages with low conversion rates or high drop-off rates can be used as examples of pages that can be improved.

**Identify Goals:** Conversion goals is one metric that can be used to determine whether the variation is more successful than the original version. Goals can be anything from clicking a button or link to product purchases or e-mail signups.

**Generate Hypothesis:** Once the goals have been identified, AB testing ideas and the hypotheses for why it is perceived they will be better than the current version can be made. Once the list of ideas is complete, they should be prioritized in terms of expected impact and difficulty of implementation.

**Create Variations:** Using AB testing software, the desired changes can be made to the elements of the website experience. Many leading AB testing tools have a visual editor that will make visual changes easy, other more advanced changes such as shopping cart modifications may require coding and more time to implement and test before releasing to be AB tested. For example, changing the shopping cart may need to be connected to the backend systems.

**Run Experiment:** Start the experiment. At this point, visitors to the site will be randomly assigned to either the control or variation of the site. Visitor interaction with each experience is measured, counted, and compared to determine how each site or page performs.

**Analyse Results:** Once the test is complete, time is required to analyse the results. Usually the AB testing software will present the data from the test and show the difference between how the two versions of the page performed, and whether there is a statistically significant difference.

If the variation has better results than the control, then there is data to support the improvements and it can be recommended to implement the changes in a more permanent way either

on the page or throughout the site. The learnings from the experiment can be applied on other pages of the site and continue iterating on the experiment to improve the results.

If the experiment generates negative results or no results, this can mean that either the process was not done correctly or simply that the variant was not acceptable to visitors, meaning there is data to support what not to do.

### 3.2 What is a hypothesis?



Figure 3 Scientific method hypothesis process

Dictionary.com defines a hypothesis as “a proposition, or set of propositions, set forth as an explanation for the occurrence of some specified group of phenomena, either asserted merely as a provisional conjecture to guide investigation (working hypothesis) or accepted as highly probable in the light of established facts.”

With that definition in mind, during the AB testing phase, generating the hypothesis is critical to a successful test, mainly due to gathering background research about the solutions and examples of other cases with similar needs - meaning to be efficient and not reinvent the wheel.

### 3.2.1 Methodology

The methodology was started with the question - "How do we lower our cart abandonment rate?". With this question in mind, a current state analysis was conducted specifically in the cart area. Current state showed a big drop in some potential areas when it came to the cart abandonment metrics. Undertaking the background research showed there was areas for improvement when customers got to the delivery stage and the payment stage of the cart, as shown in the figure below:

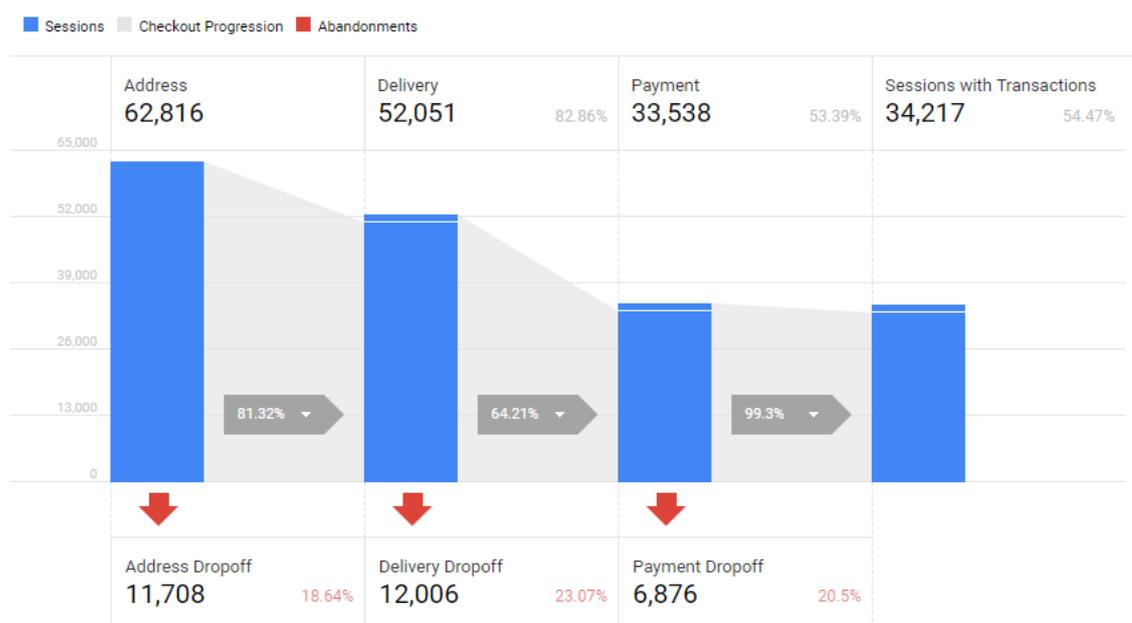


Figure 4 Current state analysis figures

As can be seen, the stage where the customer moves from the address input page to delivery page saw a drop of 23%. This could indicate that customers were not familiar with the delivery methods, or the prices were creating confusion. However, many had still proceeded to the payment page, where again there was a drop off 20%.

We identified these two points are the potential areas where we could focus on lowering the cart abandonment. A hypothesis was formed, and testing was initiated. The hypothesis will be looked at in more detail in the next chapter.

## 4 Conducting the AB Tests

Two AB tests were conducted. It was determined that on the case company's website there is a high rate of abandonment at the different stages of the purchase funnel from the data collected. As there were restrictions on the layout and website experience, a very limited amount of changes could be made.

### 4.1 Framework for the tests

A current state data gathering, and analysis showed that there were problems with a high abandonment rate towards the beginning and the end of the purchase funnel. At the time of investigation, the data indicated that the cart abandonment rate was very high at 98.6%. This indicated that of all the visitors that came to the site, only 1.4% of the total visitors had proceeded to make a purchase, making the overall conversion rate at 0.399%

The KPI's were set to improve the cart abandonment and to increase the overall conversion rate.

From the current state analysis, the hypothesis process was initiated. For the test, there were two hypotheses made. The first was that the current shopping cart platform was not "current" and needed to be updated to the changing digital payments methods available. The decision to use Klarna as a payment platform was decided upon with research into the payment methods market, with invoice payments ever increasing in the Finnish market. The second hypothesis was to find a modern method to tackle the high cart abandonment directly in form of a cart abandonment email.

These tests for the hypothesises were conducted separately, however are reported as one test in this thesis for ease of reading purposes.

The two experiments were run for a period of two months each to gather as much data as possible for comparison purposes.

Once the tests were concluded, there was data to be analysed. In the case of both the tests, there were positive results.

#### 4.1.1 Klarna as a payment platform

While there are many payment platforms available, Klarna was chosen as a test platform due to market research in the Finland online payments usage and due to the platform's good UI and other benefits the company would gain.

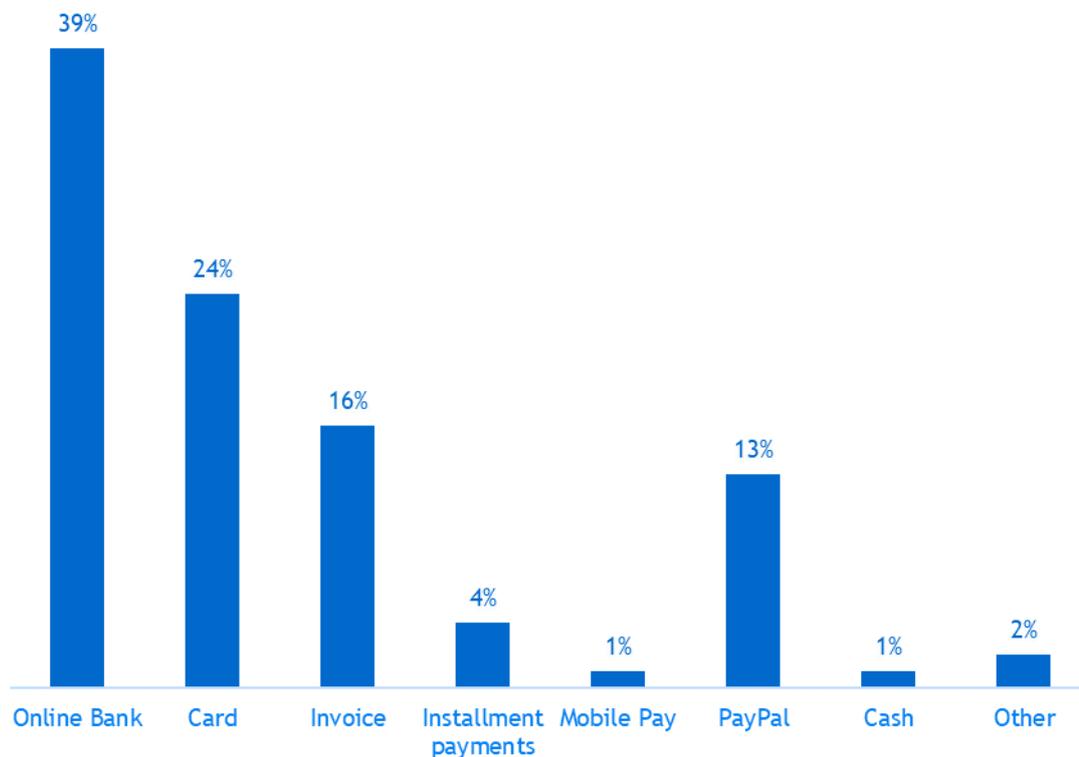


Figure 5 Payment methods in Finland (Paytrail Finnish E-commerce 2018)

Invoice payments have been increasing over the years, and at the moment the company does not have an invoice payment method to customers. One major benefit from this perspective of using Klarna as a payment option is that Klarna would open two “new” customer types - invoice payment customers and instalment payment customers. This means that having the solution available to the current customers, means that the company could open a 20% increased sales potential as these customers are more likely to make a purchase with their desired payment options available to them.

#### 4.1.2 Cart Abandonment emails

During the current state analysis, it was found that visitors to the site use the shopping cart as a wish list. This was fixed with adding a feature “Add to wish list” where customers could add their desired products to another list where it would not influence the shopping cart. However, even with this small improvement, visitors were still abandoning the cart. With a deeper look, it was discovered that customers were abandoning their carts for 2 reasons; price confusion and other general reasons. As changes could not be made to the price confusion due to the issue being more complex and externally owned, it was decided to test a cart abandonment solution in the form of an email remarketing solution.

The current cart has the following steps:



Figure 6 Cart Process Map

During step 2 - Input ZIP code, there was a script placed in the code of the page that would make a pop-up appear after either 30 seconds of idle time (the user would not move their mouse or type anything on the keyboard) or if the script detected that the mouse was moved off the page (E.g. Moved to click "x" or close the browser, or went to change tabs in the browser, or navigated away from the page either clicking the icons in the task bar or going to type in a new address in the URL bar.) and the customer would be presented with the pop-up that would say "you still have something in your cart, would you like it emailed to you?". Customers would have to input their email address to get their shopping cart emailed to them.

The solution was built internally using an internal email server and an internal database solution. The pop-up would fill the customer information and include the cart information into the database. After 1 hour, the customer will receive an email that contains the items of the shopping cart they currently have and a link to make the purchase.

## 4.2 Further analysis and hypothesis

### 4.2.1 Analysis

During the analysis phase, it was discovered that there were challenges in the lower funnel. The website has an average of 100,000 daily sessions. Out of this, only 1.4% of customers proceed to make a purchase. On average, there are 400 orders a day making the average conversion 0.39%. Note, that if you calculate the mentioned figures, they will not add up as these are average figures and differ to test results.

During the analysis, it was discovered that there were potential improvement points during different stages of the lower funnel, so after the collection of data, the goals could be set. The analysis provided the insight that there were other bottlenecks in the lower funnel of the shopping experience. Not all the insight is relevant for this topic, so they will not be mentioned.

The main area that was looked at was cart abandonment. It was discovered that the high level of cart abandonment was due to the checkout interface, payment options and a confusing price ladder. So, the question was asked, how do we lower the cart abandonment rate?

#### 4.2.2 Hypothesis decision

During the forming of the hypothesis, it was discussed that there could be two site additions that could be added to the site to decrease the amount of cart abandonments and boost other KPI's as well - mainly sales and conversion.

The proposition was thus so that a new cart platform would be tested, and a cart abandonment email system set up. The tests would be run at separate periods to get correct and relevant figures from each test conducted so as not to mix the results and get biased performance figures.

During this step, research was done into different payment platforms and systems to help with the high level of abandonment. Klarna was selected as a payment provider as the assumption was that many more customers could be reached by offering their payment options as it is a well know platform in the local market. The proposition was how much would Klarna checkout benefit the business, in terms of better customer experience, improved sales and conversion and most importantly - cart abandonments.

Additionally, research was done into different types of cart abandonment systems, and it was decided that building a local email solution would be the best way to proceed. The reason for this is that it is not difficult to implement locally, and the costs are lower than if the solution were to be outsourced to external service providers.

## 5 Results of the test

### 5.1 Payment platform test

Klarna was used as the payment solution platform, and after several weeks of testing, the results were very positive. During the duration of the test, there were 24,000 visitors who ended up to the cart (50% of total traffic as set in the optimising tool used) Table 1 shows the KPIs selected to be improved and the results.

<i>KPI</i>	<b>Standard</b>	<b>Klarna</b>	<b>Change %</b>
<i>Cart to order conversion</i>	8.7%	12.7%	+47%
<i>Revenue per unique visitor</i>	11€	17.4€	+60%
<i>Time spent in check-out</i>	5m:21s	2m:31s	-53%

Table 1 Results of Klarna checkout test

Additionally, there were other control metrics that were followed, and the results are shown in Table 2.

<i>KPI</i>	<b>Standard</b>	<b>Klarna</b>	<b>Change %</b>
<i>Unique visitors</i>	11 850	11 850	0%
<i>Orders</i>	1 004	1 479	+47%
<i>Sales</i>	127 842€	204 000€	+60%
<i>AOV</i>	129€	140€	+8%
<i>Items per order</i>	5.2	4.8	-8%

Table 2 Other KPI's in Klarna checkout

### 5.2 Cart abandonment email test results

During the testing period of 3 months, there was a positive result from the cart abandonment email as well. The test was run for a longer period than originally planned and mentioned due

to the service being implemented only on the desktop site (missing from mobile site) and reaching a smaller group of customers.

<i>KPI</i>	Standard	Cart Abandonment	Change %
<i>Average Order Value</i>	247€	600€	+143%
<i>Items per order</i>	10.8	12.2	+13%

Table 3 Cart abandonment email KPI's

### 5.3 Overview of results

Overall the results of both tests were positive in almost all aspects of the set KPI's. During the testing period, the level of abandonment clearly decreased to a new level of 94.7%. The main driver of the lowered abandonment was seen during the implementation of the Klarna checkout. The cart abandonment email system did not make a significant impact to the cart abandonment percentage; however, it was a simple yet useful tool that converted customers who would otherwise abandon their shopping carts. So, while it did not make a significant impact to the overall abandonment rate, it was successful in recapturing customers.

## 5. Conclusion

The whole optimisation project provided insight into how to improve and optimise a website, mainly being data driven and using data to make important business decisions. By using data, there is support to any hypothesis that is decided upon.

Furthermore, for the author, the most interesting part was in the current state analysis as this stage of the optimising process provides a lot of insight into current behaviours and what customers are doing on the site and what drivers make them make the decisions that they make. Current state analytics should be done often to understand if there are potential improvement opportunities.

At the case company, due to a limited amount of resources, current state analysis is not done very often - and usually when there are errors on the site or other significant effects that impact negatively. The learning here is that the company should invest more into resources here to identify these potential opportunities on the website to improve the revenue. The extra resources would certainly return the investment quickly as there is much that can still be improved and of course things that the current teams may not even be aware of.

Businesses that have an online presence need to understand that optimising their website and conducting A/B tests is essential for having a good performance. Furthermore, providing what is relevant to the customer is even more vital. Often, developers and business leaders feel that their solutions are what the markets need - however the market decides what it needs based on the convenience that is offered to it.

In this thesis we have investigated Klarna as a payment provider. With Klarna becoming more and more popular and the increase in preference for invoice payments, online businesses need to rethink their business strategy to possibly include the Klarna checkout as it is more convenient and relevant to the Scandinavian markets to enable a better shopping experience and more customers converting.

The main learning taken from the whole thesis is that with doing a current state analysis, the data can provide insight into the needs of the business, and from there conducting market research into the relevant solutions and testing and possibly implementing these solutions.



## References

### Electronic sources

Kotler, P. 2016. Marketing 4.0: From Products to Customers to the Human Spirit. Accessed January 2019.

<http://ebookcentral.proquest.com/lib/laurea/detail.action?docID=4785177>.

Paytrail Finnish E-commerce 2018. Accessed January 2019.

<https://www.paytrail.com/en/report/finnish-e-commerce-2018>

VVO A/B Testing. Accessed January 2019.

<https://vwo.com/ab-testing/>

Industry Archetypes. Accessed May 2019.

<https://www.slideshare.net/rgamorosa/chapter-7-industry-archetypes-and-best-practices>

Digital Entrepreneur. Accessed May 2019.

<http://www.pamastillero.com/2017/08/11/7-industry-archetypes-and-best-practices/>

## Figures

Figure 1 - Mapping the customer path .....	6
Figure 2 Four major archetypes .....	7
Figure 3 Scientific method hypothesis process .....	11
Figure 4 Current state analysis figures .....	12
Figure 5 Payment methods in Finland (Paytrail Finnish E-commerce 2018) .....	14
Figure 6 Cart Process Map .....	15

## Tables

Table 1 Results of Klarna checkout test .....	17
Table 2 Other KPI's in Klarna checkout .....	17
Table 3 Cart abandonment email KPI's .....	18