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IMPLEMENTING A/B TEST RESULTS ON THE E-COMMERCE WEBSITE

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ABSTRACT

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The main purpose of this bachelor's thesis was to implement the results of A/B testing in the frontend of an online shopping website. The e-commerce website is based on the Magento 2 platform and mainly focuses on furniture and home accessories.

At the beginning of the research process, the best User Interface practices and examples were analyzed to make reasonable conclusions about testing results of the website. The testing data was taken from the third-party company's research of different parts of the online shop. During the development process, practical results of testing have been implemented in the frontend part of the project. The User Interface element was created and functionality was added.

As a result of the thesis, a new popup element on the product page was implemented based on the Magento platform. The analysis of two different cases in the A/B test shows that the case with popup element leads to a greater site conversion than other variants without it. In the future, more tests will be conducted on the website to improve the user journey, also the functionality of the online shop will be improved.

Keywords: E-commerce, A/B testing, User experience, Magento 2, Conversion, LESS, XML

CONTENTS

VOCABULARY

B2B (Business to business) - market segment which initially works not for the end user, but for other companies.

B2C (Business to client) - a term for a commercial relationship between an organization (Business) and a private, "end" customer (Consumer).

CMS- this is a content management system, a set of scripts for creating, editing and managing site content.

Conversion- percentage ratio of the number of users who performed a useful action to the total number of visitors to the site during the same period of time.

Conversion rate - the percentage of visitors to the store, website, who made the choice or purchase, to the total number of all visitors.

E-commerce- It is a set of technologies and services which provides an opportunity to sale and purchase products and services on the Internet, accept orders, issue invoices, as well as receive payment and transfer money through Internet.

FTP (File Transfer Protocol)- one of the basic file transfer protocols designed to transfer files between computers on a network. Using FTP, it is possible to connect servers, view the contents of their directories and download files from or to the server.

MVC (Model-View-Controller) - web application design pattern that includes several smaller templates. Using MVC, the application's data model, user interface, and user interaction are divided into three separate components, so that modifying one of them has minimal impact on the others or does not have it at all.

SMTP (Simple Mail Transfer Protocol)- protocol whose main tasks are to check the correctness of the settings and sending outgoing messages to the specified address, confirming the successful sending of the message.

UI (user interface)- the process which determinates how interface looks like and what physical characteristics it acquires.

User Journey- experience of consumer interaction with a product or service.

UX (user experience)- the process determinating what kind of experience the user will receive using product.

Value proposition- value that is presented to the customer through a product or service, the benefits that accrue to the client.

WYSIWYG (“What You See Is What You Get”)- property of application programs in which the content is displayed during editing and looks exactly like the final result.

1 INTRODUCTION

E-commerce and online businesses have a significant impact on the user behaviour in the shopping process. As was said by Frank Chimero, author of "The Shape of Design" – "Design can speak the tongue of art with the force of commerce." (24). The crucial role of User Experience was proved by a massive number of researches and tests in the e-commerce industry. From small shops to large companies, all sellers want to have online shops with the well-developed visual part to attract new customers as much as possible. This is a reason for many business owners to build their online shops based on e-commerce platforms with ready-made visual solutions and functional flexibility of the system.

User experience design for e-commerce platforms usually depends on components and modules included in this platform. However, each of the internet-based businesses is individual and requires a personal approach to the customers, and website conversion will increase only in case if the store value proposition is shown to the website visitors in the right way. This factor entails companies to conduct an analytical research of the store and explore how visitors are coming to the site and what is their behaviour. For assessing and managing the effectiveness of a website store, owners usually use the A/B testing (or Split testing) to compare the different versions of User Interface.

The aim of this thesis is to cover the basic principles of A/B testing and implement in the front-end the testing results to check how active the UI development of changes was. This project will include the real statistical data and SiteGainer.com analytics information of a Finnish B2C E-commerce store. The particular interest in the topic is coming from the personal intention to improve the User Experience skills in the field of e-commerce.

The thesis consists of a theoretical part which will be split into two parts- The first part will describe UX and UI aspects of the website based on the Magento 2 e-commerce platform, the second one will conduct the structure of A/B testing and report the way to integrate test results on the next steps.

1.1 Project background

The project was commissioned by the Vaimo company which supports the thesis research by all the analytics data of one of the leading clients in Finland. The real-life case was provided as a base for learning the role of analytics in UX/UI e-commerce design. The company's client gave access to all website data to support a research. The primary interest of the author as a Vaimo employee was to understand priority values of client in provided e-commerce solutions for them. Also, this research gives a broader understanding of how the design should work in the final point of interaction with users.

1.2 The main aims of A/B testing

The primary aim of A/B tests is to attract users to product and improve the leading indicators of the project. Using A/B tests increase a page conversion, selecting optimal headline and improving search quality. Regarding the e-commerce, split testing clarifies which of the design options is most effective to both designer and, more importantly, the client. Between the designer and the clients, there is a constant discussion. While the designer wants to make an attractive design, the store owner is more focused on achieving specific business aims. The figure 1 shows three main achievements of split testing to be reached (10):
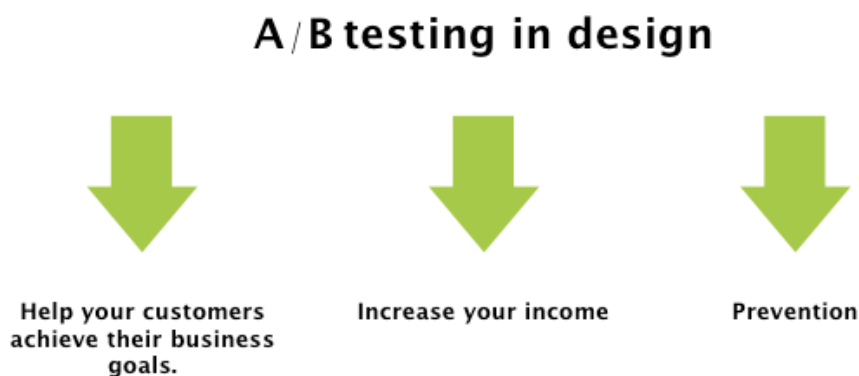
FIGURE 1. The main aims of testing

1. **Helping customers to achieve business goals**

    A significant amount of tools and methods are regarded by clients as a step to the more substantial results and incomes for their businesses. It is self-evident that the analytical methods such as testing the hypothesizes and creating web statistics, indicate for the designer and clients the right way to underscore the value proposition of e-commerce store.

2. **Increasing income**

   It should be noticed here that the ending point of business is presumed to be the final income of the company. Optimization, as a practical result of testing, promotes increasing the e-commerce conversion and as a result, the amount of potential buyers.

3. **Prevention**

   In fact, the cooperation between the designer and the client does not always lead to productive work. Making the suggestions, the client neglects the whole picture of the design and has the subjective opinion based on personal experience. Split testing provides evidence for different UI solutions and determinates the best one.

In the web context, A/B testing allows to solve the discussion by separating of users between two variations of one element or page (A and B) and monitoring which one achieves the conversion goals more effectively.

2 USER EXPERIENCE IN E-COMMERCE

2.1 E-commerce UX design structure

At the very beginning of the online store development, when ordering the design, there is usually a question which pages and sections of the online store need to be ordered from the designer. This is a valuable question because it depends on the design of sections, pages and how the whole project will be done in the end.

The success of the online store depends on a large number of different factors, one of which is its structure. "If the structure of the online store is inconvenient for visitors, and even not optimized for promotion in the search engines, then such a store loses almost half of its chances to success." (2) Therefore, it is essential to carefully consider the future structure in the early stages of developing an online store.

One must admit that depending on the subject of online stores and the features of their target audience, the optimal structure in each case will be individual. Nevertheless, there are some of the elements, which today can be called a standard one and without which online stores are not working. The figure 2 illustrates the distribution of components and site structure among the main parts of the site (2):
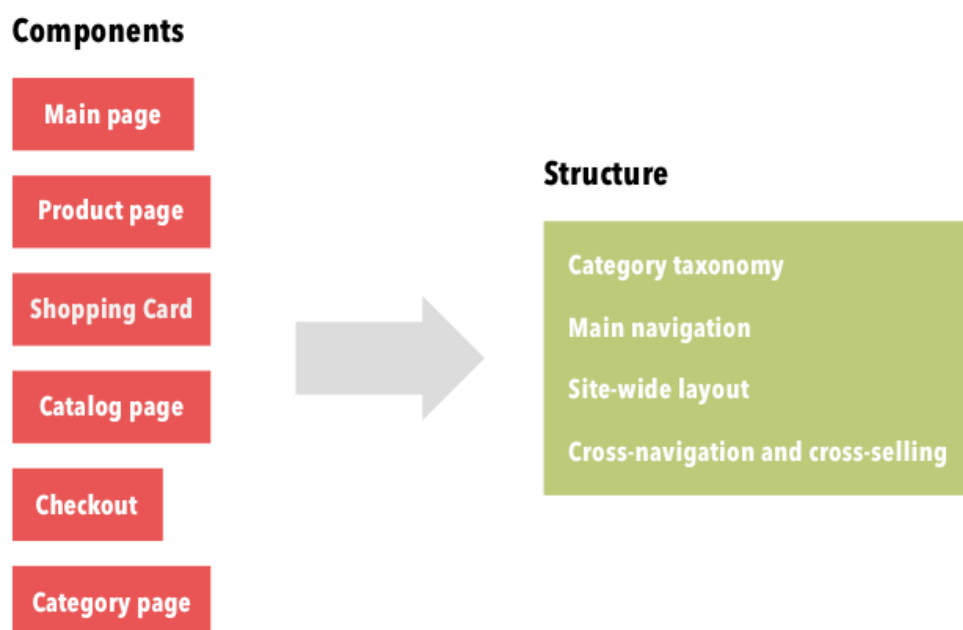
Components

Main page

Product page

Shopping Card

Catalog page

Checkout

Category page

Structure

Category taxonomy

Main navigation

Site-wide layout

Cross-navigation and cross-selling

FIGURE 2. E-commerce store plan (2)

The figure 2 above illustrates the main components which are the main structural parts of any online shop. The figure 3 below shows a more detailed organization of each e-commerce website component. In next chapter, attention will be drawn to the UX role of these components one by one (21).
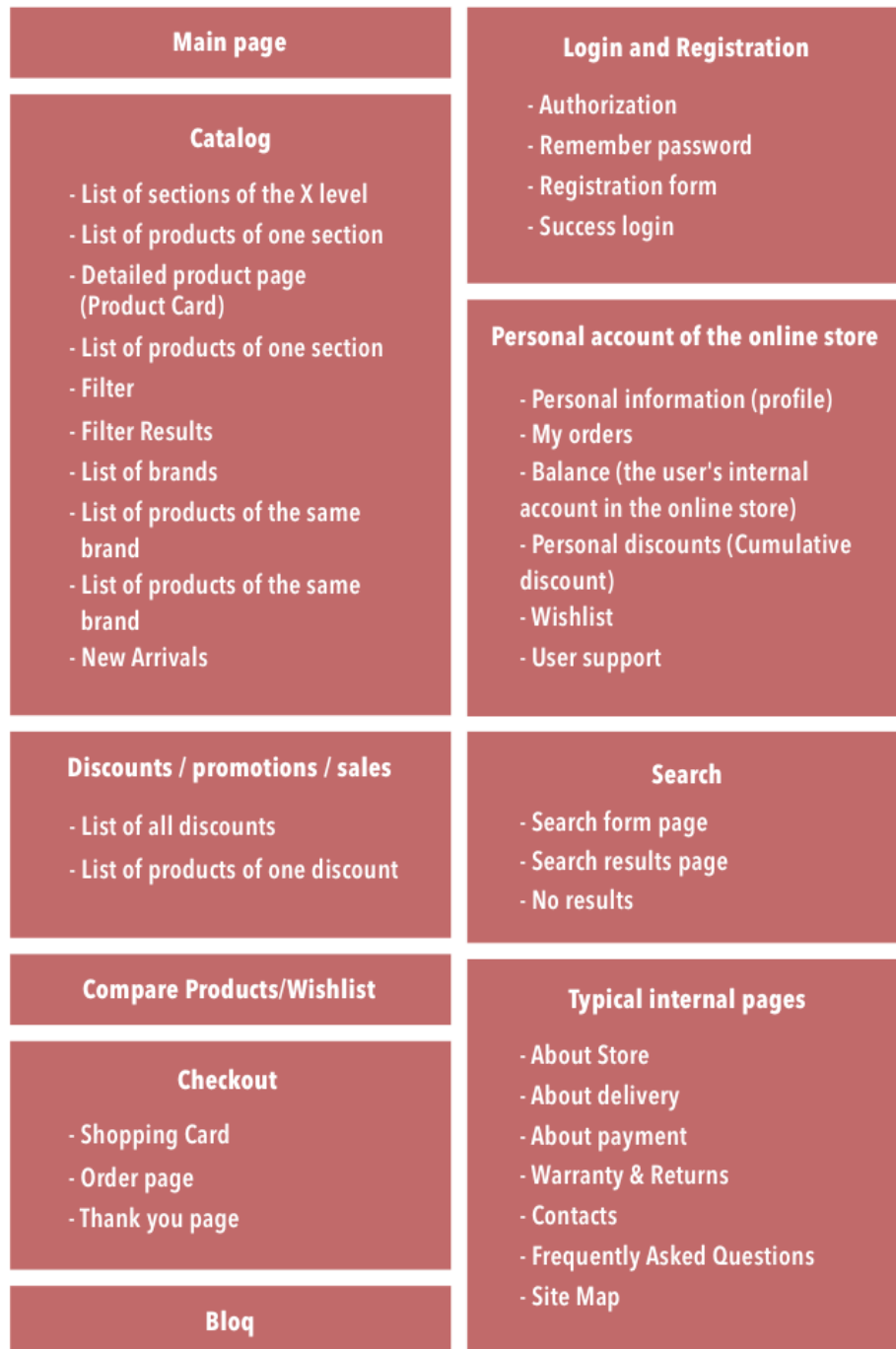
Main page

Catalog

- List of sections of the X level
- List of products of one section
- Detailed product page (Product Card)
- List of products of one section
- Filter
- Filter Results
- List of brands
- List of products of the same brand
- List of products of the same brand
- New Arrivals

Login and Registration

- Authorization
- Remember password
- Registration form
- Success login

Personal account of the online store

- Personal information (profile)
- My orders
- Balance (the user's internal account in the online store)
- Personal discounts (Cumulative discount)
- Wishlist
- User support

Discounts / promotions / sales

- List of all discounts
- List of products of one discount

Search

- Search form page
- Search results page
- No results

Compare Products/Wishlist

Typical internal pages

- About Store
- About delivery
- About payment
- Warranty & Returns
- Contacts
- Frequently Asked Questions
- Site Map

Checkout

- Shopping Card
- Order page
- Thank you page

Bloq

FIGURE 3. List of components in an online shop (21)

1. The main page of the online store

In addition to shares and advertising banners, the main page of the online store should contain a list of products. In fact, it is better to see not only abstract discount offers but also concrete products which could be bought at once. (7)

2. Product catalog

When an online store has several different categories of products, the catalog structure of such a store consists of several levels. In this case, this is a three-level nesting of the catalog, where the last third level is the actual products. It should be considered in design that visually the list of sections obviously differed from the list of the products by many details. It is essential that the visitors clearly understand what they click on the section or on the products, their expectations from actions on the site should be justified. (7)

3.Product page

A product card / product information page is a detailed product description with functional elements (buy / add to cart, related goods, available colors and sizes of goods).
The purposes of the product card are (7):

- Reducing the distraction / focus of the consumer
- Attracting on various stages of the purchase
- Confirming the motivation of the buyer (answer the question, why the buyer needs it)
- Answering questions and building confidence
- Making the desired action simple and obvious

4. Filter Results

In the online store for the convenience of viewing the goods, there are usually filters for product characteristics. In the case of a clothing store, it would be logical to provide filters for size, price, brand, season, style and fabric composition. The page with the results of the filter usually looks the same as the product catalog page of the same section. (2)
The more products are in the store - the more it needs filters. In a small clothing store, there are only a few products in each section and in this case it is better to replace some filters with sorting.

5. Shopping cart

On this page, buyers can change constituents of the order - change the number of product units or completely remove them.

On the pages of the shopping cart, a designer should try to minimize the number of items not related to ordering, in order to minimize the buyer's distraction from the order process. Banners, news, links to other sections, such as social networks and stuff, all these components can distract the buyer out of card and reduces the possibility that the order will be brought to the end. In ideal way of UX, there should be only two links from the card - a standard link from the header logo and a link to "continue shopping" (14).

6.Checkout

A number of fields must be interdependent. The user should have a strict way through all the steps to proceed payment. If they choose the "Pickup" delivery method, then "Delivery address" field is hidden (they will not need address taking the order by themselves). If the buyer is not from the same city, the "Pickup" and payment methods can be replaced by the "Payment at the point of self-delivery" and "courier for delivery" (7).

2.2 Magento as a platform for an online store

Magento is one of the most popular CMS in the world for online stores. Like many other e-commerce engines, it is based on PHP and MySQL. The source code is open for programmers. The founders are Americans Roy Rubin and Yoav Kutner, who initially (since 2011) were developing online stores on the osCommerce platform. Magento uses the Zend Framework (PHP framework working on the MVC model) in the same way as osCmmerce but it has no other similarities with the Zend Framework. The first version of Magento was released in 2007. Many online stores of the largest world brands, such as Lenovo, Samsung, Gucci, Rebel8, Olympus, Skype and Swarovski, work on the Magento platform (20).

The user can use both the free version of the platform and the paid one: the Enterprise version with enhanced functionality and online store support, or Magento Community, which works in the Cloud service. The Enterprise version, in turn, has the following advantages over the Community: the ability to organize gift certificates and cards; the possibility of customer segmentation, as well as the organization of closed sales of goods for certain groups of customers; included functionality for

wholesalers and distributors. At the same time, Magento Enterprise has the opportunity to encourage regular customers by awarding bonus points for purchases in your online store. (20)

2.2.1 The role of Magento on modern e-commerce

The E-commerce field is rapidly growing all over the world, answering the people's needs to buy products spending a less amount of time than before. This influence also effects on the Finnish target market where online shopping becomes more popular every day. In the last five years, there has been a rise in B2C sales of consumer goods and online services. The table 1 below highlights the percentage ratio of e-commerce using in sales by country:

TABLE 1. Online sales usage from all sales by countries (22)

Country	Ecommerce share of total retail sales
Russia	2%
China	15,9%
France	5,1%
Finland	9,6%
Germany	8,4%

The diversity of online selling platforms diversity between each other may vary by the software architecture and the SEO structure of the platform (UX, speed and meta tags). The growing or start-up businesses may usually prefer free e-commerce solutions for their stores, as they face limitations already in the process of extending the business, this may cause incur losses in the future (11). Therefore, considerable players in e-commerce still prefer large platforms with a huge variety of settings and a widely considered UX structure. The figure 4 below shows the list of ten leaders within the platform's usage in European countries. One of the leading technical platforms is Magento 2.0, the usage of which has increased by over 48,000 websites during the last year (11). This software solution is used primarily for large e-commerce projects. According to analyses on W3Techs.com, in April 2014, this platform was used by 1% of all websites of the world. Moreover, within 20 most popular platforms for e-commerce, Magento holds a share of 34%. It should be also noted that on official website it is shown that Magento serves 34 companies from the list of TOP-500. Magento's general statistics of platform are considered the number of online

stores using Magento is more than 150,000, and the number of extensions is more than 6,400 (11). The figure 4 shows in the pie chart that Magento 2 takes the second place among the ten technologies used in online stores business:
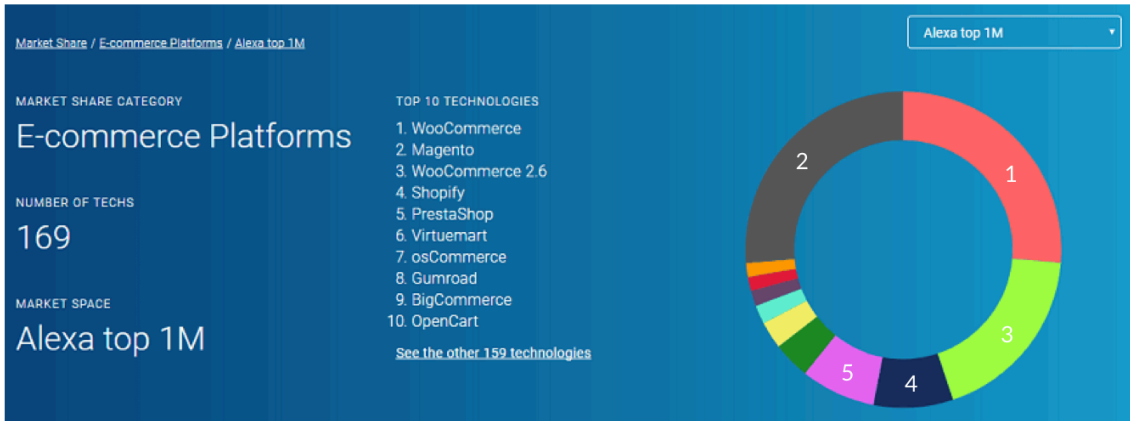

FIGURE 4. E-commerce platforms rating (11)

The reasons for this popularity of this CMS are coming from its technical opportunities. The first one is that Magento is relatively stable, updates are coming often enough to cover bugs that appear in the system. Secondly, Magento supports Multilanguage settings, that allow worldwide usage of this platform as it is shown in the figure 5.

FIGURE 5. Google trends of Magento searches (11)

Another advantage of Magento is the availability of a free community version. This is an opportunity for trying the system in action without spending money on it. Besides, the main reason to choose Magento is the fact that this system is very flexible. It allows to integrate it both with social networks and with accounting programs. Magento contains a full set of tools for reporting, which gives an

opportunity to make the necessary changes depending on the customers' needs: The tools consist of the following:

- RSS feed for new orders
- Tax Report
- Report on products in the cart that were not paid for
- Report about the most viewed products
- Report on Reviews
- The best customers by the amount and number of orders
- Report on discount coupons

In the "starter pack" of Magento there are immediately a huge number of widgets, necessary for the normal operation of the Internet store. The table 2 lists cases where Magento can be used or not.

TABLE 2. Magento usage examples

Can be used for	Not suitable for
Online Media	Promotional sites
Content Portals	Loaded online stores
Intranet Portals	Landing
Corporate Websites	

2.2.2   Technical structure

Magento is a complex system based on the Zend Framework to work with a dynamic content. Magento does not use the classic MVC pattern. To generate pages, the set of the following elements is used (18):

- Model
- Block
- View
- Controller

This structure cause that the user cannot load the template page directly from the controller. To generate pages in addition to standard PHTML template files, XML files are used to determine which blocks are included in the current page (17). Magento has a very high degree of extensibility. In fact, any store feature can be overridden, replaced with developer files. For any model of the block, a developer can create a "rewrite" and replace it with own one. For controllers, a web-programmer can activate the redirection of query paths. Besides, using the event observer for most key actions, developer can add arbitrary functionality. Using the third-party code that does not affect core files also allows performing an update to new versions of Magento (17). The details and advantages of development on the Magento platform will be discussed in the next chapter.

2.2.3 Magento Usability

According to some Vaimo customers, Magento has a convenient interface for administrators. After spending time, the user will be able to perform necessary actions, edit content with VDE and WYSIWYG without looking for help. At the same time, some moments can be quite opaque. For example, managing taxes, creating mailings, managing localization, multiple currencies, various types of store. Functionality Magento allows developers to implement the management of stores with different domain names using a common backend. In this case, users may not even know that these stores are connected (19).
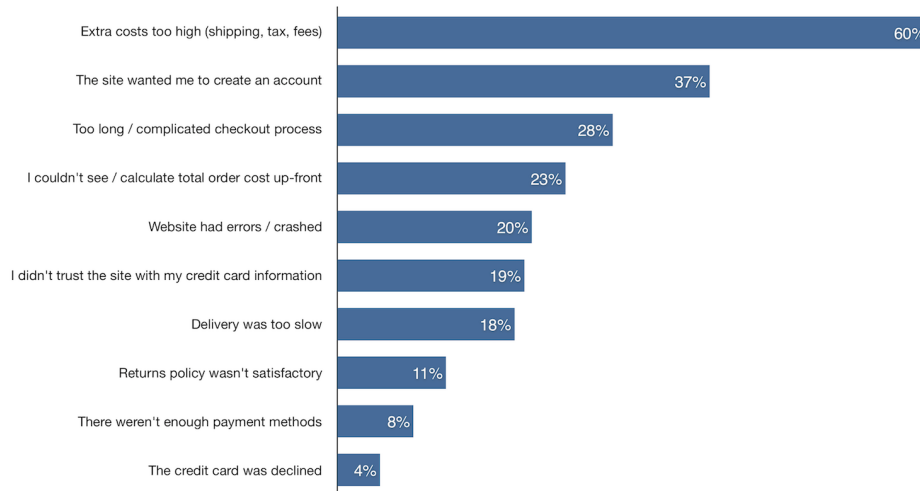
2.3 User Experience role in the e-commerce field

User experience (UX) is the general experience of the person who visits the store, from start to finish. As a rule, UX is evaluated on the basis of how comfortable and pleasant for visitors to navigate the store, to find what they are looking for and to make a purchase. When developing the design and user interface, the main emphasis is on making everything look beautiful on the page, and UX aims at a better understanding of the intentions of the user and how to help realize his aims. The whole point of UX is to ensure that the product and the user experience that the designer has created produce the results that customers need. In the first place - it is online stores, where many interaction's points. Particular attention should be paid to the process of product selection and ordering. Typically, the highest level of user's stress happens at this stage and a high failure rate, including abandoned baskets and payments. Many key issues arise from the statement. For instance, shopping cart abandonment became a valuable factor in the e-commerce industry to start also taking into account User Experience role. According to the Baymard Institute's calculations, almost 70% of online customers leave the website without making an order. (14)

Reasons for abandonments during checkout

1,799 responses · US adults · 2017 · © baymard.com/checkout-usability

"Have you abandoned any online purchases during the checkout process in the past 3 months? If so, for what reasons?"
Answers normalized without the 'I was just browsing' option

Reason	Percentage
Extra costs too high (shipping, tax, fees)	60%
The site wanted me to create an account	37%
Too long / complicated checkout process	28%
I couldn't see / calculate total order cost up-front	23%
Website had errors / crashed	20%
I didn't trust the site with my credit card information	19%
Delivery was too slow	18%
Returns policy wasn't satisfactory	11%
There weren't enough payment methods	8%
The credit card was declined	4%

FIGURE 6. Reasons for abandonments during checkout (14)

As it is visible from the figure 6 above, 1/3 of interviewed people did not finish the checkout because of a "too long/complicated checkout process". In fact, this is the UX problem that decreases conversion of the website at all. To solve these issues, companies sponsor Usability researchers and A/B testing to understand customers' behavior and prevent leaving the page by visitors. Paul Rogers, eCommerce & Digital Consultant for huge brands, points out solutions for a better checkout experience (23). One of them aims to make the process of verifying the customer easier and receive their email data as early as possible. According to Paul Rogers experience, the separation of email verification, as shown in Figure 7, allows the customer to fastly pass this step and the business owner to collect more email addresses than before.
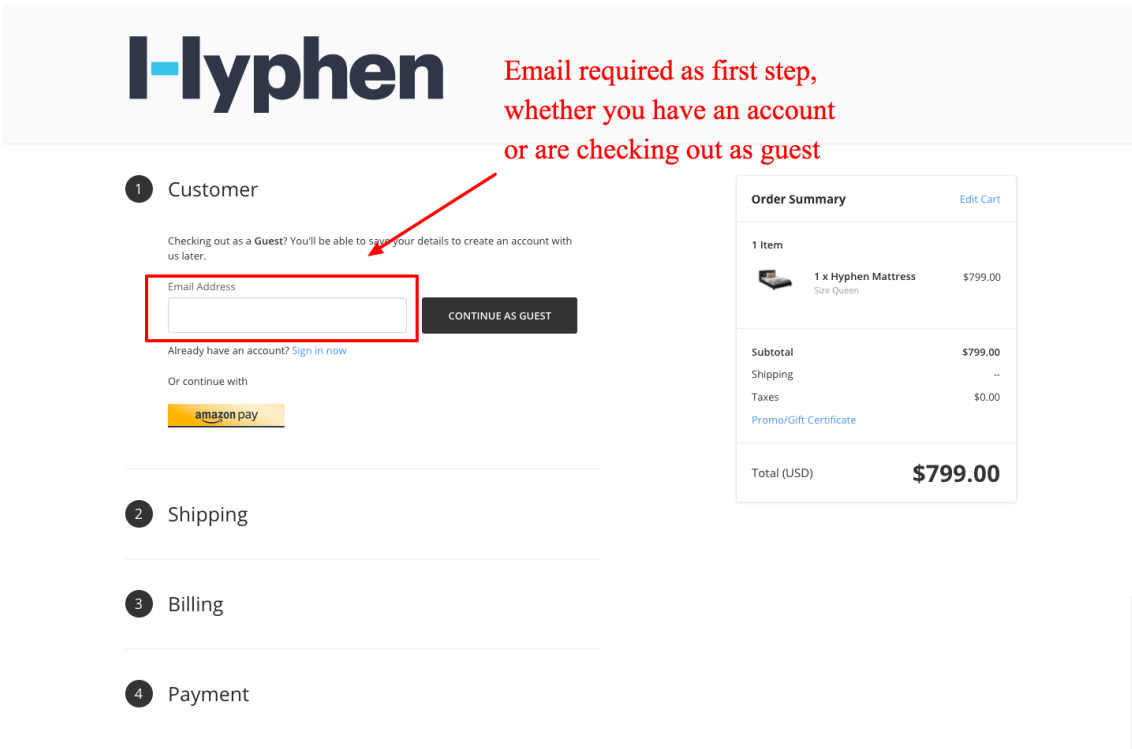
FIGURE 7. Example of usage separate email verification (3)

Perhaps, the foundations of authors of "The Ultimate Guide to A/B Testing Your E-Commerce Store " guide, should also be pointed out and examples illustrating significant changes after A/B testing on different websites need to be taken into account. Coming back to the theme of checkout improvements, the value of a single page checkout in comparison with a Multi-page one is visible. The figure 8 shows what kinds of design changes were done to implement it. The Vancouver Olympic Store has Multi-page checkout with each step on a separate page. Conducting the test the UX team figured out that the statistical significance is 21.8% increasing the conversion of the website. (3)
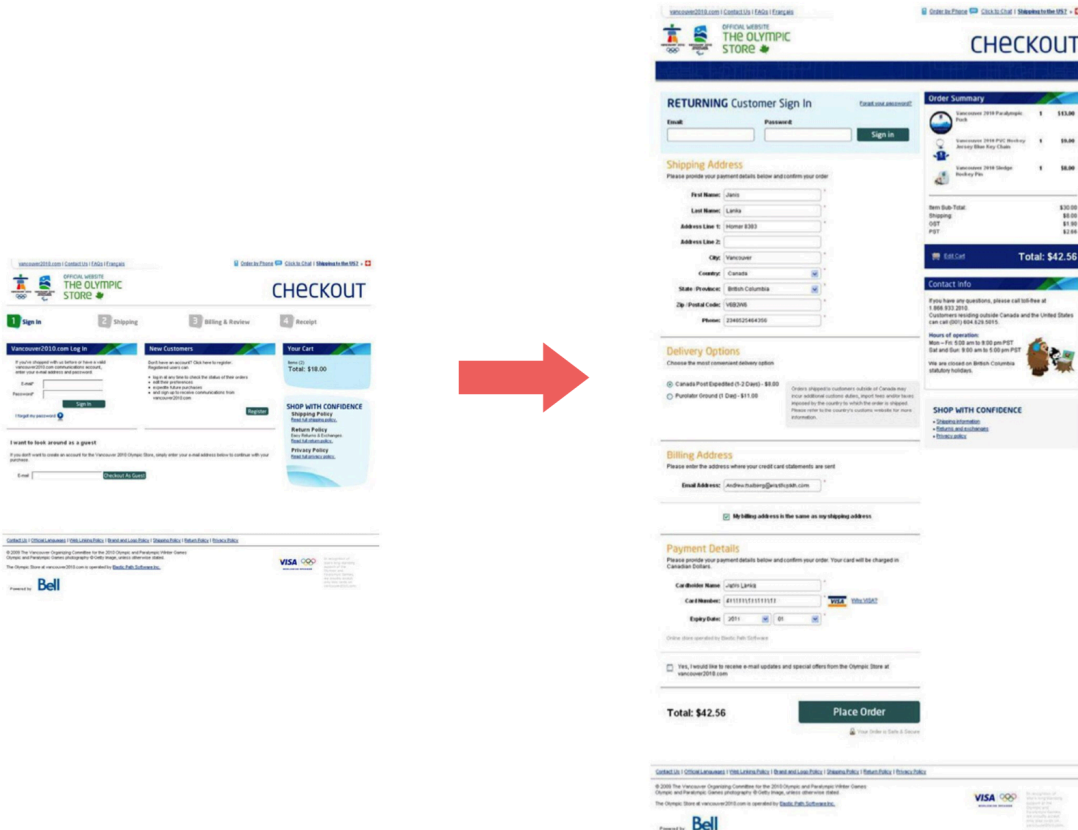
FIGURE 8. Example of improving the checkout (3)

Another part of the store through which any user passes is the product page, where User Experience can play the central role when choosing the product to buy.

People usually prefer to know about the future purchase as much as possible. The FreestyleXtreme online store faced with the problem that people left the product page without clicking the "Add to Cart" button. They hypothesized that customers need a more considerable amount of details before placing the order. The design solution of this idea is illustrated in figure 9. However, when conducting the test, one fact was figured out - adding a product description to the main field of the product info decreases conversion by 31.4%. In fact, the position of added elements may also play a massive role in final conversion results. From this fact, it can be concluded that the testing process is a search for several correct solutions whose combination of which gives the best result from the UX perspective. (3)
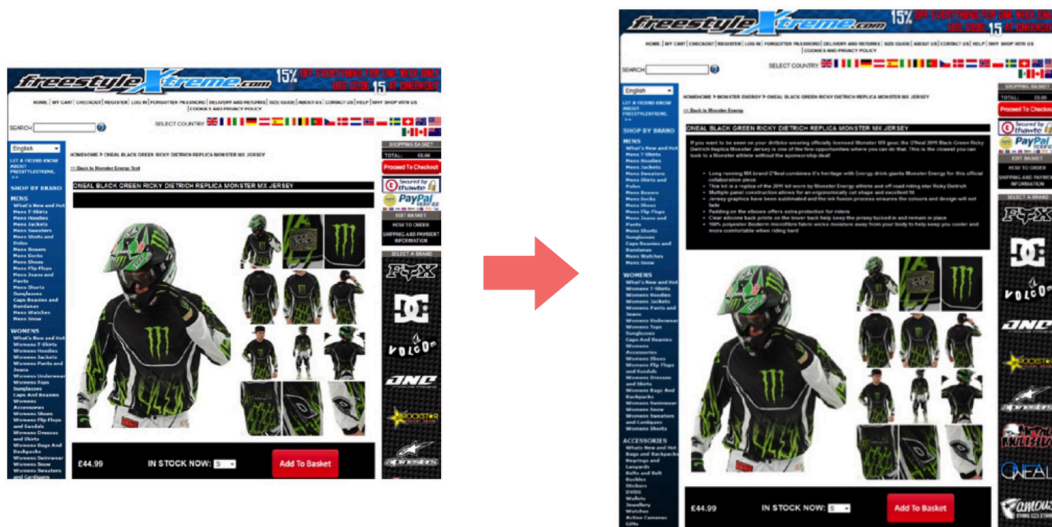
FIGURE 9. Example of improving the product page (3)

Typically, online stores with the best design usually recommend the users to choose several products that they may like. For example, recommendations can be based on the most popular products on the site or on the user's previous purchases of the user. (3)
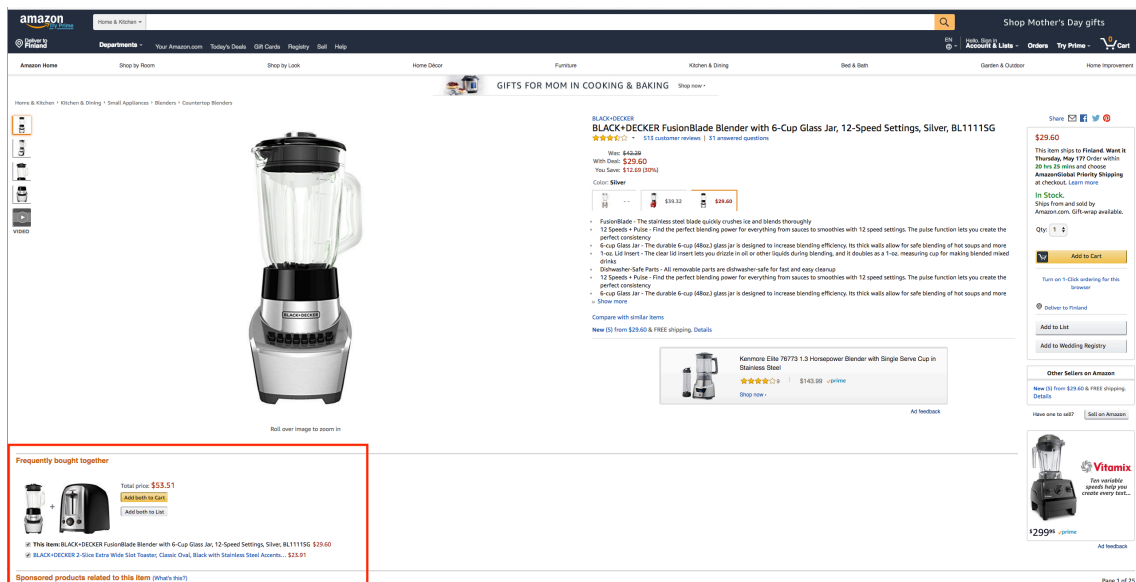

FIGURE 10. Example of improving the product page (3)

It is more beneficial to have the client to buy different things at once instead of planning several small orders as separate orders. An example of this cross-selling feature is visible from

www.amazon.com in the figure 10 where the "Frequently bought together" field suggest buying a complex of related items at once. (3)

2.3.1   Features of development

For the entrepreneurs and business owners choosing the right e-commerce platform is one of the most valuable things to build successful and profitable projects. One of the aspects that can affect selecting the platform is the development process and features of functionality and customization of the online store. The Magento 2 platform has a large number of useful enhancements from a web development point of view.

The first thing that needs to be mentioned is the enhanced performance and scalability of the website. Magento platform uses indexing of data and Varnish cache practices that allow increasing the performance. Indexing to Magento is the process of converting data, such as products, categories, to improve site performance. The changed data needs to be updated or, in other words, reindexed. Magento stores a significant amount of information (including catalog data, prices, users, stores) in many database tables. To optimize the site performance, Magento accumulates information using indexes.

Another feature is the usage of Varnish cache in web development. Varnish is a caching reverse proxy server and an HTTP accelerator which aims at splitting the web page into parts and requesting them separately (18). Varnish receives the request, processes it and immediately answers if data is present in the cache, otherwise it contacts the web server for the result. The answer is placed in the cache. From a development point of view, it means that Varnish was designed as an HTTP accelerator. Varnish is focused exclusively on HTTP, unlike other proxies, which often support FTP, SMTP, and other network protocols. These advanced caching capabilities imply the stable website performance with a mobile browsing experience of users and the usage of dynamic content in a web store. (8)

Secondly, Magento 2 has a responsive theme and mobile-friendly checkout.During the last five years, people have switched to using smaller devices for browsing on the internet including online shopping. According to OuterBox statistical data, approximately 50% of all the internet traffic on e-commerce websites comes from mobile or tablet devices. The Magento 2 platform meets current trends, and default themes support adaptive and responsive designs for different screen sizes. (9)

In addition, Magento platform is an advanced and open source system where developers are free to change styles, layout, and templates to create the user interface according to custom functionality and content of a website. The number of new modules and extensions for this platform continually grows. This expands the number of features and capabilities.

2.3.2   Frontend development process

The Magento platform 2018 is already the second version where many things were improved in comparison with the first one. Modern Magento 2 built-in features meet current trends in front-end development including (5):

1. Full support for HTML5 and CSS3

2. Built-in preprocessor LESS

The choice in favor of LESS is justified by the fact that Magento 2 comes with an internal compiler, which allows the developer to concentrate directly on the development itself. LESS compilation can be either server-side (using the LESS PHP library) or client (using the less.js library).

3. Asynchronous loading of modules using RequireJS (without manually adding scripts to the head section). This increases the speed of loading pages. RequireJS is an implementation of AMD (Asynchronous Module Definition), an API for declaring modules and their asynchronous loading at the moment they are needed.

4. jQuery / jQuery UI instead of the Prototype library

5. Magento UI library (a set of components for a simple and flexible rendering of the user interface).

Frontend development in Magento starts from the main theme where all the styles, JavaScript, and layout changes will be done inside this directory. The structure of theme is shown in the figure 11:

```
1   app/design/frontend/<Vendor>/<theme>/
2   |--- <Vendor>_<Module>/
3   |        |---web/
4   |        |        |--css/
5   |        |        |        |--source/
6   |        |---layout/
7   |        |        |--override/
8   |        |---templates/
9   |---etc/
10  |---i18n/
11  |---media/
12  |---web/
13  |        |---css/
14  |        |        |--source/
15  |        |---fonts/
16  |        |---images/
17  |        |---js/
18  |---composer.json
19  |---theme.xml
```

FIGURE 11. Structure of Magento theme (4)

The whole theme is organized relative to app/design. Each module will have its own <Vendor> _ <Module> directory with its presentation, which will contain templates, JavaScript, CSS / LESS files (17). Theme folder also should contain three default files:

i18n – is the folder with .csv files for translations. A developer can add different languages to the project and dynamically change them countries in a store.

theme.xml - is used to initialize the theme. The name, the version of the theme, the parent template and the preview image of the theme are written with theme.xml.

composer.json - The Magento themes are organized by default as composer packages. There is also a possibility to submit users' own theme as a composer package by adding and configuring the composer.json file in the theme folder.

3   FRONTEND IMPLEMENTATION OF A/B TESTING RESULTS

3.1 Case of A/B testing

The primary object of this project became from one of the client stores of the Vaimo Oy company. This is one of the largest furniture online stores in Finland with large and multi-level navigation and a wide variety of products. Initially, the same store has already been working on the Magento 1 platform and has a successful experience of using this platform earlier. The client decided to move the website to the Magento version 2 because of new features and more advanced functionality. The transfer for the latest version of the platform requested new UX/UI solutions. This factor influenced the design approach and its impact on the conversion and site efficiency. One of the answers became conducting various studies, including tests and heatmaps of the pages. The main research priority was understanding the factors influencing the choice of buyers in the field of furniture e-commerce market.

3.2 Development implementation

During the development process, a third-party company conducted a conversion research for the client and tested the main parts of the website. They are listed below:

- Category page
- Product page
- Checkout

In fact, the conversion may rapidly depend on small design elements and increase or decrease the attendance and outcome indicators of User journey. Researches paid attention to the functional elements on main pages and ran A/B test shown in the table 3:

TABLE 3. List of realized tests

Id	Project	Website	Status	Visitors	Created
192498492	Benefit Bar popup	Company A	Paused	55884	2018-05-15

One of the main rules to conduct a successful test is to have them in a different time. Also, if the purpose of the element is to increase sales, then it must be first checked the design that best conveys the advantages of the offer or suits the target distribution group. After that the time when this element is most popular for visitors is decided. According to this logic, the first test was done for 49 calendar days and contained the Benefit bar Popup on the Product Page. The main testing objectives were focused on the user behavior on the product page after interacting with the toolbar. They are as follows:

- "Add to cart" clicking
- Shopping Cart visiting
- Checkout visiting
- Choosing payment method
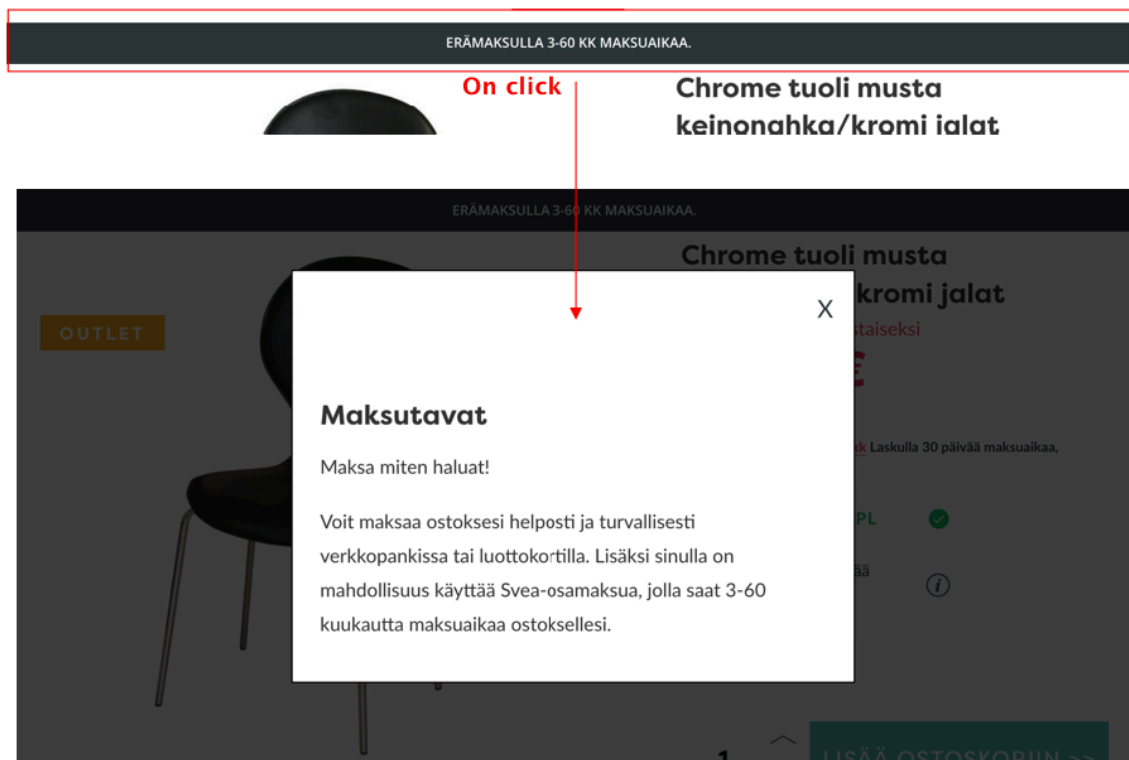
FIGURE 12. Test 1 "Benefit Bar Popup" case

For the frontend implementation in frames of testing a separate task was created. The Estimation time for development and testing phases together was approximately 15 hours in total. The primary

aim was to implement a popup which was appearing by clicking on the CMS block in the header of the website as is illustrated in the figure 12.

The first step of Implementation became the UI style of the popup. There was no ready-made design, and in this case, the developer should make an implementation based on the style guide of the project. Some parts of this style guide are shown in the figure 13:
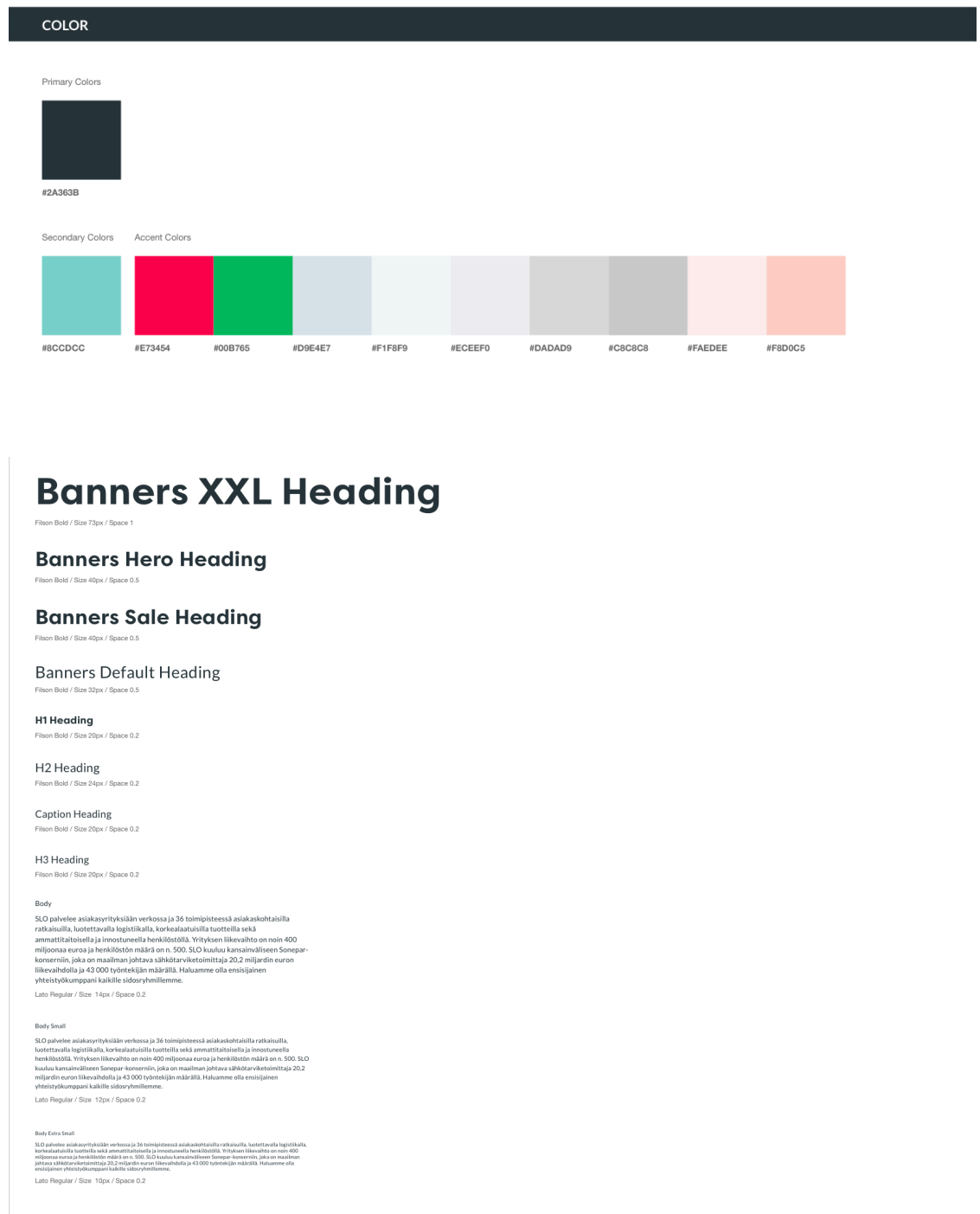

FIGURE 13. Fragments of Style Guide for the project.

Keeping the interface simple and clean is very important to users. Therefore, fonts styles and colors to style the text and the UI element style (popup) were taken and done according to main design Guide Lines.

The next step is the actual web development of the task. First of all, the popup element must be added by initializing it in a separate PHTML template file. During the project development, the separate modules under the project theme were created. The right place to add this template will be the Magento_Catalog module where layouts and templates for the category and product page are based. The JavaScript and CSS/LESS files are located in the "web" folder of the same parent theme as is visible in the figure 14.
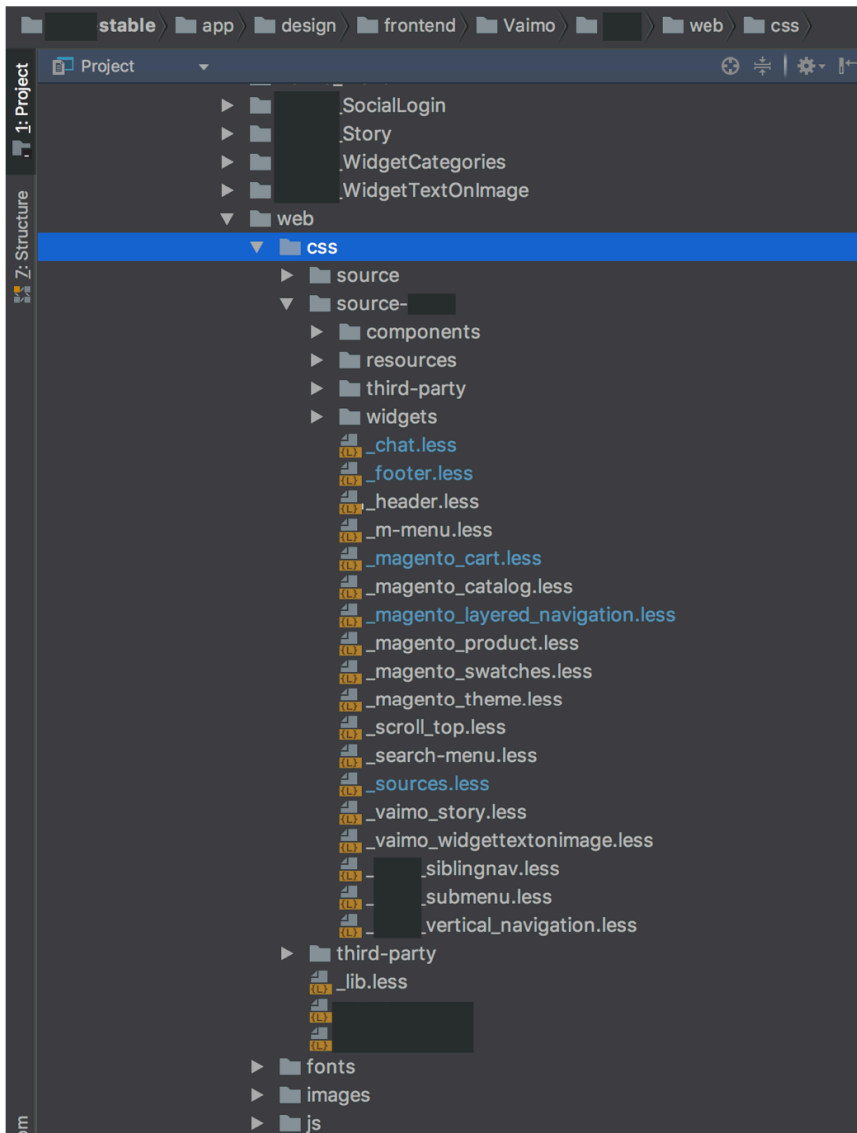

FIGURE 14. Folder location where all styles and JavaScript files are done
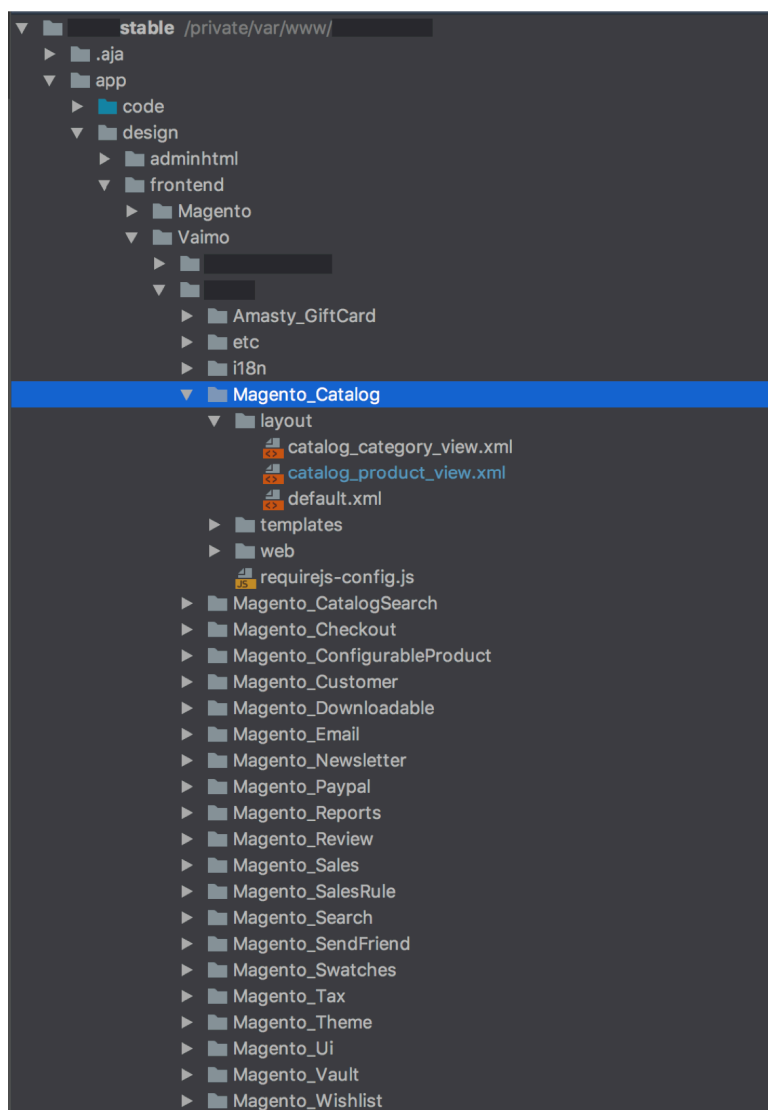
FIGURE 15. The structure of modules in project theme folder

A new template file "benefit-bar-popup.phtml" with html structure of UI element was created. The content of this template is shown in the figure 16.

FIGURE 16. Template content of the popup

In Magento, pages are built using blocks and templates that have the extension * .phtml. Any phtml file is valid html code. The end result is created by decorating one block into another through the layout positioning. Visually this structure looks like the figure 17. where the layout acts as the frame of the project, including blocks in a particular order.

FIGURE 17. Schematic designation of the Layout/Template role

It is possible to declare this new block in main product layout catalog_product_view.xml using the next attributes (17):

Type – is the Magento path indicating the class of the block. For example, "cms / block" refers to the class Mage_Cms_Block_Block, which is located in app / code / core / Mage / Cms / Block / Block.php. If a developer does not need the specific processing logic of the block but simply wants to display some kind of pattern, then "core / template" can be used as a type.

name - is the unique name of the block. It is necessary so that the developer can then access it via the reference directive.

as – is an alias for the block name. It is used if accessing the block from code with the methods of the parent block getChild or getChildHtml is needed.

ifconfig – is a configuration path where the block will be shown only if the setting value is true.

after - specifies the name of the block after which a developer wants to display this.

before - specifies the name of the block before which a developer wants to display this. If a minus sign ("-") were specified, the block will be displayed the very first of all in its parent block or container.

template - specifies the template for the block.

translate - indicates the tags (nodes) the contents of which need to be translated.

The figure 18. below shows that a new block with a UI element in the referenceContainer "product.info.main" and argument "name" for further use in other files are added.

```
<referenceContainer name="product.info.main">
    <block class="Magento\Framework\View\Element\Template" name="benefit.bar.popup" as="benefit-bar-popup"
        template="Vaimo/      /Magento_Catalog/templates/product/view/benefit-bar-popup.phtml">
        <arguments>
            <argument name="title" xsi:type="string">Benefit Popup Bar</argument>
        </arguments>
    </block>
        <container name="product.info.left"  htmlTag="div" htmlClass="product-info-left" />
        <container name="product.info.right" htmlTag="div" htmlClass="product-info-right" />
</referenceContainer>
```

FIGURE 18. Layout

The second step will be the execution of "on-click" functionality through the jQuery function, shown in the figure 19. In fact, jQuery is one of the most widely used JavaScript libraries in the front-end development. According to Maxwell (17), the usage of jQuery has a list of advantages in comparison with regular JavaScript. Firstly, it has easy DOM manipulations which allow the programmer to easily use ready functions instead of creating code one by one line. Also, jQuery is compatible with most of the Internet browsers giving developers complete freedom.

```
1   /**
2    * Copyright © 2009-2017 Vaimo Group. All rights reserved.
3    * See LICENSE.txt for license details.
4    */
5   define([
6       'jquery'
7   ], function ($) {
8       'use strict';
9       $('.page-header')
10          .find('.header-block-marketing')
11          .on('click', function () {
12              $(".cboxOverlay").css("display", "block")
13              $(".popup").css("display", "block")
14          });
15  });
16
```

FIGURE 19. JavaScript function to enable popup

The final step of code implementation is CSS styling of the popup on the product page. As it can be seen from the figure 12, all CSS styles are compiled as separate LESS files. Magento 2 works with LESS which extend CSS with dynamic features such as variables, blending, and operations. Preprocessors allow to define properties once and then reuse them in this project, it is much more functional, than using pure CSS. Variables allow the programmer to define the used values continuously in one place and then reuse them anywhere in the stylesheet. This makes it easy to make global modifications just changing one line of code.

4 ANALYZING THE RESULTS

To summarize the results of this research, first of all, it is necessary to determine how effective the testing was and how much the result coincided with the hypotheses at the beginning of the testing.

The effect of a change is defined as the difference between the average values of a key indicator in the segments. The smaller the intersection, the more confidently it can be said that the effect is really significant (1). As a rule, for making a positive decision on the effectiveness of changes, the significance level is chosen to be 90%, 95% or 99%. The intersection of the distributions for them is 10%, 5%, or 1%, respectively. With a lower level of significance, there is a danger of making erroneous conclusions about the effect obtained as a result of the change (16).

The third-party analytical company collected and analyzed data using the SiteGainer.com platform where all the results about the conversion, visitors and conversion rate is calculated without the user's input. Results are shown in diagrams and tables. At the beginning of testing, it was determined that testing is considered successful if, as a result, the conversion increases by more than 1%. The results of 4 main aims were checked as shown in the figure 20 below:

Original – the initial product page without a benefit bar popup.
Variant 1 – a product page with a benefit bar popup.

Cart visit
Pagegoal on URL where contains 'checkout/cart'

Variation	Unique Visitors / Conversions	Conversion Rate	Increase	Significance
Original 11273153	34,686 / 655	1.89%	-	-
Variant 1 11273154	34,568 / 676	1.96%	3.56%	74.03%

Choose payment visit
Pagegoal on URL where contains 'payment'

Variation	Unique Visitors / Conversions	Conversion Rate	Increase	Significance
Original 11273153	34,686 / 62	0.18%	-	-
Variant 1 11273154	34,568 / 76	0.22%	23%	88.75%

Success

Pagegoal on URL where contains 'checkout/onepage/success'

Show Graph

Variation	Unique Visitors / Conversions	Conversion Rate	Increase	Significance
Original 11273153	34,686 / 783	2.26%	-	-
Variant 1 11273154	34,568 / 805	2.33%	3.16%	73.48%

Checkout visit

Pagegoal on URL exactly matches 'https://www.veke.fi/checkout'

Show Graph

Variation	Unique Visitors / Conversions	Conversion Rate	Increase	Significance
Original 11273153	34,686 / 1,491	4.30%	-	-
Variant 1 11273154	34,568 / 1,486	4.30%	0%	50.06%

FIGURE 20. The A/B testing results

After analyzing all 4 results, it can be concluded that the changes had the greatest impact on users' interest in payment methods for selected products. Users are 23% more likely to reach the page of the choice of payment method in the checkout. However, at the same time, it is clear that these changes did not affect the visit to the checkout and the level of conversion remained the same. The most valuable indicator was the number of users who paid for the order and reached the final page. Of the 34,568 users, 805 paid for the order on the website. That also means that the conversion increased to 3.16%.

5 CONCLUSION

The primary aims of this project were to implement the result of A/B testing, to analyze the results. Another aim was to make conclusions, based on all collected, about how effective the implementation of changes was and did the results relate to the number of spent resources. The findings of the study reached the initially set aim of the project.

At the starting point of the research, there was a product page without a promotional popup with information about part payment options to make. During the implementation, the before mentioned popup was added to the page and the A/B testing conducted with this element was analyzed. As it can be seen from the testing results, 75% of testing conversion aims were reached, and one of them (Reaching a payment method page) has a significant growth of 23% conversion.

Talking about development part of the project, the implemented UI element is right now on the live site of the online store. Development and testing phases fit in estimated 15 hours and the task successfully passes software and UI internal tests.

To conclude, it can be said that this research shows a significant value for testing the design and marketing solutions for online stores. In general, a less amount of resources was spent on checking the ideas than implementing them without any final efficiency.
The company is considering adding more A/B tests to the current website to check insignificant design changes in the future.

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```less
div.popup{
    background: #fff;
    display: none;
    overflow: hidden;
    position: fixed;
    z-index: 8010;
  width: 50%;
  top:20%;
    right:25%;
  border: 1px black solid;

}

.close-popup{
  float: right;
    margin: 15px;
    font-size: 18px;
}
.popup-content {
    padding-left: 20px;
    text-align:left;
    width:80%;
}
.popup-content p {
    font-size: 14px;
    line-height: 25px;
    margin-top:15px;

}
.popup-content h3 {
    font-size: 20px;
    font-weight: bold;
    margin-top:20px;
    line-height: 25px;

}

.popup-content span {
    font-size: 14px;
    line-height: 25px;
    margin-top:20px;
}

.popup-content img {
    float: none;
}

#cboxOverlay {
width: 100%;
    height: 100%;
    display: none;
    position: fixed;
    top: 0px;
    left: 0px;
    background: rgba(0,0,0,0.75);
    z-index:1000;
}
```