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Bachelor Thesis

Approaches to website development

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Approaches to website development

Objectives of thesis

The main objective of the thesis is to compare different approaches to website creation and find the optimal one based on selected criteria. Approaches that will be considered are creating website by using WordPress, Joomla or creating website by using HTML, CSS, and JavaScript without using any existing templates.

Partial objectives are the following:

- Conduct theoretical overview of different approaches of the website development based on available literary on online sources.
- Analyze and compare available methods for website development.
- Select optimal solution, implement it in practice and evaluate the results.

Methodology

Bachelor thesis will consist of theoretical part and practical implementation. Possible approaches to website development will be analyzed based on literature review, with focus on their advantages and disadvantages their suitability for implementation for the practical part. Optimal solution will be selected using multi-criteria analysis of variants and afterwards implemented within a use case scenario involving a small business. Based on the results of both thesis parts, conclusions will be formulated.

The proposed extent of the thesis
30-40

Keywords

Website development, CMS, WordPress, Joomla, HTML, CSS, JavaScript.

Recommended information sources

DUCKETT, Jon .HTML and CSS: Design and Build Websites, 1st Edition. John Wiley & Sons, Inc.,2011. ISBN: 978-1-118-00818-8.

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Declaration

I declare that I have worked on my bachelor thesis titled "Approaches to website development" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 14.03.2021 _____

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Approaches to website development

Abstract

The main goal of thesis is to compare different approaches to website development using multi-criteria decision analysis based on selected criteria. The approaches, that will be considered during this work, are website creating by using WordPress, Joomla or website development by using HTML, CSS, JavaScript without any given templates.

Multi-criteria decision analysis will be the tool to select optimal solution for website development. Afterwards the optimal solution will be implemented in practice and the results will be evaluated.

Keywords: Website development, CMS, WordPress, Joomla, HTML, CSS, JavaScript, Multi-criteria decision analysis.

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1 Introduction

At the present stage of human development, the internet acts in the role of a powerful tool for finding and providing information. Statistics says that more than half of the World's population has access to the internet. With the emergence of the World Wide Web, it became possible to create websites. The Internet network without information was a completely useless invention, it needed to be filled.

In the process of development of the Internet, it was assumed that the invention would not only simplify the process of collecting and storing information, but also would help to gain access to it. Considering the current trend of using the World Wide Web, we can safely say that all the idea in practice have fully justified themselves.

We live in the age of modern information technologies when electronic media practically supplanted traditional media. The Internet instantly made it possible to shorten the vast distances between people. And today it is unacceptable not to have your own website on the Internet, because by doing this, the companies and individuals lose the attention and interest of millions of people.

Since the creation of the first site was a long time and by now there are various methods for creating web sites. All methods of website development can be roughly divided into two groups. The first group includes methods for manual creating of the websites using the HTML markup language and various programming languages. To write a static site, a combination of HTML and CSS is enough. But if you are supposed to create complex, dynamic web site, then you will need to know programming languages. The main programming languages that are most often used for website development are PHP, JavaScript, APS.NET. The second group of web site development methods is simpler to implement. Since it does not require extensive programming knowledge. The web site developer is given the opportunity to create sites through the graphical interface of special programs or CMS systems (Duckett, 2011).

The bachelor thesis will be focusing on the comparison of three different approaches to web development, selecting the optimal one and showing the implementation in the practical part of the thesis.

2 Objectives and Methodology

2.1 Objectives

The main objective of the thesis is to compare different approaches to website creation and find the optimal one based on selected criteria. Approaches that will be considered are creating website by using WordPress, Joomla or creating website by using HTML, CSS, and JavaScript without using any existing templates.

Partial objectives are the following:

1. Conduct theoretical overview of different approaches of the website development based on available literary on online sources.

2. Analyze and compare available methods for website development.

3. Select optimal solution, implement it in practice and evaluate the results.

2.2 Methodology

Bachelor thesis will consist of theoretical part and practical implementation. Available approaches to website development will be analyzed based on literature review, with focus on their advantages and disadvantages their suitability for implementation for the practical part. Optimal solution will be selected using multi-criteria analysis of variants and afterwards implemented within a use case scenario involving a small business. Based on the results of both thesis parts, conclusions will be formulated

3 Literature Review

3.1 Importance of websites

An innovative revolution has taken place that has given impetus to the rapid development of modern Internet technologies and online business. There are now billions of virtual pages.

Website - a set of web pages that are logically interrelated and it is a place where you can publish detailed information about the company, services, order conditions and performance of services, contacts, and details. The website informs your customers all year round, night, and day (www.techopedia.com, 2021).

Based on Forbes' article, the main reasons to create a website:

1. The virtual non-stop office and business card.

Just imagine that a few years ago, to find out the details of the company's work, to clarify what services it provides, you had to call or even come to the office. This could only be done during working hours. The website is a virtual office that works around the clock, seven days a week. At any time, the user can get the information he needs, for example, detailed description of goods and services, contact details, working hours, etc.

2. Business tool.

It is a real and effective business tool. It will present all the most important information that you may need: clients, partners, suppliers. Clear and understandable description will attract more customers to you. If you think over all the details on the website, provide a feedback form or give the opportunity to order goods / services online, the efficiency of your resource will increase significantly.

3. Interaction with customers.

Be sure to include a "Feedback" section. It is very useful, it will allow your client to know how effective you are at work, what are your advantages. In addition, the words spoken by other clients cause a high degree of trust among potential clients. In addition, through the website, you can conduct surveys, research, helping to understand what exactly interests your customers.

4. Facilitating the work of company employees.

Clients will be able to find answers to common questions on the site, without distracting from the work of your company employees.

5. Inexpensive advertising

The site is a constantly running advertisement that is much cheaper than, for example, renting billboards. In addition, the percentage of attracting real customers to the company from websites is much higher, because the site works with the target audience - people who are looking for information on the Internet about the company's products or services.

3.2 Approaches to website development

3.2.1 Website development using HTML, CSS, JavaScript and PHP

One of the approaches to website development is to create website manually by using HTML, CSS, and other programming languages without any content management systems (CMS) and templates (Duckett, 2011).

It will require knowledge of the hypertext markup language HTML, as well as CSS - cascading style sheets. With the help of HTML, the skeleton of the future site is built, and its appearance is adjusted through CSS (Duckett, 2011).

If you need to create a dynamic website, you will need to demonstrate your knowledge of using the PHP scripting programming language. It is also sometimes called a server-side language due to its ability to interact closely with the server. Also, if you are going to create interactive websites, it will be necessary to use JavaScript (Flanagan, 2011; Vaswani, 2009).

3.2.2 Markup language HTML

HTML was developed by British scientist Tim Berners-Lee around 1991-1992 at the European Council for Nuclear Research in Geneva. HTML was created as a language for the exchange of scientific and technical documents, suitable for use by people who are not experts in the field layout. It allows the user to create and structure sections, paragraphs, headings, links and blocks for web pages and applications (www.w3schools.in).

HTML is not a programming language; it does not have the ability to create dynamic functions. Instead, it lets you organize and format your documents in a similar way to Microsoft Word. HTML documents are files that end with the .html or .htm extension. You can view it with any web browser (like Google Chrome, Safari, or Mozilla Firefox). The browser reads the HTML file and displays its contents so that Internet users can view it (Powell, 2010).

Typically, the average website contains several different HTML pages. For example: home pages, regular pages, contact pages will have separate HTML documents. Any HTML-document starts with the basic structure. It includes a tag that is in any HTML-file. These tags and browser service information needed for correct display (Powell,2010).

The basic structure of any HTML-document:

```
<!DOCTYPE html >
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph</p>

</body>
</html>
```

Also, it is very important to decide on a set of programs that will be needed for working with HTML. It is necessary to have the browser (Internet Explorer, Opera, Mozilla Firefox, Google Chrome) and the appropriate integrated development environment (IDE) (McKinnon, 2020)

There are also a lot of options to choose from. The most popular are:

- Visual Studio Code
- RubyMine
- Komodo IDE
- Webstorm
- PhpStorm
- Eclipse
- PyCharm

3.2.3 CSS

CSS is one of the technology for web development and the abbreviation stands for Cascading Style Sheets. CSS-styles are indispensable in the design of website pages: one

file contains information about the display of all elements of the document (Duckett, 2011).

Basically, a style sheet is a file that describes how each of the elements on the page will look like. Thus, in the HTML document, only the structure of the page remains: the blocks themselves, their content and location. You can create a page and design it without using tables, writing the visual properties of each element in its description. But, if there are hundreds or thousands of pages, it is inconvenient to use this method: when you change the design, you have to change many documents, in addition, it clutters the layout up. Therefore, the use of CSS is considered as the gold standard for web site design: it happened due to the flexibility and variety of possibilities of cascading tables (Duckett, 2011).

There are advantages of using CSS based on "The book of CSS3, 2nd edition":

- CSS saves time. You can write CSS once and then use the same table across multiple HTML pages. You can define a style for each HTML element and apply it to many web pages.

- Pages load faster. If you are using CSS, you do not have to write the HTML tag attributes every time. Just write one CSS rule for a tag and apply it to all occurrences of that tag. Thus, less code means faster load times.

- Ease of maintenance. To make global changes, simply change the style and all elements on all web pages will update automatically.

- Improved styles for HTML. CSS has a much wider set of attributes than HTML, so you can make your HTML page look much better than HTML attributes.

3.2.4 PHP

PHP (Personal Hypertext Preprocessor) is one of the most common web development languages. It is used to create websites and web applications of any complexity, including the landing pages, blogs, online stores, and browser games (Hughes, Zmievski, 2001).

PHP significant difference from any code that is running on the client side, for example, JavaScript, is that PHP-scripts are executed on the server side. You can even configure your server so that HTML files are processed by the PHP processor, so clients will not even know if they are receiving a regular HTML file or the result of a script (Hughes, Zmievski, 2001).

The advantages of using this programming language based on "PHP developer's cookbook":

1. The possibility of implementing any interactive features.
2. Programming is carried out without using special software: an ordinary text editor is enough.
3. It contains a huge number of tools for working with queries, databases and files by default.
4. PHP is available for most operating systems, including Linux, many Unix modifications, Microsoft Windows, Mac OS X, RISC OS, and many more.

3.2.5 JavaScript

The JavaScript programming language was developed by the Netscape Communication Corporation in 1995. The language was originally called Mocha, but later it was renamed LiveScript. Even later, the language was renamed JavaScript, influenced by the popularity of the Java programming language. The syntax of the language was strongly influenced by languages such as Java and C. JavaScript was written primarily for client-side scripting (DeGroat, 2019).

The JavaScript programming language was invented specifically to create interactive websites. Such websites react to your actions: add a like when you click on the "heart"; load new posts to the feed when you reach the end of the page; show notifications about new message or letter. That is what JavaScript is for (DeGroat, 2019).

Today it is one of the most popular and demanded programming languages, so it will come in handy for every web developer. It makes the web pages more functional, and if for some reason JavaScript is disabled, the content or functionality of the web page may be limited or not possible at all (DeGroat, 2019).

JavaScript program is embedded directly into the source code of HTML document using the <script> tag and interpreted by the browser as the document loads (Flanagan, 2011).

JavaScript variables

Variable - a named piece of memory for data storage. You can imagine a variable as a certain area of memory, into which you can both write some information and read it from it. This location in memory is accessed by the name that you set to the variable when you created it (Flanagan, 2011).

The variables in JavaScript are declared using the var keyword. When declaring, the type of the variable is not specified. This type is assigned to a variable only when a value is assigned to it (Flanagan, 2011).

JavaScript data types

- Null: indicates an undefined value
- Boolean: represents a logical value of true or false.
- String: represents a string
- Number: represents a numeric value
- Undefined: indicates that the value is not set

JavaScript Objects

JavaScript is object-oriented programming language. JavaScript objects are sets of properties and methods. We can say that properties of objects are data associated with an object, and methods are functions for processing object data (Flanagan, 2011).

In addition to their own properties, JavaScript objects can also inherit properties from other objects known as prototypes. Object methods are typical representatives of inherited properties, and "prototype inheritance" is a key feature of the JavaScript language (Flanagan, 2011).

JavaScript objects are dynamic, and they usually allow you to add and remove properties, but they can also be used to simulate the static objects and the "structures" that are available in programming languages with static type system. They can also be used (aside from the fact that objects map strings to values) to represent sets of strings (Flanagan, 2011).

The advantages based on the article of PHPBabu The Web Experts:

1. Versatility. All popular browsers support JavaScript.
2. Interpreted language - the application code is interpreted when handling without pre-compilation is required.
3. A large community has formed around this programming language. Powerful tools are available to developers, for example: libraries and frameworks for creating applications (React, Vue); static site generators (Gatsby.js, Next.js).
4. The speed and performance. JavaScript allows partially processed web page on a user's computer without requests to the server. It saves time and reduces the load on the server.

5. Ease of learning the language. Perhaps this is a matter of habit. At first, the code may seem complicated, but you quickly get used to its syntax and logic.

3.2.6 Content management system (CMS)

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

The main point of the CMS is in the scheme of dividing the content of the site and its design. The user is given the opportunity to choose a template - a template that determines the design of the page. It remains only to fill it with information (Barker, 2016).

It should be noted that the website does not consist of a collection of pages but is generated dynamically. The added content is saved in a database, for example, MySQL, and is used when generating a page after receiving a corresponding request from the client (Barker, 2016).

The majority of CMS are flexible and can be used for the development of sites in various fields.

Based on "Web Content Management", there are three types of CMS:

- Open-source CMS. Open-source software is often available without licensing costs. Therefore, such solutions are especially attractive for companies from an economic point of view. Open-source means that the engine can be modified by anyone. Thanks to this, new add-ons and themes regularly appear in such CMS, as well as find and fix vulnerabilities faster. This is one of the main reasons why WordPress has become such a popular engine. Popular open source CMS: WordPress, OpenCart, Joomla! , Drupal, Magento, PrestaShop.
- Proprietary CMS. Closed source software usually means better security and support. If developers are dealing with problems, the vendors are more than happy to offer you support. This is convenient because it reduces development time and cost. Only official developers can make changes to the engine. This does not mean that such CMS systems are less secure or have worse functionality, but the number of themes and add-ons is usually less. Popular proprietary CMS: Tilda, SitePro, Wix, Shopify.
- Individual CMS. These are programs that are developed to order. This is the most expensive CMS option. This format is most often chosen by large companies to create websites with special functionality. If you have a one-page website or

landing page, then most likely this type of CMS will not suit you. The main advantages: there are no plugins or extensions that require maintenance; the lower probability of hacking, you and developer are the only persons who can access the source code; easier management - you can only include the elements that you need. You can think over the functionality of the site for a specific project. Development on frameworks is more difficult than on CMS and requires high qualifications from both the developers and the customer. It is necessary to select a specialist, evaluate his experience and clearly set tasks for him. The flexibility of development on frameworks opens up a lot of opportunities, but in the meantime, it brings certain difficulties.
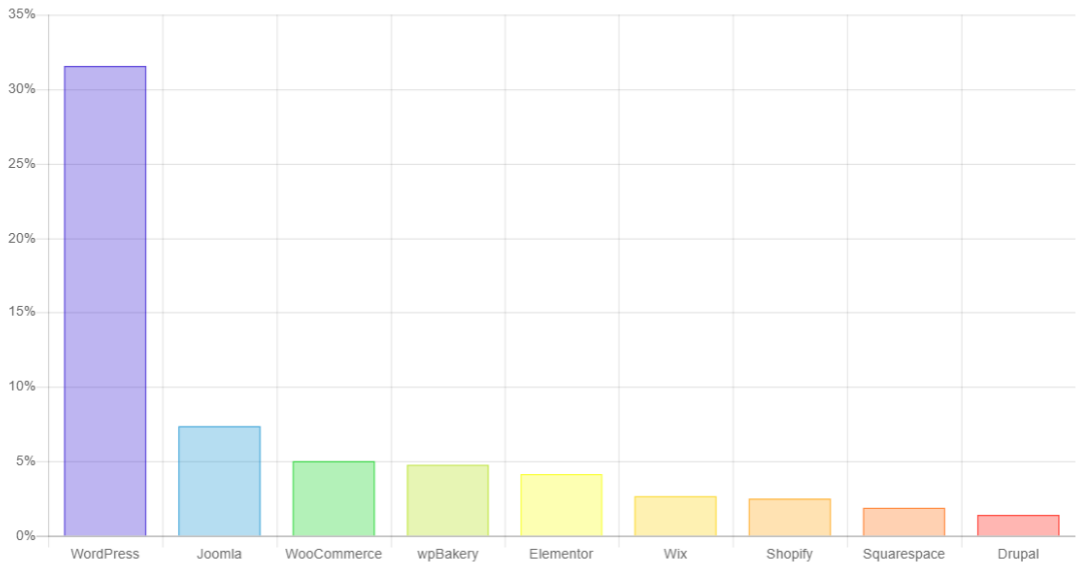
What are the advantages of CMS?

1. Access to a huge database of templates and themes.
2. Simplicity and ease of use.
3. The website can be created in a short period of time.
4. It is easy to manage the resource. This task can be performed by almost any employee with basic IT knowledge.
5. If there is some problem, the probability to find an answer in the network is very high. Every popular content management system has a community, where you can get support for many issues. The main thing to formulate the problem, and a detailed description of the individual features of a web project.
6. No special skills required to start working with (Barker, 2016).

What are the disadvantages of CMS?

1. There is no official support.
2. A content management system is a software and like any program, it contains a lot of errors (bugs). They can manifest themselves in a variety of situations, and as a result, cause a complete failure of the website or incorrect display of information. Moreover, there is such a tendency: the more complex the CMS, the more likely it is that errors will occur.
3. Increased website loading time.
4. You need to check for updates and compatibility with new versions of the amendments.
5. Not suitable for atypical tasks (Barker, 2016).

There are several websites that track CMS usage statistics around the world: W3Techs, WhatCMS, and BuiltWith. The data on each of these sites is slightly different, but on all of them, WordPress wins by a huge margin. According to various sources, from 30 % to 40 % of all sites that use CMS work on this engine. Other CMS that made it to the top 5 on different sites: Joomla!, Drupal, Wix, Shopify,Squarespace.(www.w3techs.com,www.whatcms.org, www.builtwith.com)
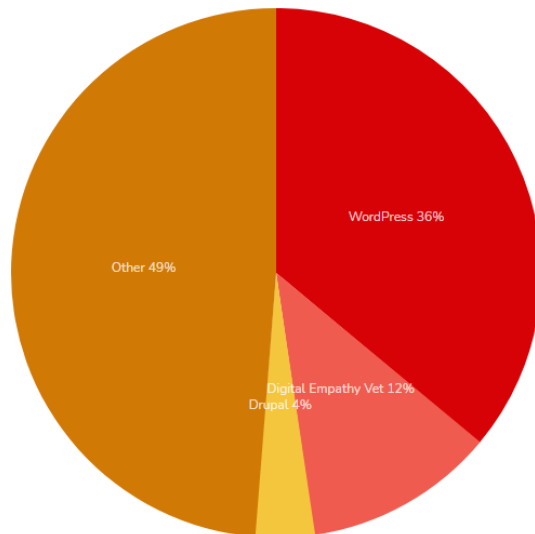
Figure 1 - CMS statistics

Source: www.whatcms.org

Figure 2 - CMS statistics

Source: www.builtwith.com

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Table 1 - CMS statistics

Content Management Systems

Most popular content management systems

© W3Techs.com	usage	change since 1 February 2021	market share	change since 1 February 2021
1. WordPress	40.5%	+0.6%	64.5%	+0.3%
2. Shopify	3.4%	+0.1%	5.4%	+0.2%
3. Joomla	2.1%	-0.1%	3.4%	-0.1%
4. Squarespace	1.6%		2.5%	
5. Wix	1.5%		2.4%	

percentages of sites

Fastest growing content management systems since 1 February 2021

© W3Techs.com	sites
1. WordPress	1,689
2. Elementor	1,227
3. WooCommerce	632

daily number of additional sites in the top 10 million

Source: www.w3techs.com

3.2.7 WordPress

WordPress is one of the most popular CMS in the world. This is due to the rather large capabilities provided by this content management system. WordPress allows you to create both blogs and websites of varying complexity, however, this CMS is known more as an "engine" for blogs, in which it is the undisputed leader (Williams, Damstra, Stern, 2015).

WordPress is the best option for creating both a simple informative website and a high-quality blog. The undoubted advantage of this CMS is a huge variety of modules and templates that can be used additionally, making the resource even more convenient and attractive for its visitors. In addition, you can make some changes to the website design yourself (Williams, Damstra, Stern, 2015).

It uses PHP and MySQL; they are supported by almost all hosting providers. However, special tariff plans for hosting WordPress can greatly improve the speed of performance, productivity, and reliability of the website (Williams, Damstra, Stern, 2015).

Since the WordPress platform is open-source, it allows you to modify the source code. If the changes are successful, they can be proposed to the community for inclusion in the next official release of this system. But only five main developers can add new code to the core

of the platform for these releases. Furthermore, additional functionality can be implemented by extension or plugins (Williams, Damstra, Stern, 2015).

When you are looking for WordPress in Google or other search engines, you can find two web sites: WordPress.com and WordPress.org. This can be confusing since both sites have their own purpose and user base (Miller, 2015).

WordPress.com

WordPress.com is a hosting company that uses the WordPress content management system for all blogs they host. Users who signed up for this service get their own blog with a domain. Own domains are also supported, but on a paid basis. WordPress.com resource is owned and maintained by Automattic, which also oversees the WordPress.org website and provides its developments. This company provides the infrastructure to support WordPress cms and offers jobs to many web developers of this system (Miller, 2015;Williams, Damstra, Stern, 2015)

WordPress.org

WordPress.org contains the latest versions of the CMS, plugins, themes and templates. WordPress.org – is what you need if you decide to run a self-hosted site. Here you can download the platform and find a large number of plugins and themes. To host your website you need to register a domain and hosting (Miller, 2015; Williams, Damstra, Stern, 2015).

Domain and hosting for the website

At the beginning of creating a website based on WordPress, you need to register a domain name and find a web hosting that will host this resource. When choosing a domain, consider the following:

- The domain should be easy to remember
- Have a simple spelling
- Express the idea of the website to which it is linked
- Contain keywords that are understandable to search engines

After choosing a domain name and registering it, you need to choose a hosting provider. When choosing a hosting provider, you need to find the best option between cost and functionality. There are many hosters that offer their services for hosting websites on their servers. Most hosters provide their clients with the possibility of registering domains, managing your website through the web interface (Williams, Damstra, Stern, 2015).
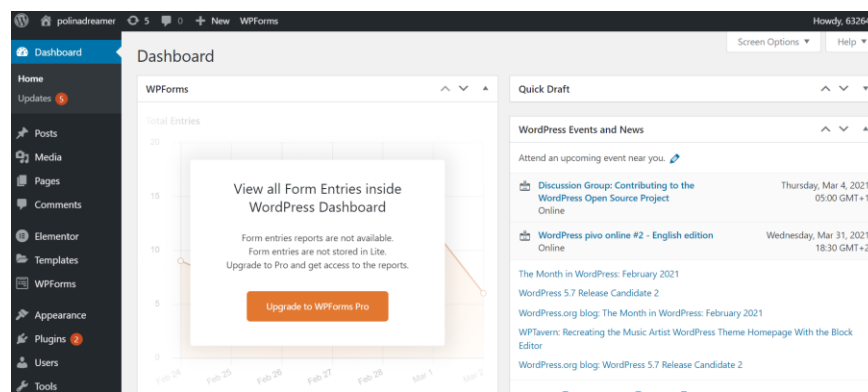
WordPress interface

The WordPress platform interface is intuitive and easy to use. The first element is the management console menu (Dashboard). The console provides quick and concise information about what is happening with the website. It displays information such as the number of comments that are awaiting moderation, the availability of plugin and cms updates, as well as news related to WordPress (Williams, Damstra, Stern, 2015).

The following paragraphes will describe what the individual items in the left menu, which are shown in the following figure, mean and what they represent. Regarding the language versions, the user can select at the beginning of the installation, but it can also be changed later (Williams, Damstra, Stern, 2015).

Below is a content block that contains the main site management tools.

Figure 3 - WordPress Dashboard

Source: own processing

Posts

Posts represent blog content in reverse chronological order (most recent content above). The user will see the published posts on the page of their blog, the most common
the form of the contribution is therefore an article. Because WordPress posts are published with respect to time and date, they are published through RSS feeds. This allows readers receive notifications of the latest post updates. Bloggers can use RSS feeds to deliver emails through services (Williams, Damstra, Stern, 2015)

Media

The user can upload a number of documents to the media, whether it is photos and videos used across his entire website, a logo appearing in the header of the website, or a pdf file with business conditions (Williams, Damstra, Stern, 2015)

Pages

We can imagine the homepage below that, contact page, privacy policy, service page, etc. The WordPress database stores the date the page was published, similar to a post, but this does not affect its display on the web (Williams, Damstra, Stern, 2015)

Comments

Using the comments users can comment on individual contributions and engage in such discussions. In the blog, this functionality is crucial, as well as in some forum. Since WordPress database system, it is important to protect and comments belong to the possibilities, thanks to which, for example, spammers can attack created a blog, but also to his readers. All comments posted on the site can be managed from here (Williams, Damstra, Stern, 2015)

Appearance

This section is used to customize the appearance page of our website using a template. What a template is is explained in the following chapter. However, this section also creates and updates web menus, used widgets and is the only place where the user can reach into the back-end part of the web (Williams, Damstra, Stern, 2015)

Plugins

The plugins section is used to upload or install a new plugin. Basically, it is a possibility to extend the functionality of WordPress beyond its original framework. You can extend the functionality of a website based on the WordPress platform by connecting additional modules called plugins. These modules are distributed like themes under a free license or on a paid basis. Downloading the necessary plugins is possible from the main resource wordpress.org. (Williams, Damstra, Stern, 2015)

Users

In this section, you can manage the profiles of users who have access to the website. These can be administrators, editors to SEO editors or visitors. Of course, everyone has a different approach to the web, for security reasons (Williams, Damstra, Stern, 2015)

Tools

In this section, you can monitor the technical condition of the site, but also export and import the data into posts, pages, media etc (Williams, Damstra, Stern, 2015)

Settings

In the settings you can manage general data about the site, from privacy and URLs, to permanent links. Usually this section is visited by the user for checking after the initial

installation of WordPress, or if he wants to change a fundamental thing make the friendlier administration of the selected template (Williams, Damstra, Stern, 2015)
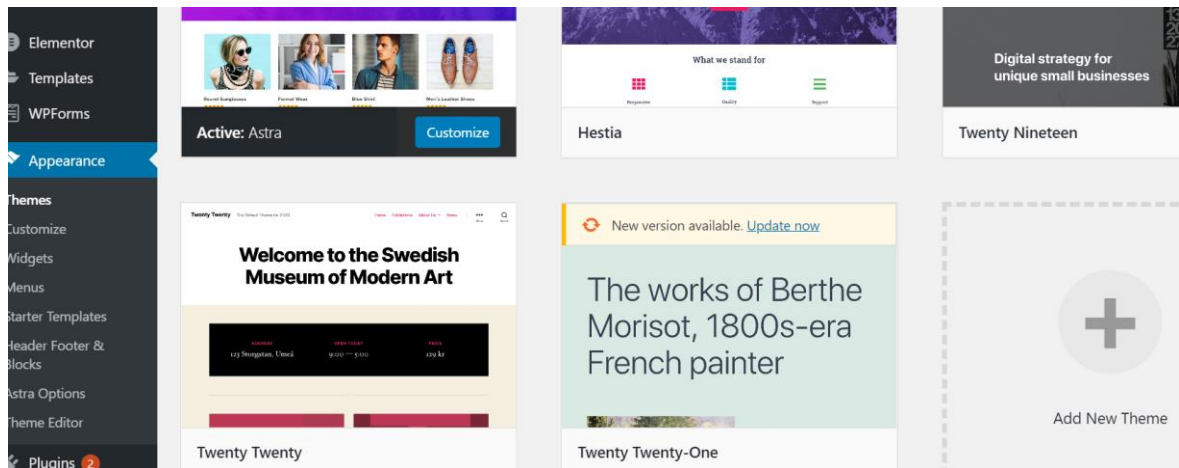
WordPress Themes

WordPress uses a variety of themes to change the appearance of a website. Each theme is located in a separate folder with the name of the theme. Two files are needed for theme to exist: index.php and style.css. Typically, themes contain many more different files that perform specialized functions (Williams, Damstra, Stern, 2015)

Most of the themes for the WordPress platform are free, although there are paid alternatives. Free download themes can be downloaded from wordpress.org.

There are two ways to install the selected theme. The first is to copy the theme files to the themes folder of the WordPress platform, and then activate it through the admin panel. The second way is to use the administration system to install and select a theme directly, without resorting to third-party software (Williams, Damstra, Stern, 2015)

WordPress automatically has three installed themes, which can be used: Twenty Nineteen, Twenty Twenty and Twenty Twenty-One.

Figure 4 - WordPress Appearance

Source: own processing

Most popular themes for creating a website:

- Divi
- Neve
- Ocean WP
- Astra (Gennario, 2020)

Elementor Page Builder

Elementor replaces the basic WordPress editor with a live front-end editor, so the user can visually create complex layouts and live design and edit their web pages without having to switch between the editor and the preview mode that works in the basic

editor from WordPress.

Layout is done by using ready-made elements that you select by simple drag-and-drop and set the necessary settings through a convenient admin panel.
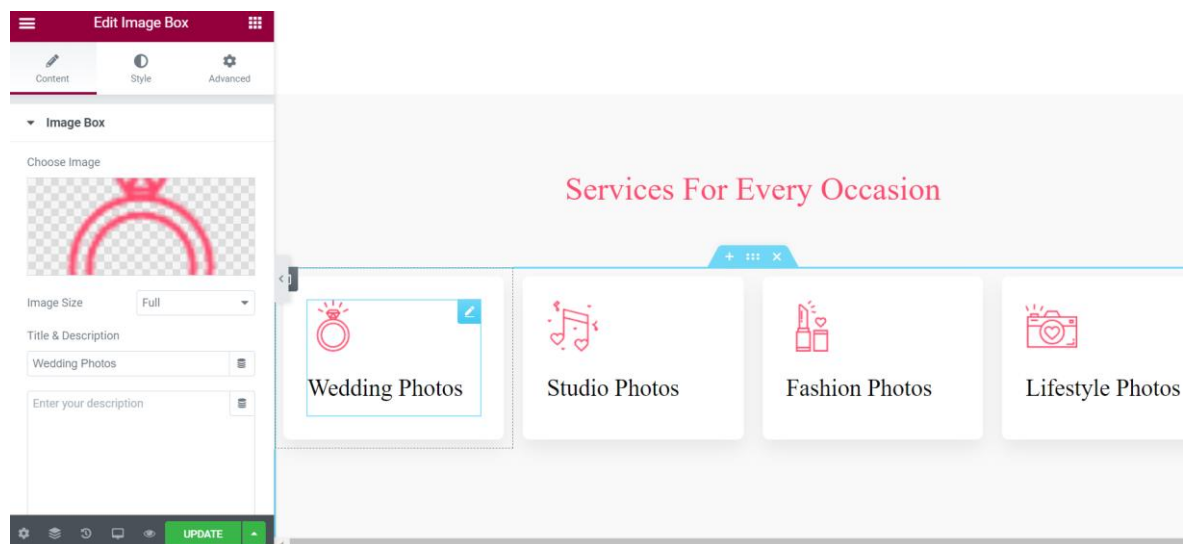
No code or programming required. Thanks to such constructors, life has become much easier for people who wants to make layout of landing pages and pages by themselves.

The plugin has two versions, free and paid, called Elementor Pro. Which one to use, everyone decides for himself, it depends on what kind of functionality you need (Price, 2021)

Features

Live editing. On the left you can see the block with the settings ad on the right your site. All settings are applied immediately and you see the final result. (Williams, Damstra, Stern, 2015).

Figure 5 - WordPress Edit Image Box

Source: own processing

Section

The section is the area where you add the elements. Each section consists of columns, you can choose from 1 to 6 columns. Sections are needed to set the position of the elements. For example, place the content in two columns, the left is a picture, and the right headline, text and buttons (Williams, Damstra, Stern, 2015).

Settings for elements, sections, columns (Content, Style, Advanced)

Each element, section or column has additional settings, which are divided into three tabs:

Content - here you add content, text, images, links to buttons, etc.

Style - here you can set the settings for typography, colors, shadows, etc.

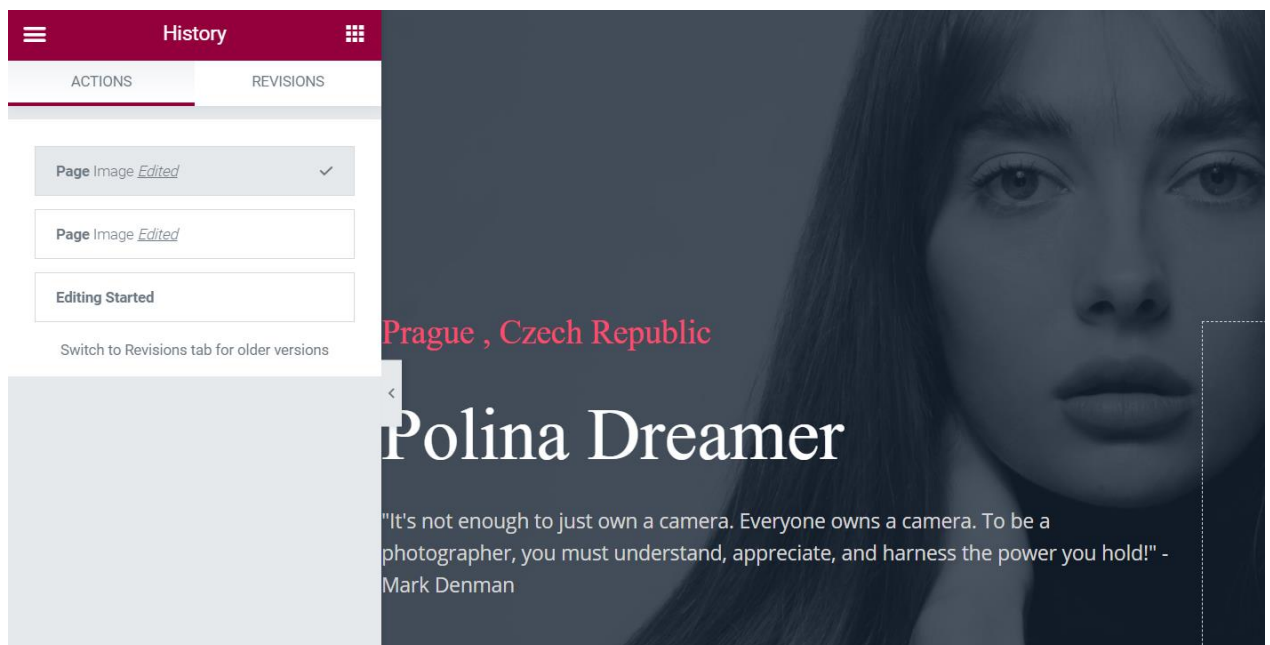Advanced - here you can set margins, motion effects, etc.

Setting adaptability to different devices (computer, tablet, phone), you can customize the display of your landing separately on any device. Switch between devices and make settings right in the editor (Williams, Damstra, Stern, 2015).

Today it is very important that your website works properly and quickly on all devices, especially on mobile.

 History change

The plugin is the story changes if you want to go back a few steps back, then choose the desired stage. The functionality is similar to the story in Photoshop (Williams, Damstra, Stern, 2015).

Figure 6 - WordPress History

Source: own processing

3.2.8   Joomla

Joomla is an open-source content management system written in the PHP programming language with JavaScript elements. This is a kind of skeleton, a framework on which all sorts of different plugins, modules, extensions, and components are already hung. Today

there are many website builders (CMS), for example, the same, or DLE, but today we will consider the most popular system after WordPress (Tiggeler, 2013)

No programming skills are required to run a Joomla website. At the same time, the engine offers tools with which you can implement a project of any type. Adaptation for solving different tasks is done through themes and extensions, most of which can be downloaded for free (Tiggeler, 2013; Severdia, Gress, 2014)

Features of CMS:

1. Built-in debug mode for quick troubleshooting.
2. Engine bug reports.
3. A general mail system that allows you to start private dialogues with registered users.
4. Built-in caching system to speed up page loading (Tiggeler, 2013; Severdia, Gress, 2014)

Main features of the admin panel on CMS Joomla:

1. Creation of an unlimited number of pages.
2. Optimization of pages for the requirements of search engines.
3. Delayed publication of records.
4. Setting up a template with deep customization of the appearance of the site.
5. Convenient addition of modules to extend the functionality of the engine.
6. A visual editor designed to add new materials to the website.
7. A content manager that allows you to manage publications and drafts, as well as monitor user reactions to materials, provided that additional modules are installed.
8. Powerful search with built-in filtering tools.
9. Blocks for working with banners, adding a feedback form, related products, and accessories (Tiggeler, 2013; Severdia, Gress, 2014).

Joomla's website management does not require any special skills. To learn how to add content, you just need to see how it is done once. Therefore, the system is chosen by many web developers who needs to create a high-quality website quickly and without serious effort. Professional web developers pay attention to the engine code and are not always satisfied with the ways of modernization it offers (Severdia, Gress, 2014).

Another Joomla's problem is that site security suffers from the ability to install third-party extensions uncontrollably. However, this is a feature of all free open-source CMS: the

entry threshold is low, users often lack the experience to separate high-quality modules from solutions with vulnerabilities. To avoid security problems, you should install only verified modules. But it has more to do with user experience than with the characteristics of the CMS itself (Severdia, Gress, 2014).

3.3 Multi-criteria decision analysis

The main purpose of multi-criteria decision analysis is to use ranking criteria for an objective and transparent assessment of various decision options. Ultimately, you need to identify and prioritize the available solution options. The analysis involves the development of a matrix of options and criteria that should be ranked and combined to provide an overall assessment of each solution option (Ishizaka, Nemery, 2013). MCDA is a sub-discipline of operations research, that explicitly evaluates multiple conflicting criteria in decision-making (both in everyday life and in settings such as business, government, and medicine). Conflicting criteria are common when evaluating options: cost or price is usually one of the main criteria, and some quality measures are usually another criterion that easily conflicts with cost. When buying a car, cost, comfort, safety, and fuel economy may be some of the main criteria we consider - it is unusual that the cheapest car is the most comfortable and safest. We are interested in making high profits, but at the same time reducing our risks, but stocks that have the potential to generate high returns, as a rule, also carry high risks of losing money (Ishizaka, Nemery, 2013; Belton, Stewart, 2002).

3.3.1 Basic definitions of multi-criteria decision analysis

The alternative is the object to be analyzed.
Weightage coefficient is a numerical indicator reflecting the relative importance of a criteria, its significance in the decision-making process, revealed in a survey of experts (Ishizaka, Nemery, 2013; Belton, Stewart, 2002).

3.3.2 Procedure of MCDA

This procedure has a wide application in practice. Multi-criteria decision-making analysis recommend especially in the case of evaluation of similar (not mutually exclusive) projects or projects with the same focus or from the same area of the public sector, where it is relatively easy to find and set evaluation criteria.

Also, it is worth mentioning, that obvious assumption is that there are at least two alternatives to be compared while making multi-criteria decision analysis (Ishizaka, Nemery, 2013; Belton, Stewart, 2002).

Step by step procedure of multi-criteria decision analysis:

- define the criteria for evaluation of the selected alternatives
- determination of model evaluation values and point scales (including a verbal description of the meaning of individual evaluation levels)
- determination of the weightages of evaluation criteria
- defining the order of alternatives and selecting the optimal one for our case (Figueira, Greco, Ehrogott, 2015)

3.3.3 Selection of a set of criteria

Selection criteria set depends on the application analysis. There are also several general requirements that must be met to form a correct analysis methodology. Let us consider these requirements.

1. Criteria should be independent: the relative importance of the evaluation of each of them should not be correlated with the estimates of the relative importance (weightage coefficients) other criteria.

2. It must be ensured that there is no double counting: you cannot include more than one criterion describing one of the sides of the problem.

3. Ensuring the functionality criteria: all included criteria should be measurable and clearly defined (Figueira, Greco, Ehrogott, 2016; Ishizaka, Nemery, 2013).

3.3.4 Classification criteria

There are two types of criteria: qualitative and quantitative. For each of the criteria, it is assumed that there is a spectrum of values - the so-called scale of values of the criterion, which qualitatively or quantitatively describes the criterion from the point of view of all existing variants of its manifestation and has a numerical expression.

- quantitative, it is objectively measurable (determinable) data – for example, comparison of the number of available themes or plugins
- qualitative, which cannot be measured objectively (values can only be expressed verbally) and it is necessary to create point scales according to evaluation – for

example, if we are dealing with such criterion as required skills, there is no possibility to measure it objectively.

According to their nature, we divide the criteria into:

- beneficial - the highest rating corresponding to the highest value. In case, we consider such criteria as the number of available templates for website development, it will be beneficial criterion, logically, the more templates are available, the higher will be value of the alternative.

- non-beneficial - the best ratings have the lowest values. For example, we can choose as criterion the time, that will be spent for website development.

3.3.5 Advantages of MCDA

- The method allows one to rationally investigate the problem of finding an optimal solution.

- The method allows you to reach a compromise in a situation where the parties involved have different goals and, therefore, criteria.

- The method provides a simple framework for effective decision making and presentation of assumptions and conclusions (Figueira, Greco, Ehrogott, 2016; Ishizaka, Nemery, 2013).

3.3.6 Disadvantages of MCDA

- The method is subject to the influence of a biased and incomplete choice of criteria for making a decision.

- The majority of multi-criteria problems are not final or single solution.

- Calculation algorithms that determine the weights of criteria from established preferences or combine different opinions can hide the ideological basis of decision-making (Figueira, Greco, Ehrogott, 2016; Ishizaka, Nemery, 2013).

4 Practical Part

4.1 Multi-criteria decision analysis

Multi-criteria decision analysis was selected to evaluate and compare approaches to website development. As a result, it is a combination of relatively subjective criteria (focused on the content and quality of tools perceived from the "customer" or "client" point of view) and objectively measurable selected tool properties. All criteria were given different weightages accordingly to the importance of the criterion. For comparing the suitability of the approaches, the relevant evaluation criteria were selected.

In assessing the approaches, the assessor joined the evaluated tool and in the case of evaluating subjective criteria he acted as a so-called "mystery client", which is a kind of fictitious the client obtaining information and measuring the level of the given area according to the (point) scale set in the evaluation form. It is an analogy of a qualitative method of market research, which obtains information and measures the quality of services of its own or competing companies. It is called Mystery shopping, with the help of a fictitious customer who is in fact a secret researcher.

For comparison approaches were selected 6 indicators. There are required skills, popular blogging solutions, number of templates, selection of plugins, security, and size of support community. Chosen criteria can be divided into subjective and objective and all of them have different units.

Here are represented the criteria for the alternatives:

1. **Required skill**. The chosen criterion evaluates how easy and suitable the tool is for beginners. Because, for example, to use JavaScript, you need to have programming knowledge. The highest number of points is the tool that requires the least knowledge in programming.

2. **Popular blogging solutions**. This criterion shows which tool is most focused on blogging websites. Because the goal is to create a blog for the photograph, it is important to consider the suitability. The highest number of points shows which tool is most focused on blogging websites.

3. **Number of templates**. The chosen criterion shows how many templates the tool has. From the customer's point of view, it is necessary to have the highest possible number of templates. This is the highest probability that the user will

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create a website according to their ideas. The highest number of points indicates which tool has the highest number of templates.

4. **Security**. This criterion evaluates how high the level of the safety base of the tool is. The tool that has the highest level of safety has the highest number of points.

5. **Size of support community**. This criterion shows how big the support community is. The greater the support community, the more likely it is to solve problems. The highest number of points shows how big the support community is.

So, as it is shown in the table below, there are three chosen alternatives: WordPress, Joomla, and JavaScript and all the criteria are beneficial. There are certain issues while selecting the optimal alternative for website development, because not all the criteria have the same units as required skills and number of templates can not be represented in numbers the same way because of the usage of linguistic terms. To get all the criteria into one table with the same comparable units, there is possibility to convert the words into the numbers by using a conversion scale.

For example, the first criterion – required skills – were assigned points from 1-3, which mean 1- advanced, 2 – intermediate, 3 – novice. As it is written in the left column, the criterion is beneficial, and this is the reason why the approach (JavaScript) which requires more experience and highest level of knowledges will get the lowest point.

1. Required skills

To create website using WordPress, it will take you not so much time to learn how it works even though you do not have previous experience with it. You do not have to learn such programming languages as PHP or JavaScript. That is why I assigned 3 points to WordPress, the highest number is for the approach which requires the least knowledges in programming and not require so much time to start creating website by your own.

Joomla also does not require knowledges of programming languages, but if we compare WordPress and Joomla, Joomla is a great option for users with web development experience. It offers a basic version a lot more features than WordPress, but it also means that you will be harder to master it. It is also worth noting that Joomla! great for building social platforms and multilingual sites thanks to its built-in features. If we consider that you do not have previous experience, it will take much more time to start working with, because of the difficulties while using admin dashboard for the first time. That is the reason why I assigned 2 points.

And the third approach is creating website using programming languages without any templates. For creating website using JavaScript, you are supposed to have solid knowledges of programming languages. There is no way to start working on website if you are not good at programming. In case, if you are going to learn HTML, CSS, JavaScript and PHP, it will take you much more time than if you are going to start working with CMS. There for, JavaScript gets 1 point, because it is the most difficult way to create the website from chosen alternatives.

2. Popular blogging solutions

It is worth mentioning that WordPress was originally created for blogs. It offers a basic set for the publication of posts. By default, the main page displays a list of recent publications. There is a powerful visual editor for adding text, photos, videos, buttons, and other interactive elements. The highest points go to the most suitable blogging solution and I assigned 3 points to this alternative. Joomla was originally an engine for creating corporate and informative websites, while WordPress is way ahead of its competitors in terms of blogging. In its basic configuration, it offers an advanced system for managing users and their rights. In Joomla, you can flexibly manage the display of blocks and menus, create different nesting of the site structure: categories, subcategories, materials. It also suitable for blogs, but in comparing with WordPress it will get less points – 2. While we are dealing with the alternative of creating website using HTML, CSS, JavaScript for blog website, even though there is possibility to create all kinds of website using HTML, CSS, JavaScript, PHP, but it is not so popular approach for it.

3. Templates/Themes

This criterion is also beneficial, and the highest number of points will be assigned to the alternative, which has the highest number of templates/themes. As for the JavaScript, logically JavaScript has no templates/themes, so you will need to create website manually without any given templates. That is why I assigned 0 points to JavaScript.

As for WordPress, there are many kinds of the themes, which are available for download. More than 30000 themes exist in WordPress and I assigned the max points 3 to this alternative. As for Joomla, there are more than 6000 templates for creating a website, which is less than WordPress has, that is why I assigned 2 points for Joomla. (2020, Sceptermarketing.com)

4. Security

Most hacking websites is not intended to steal your data or disrupt website. It is used to use your server to send spam or to temporarily use a web server to store files, illegal content. According to the WordPress popularity, there are huge number of websites which were created using this CMS and logically, if the number of websites are huge, the more WordPress websites are being the target of hackers. Also, considering that WordPress has more than 50000 plugins and different extensions, there is no possibility to be sure that all of them are totally secure. In order to secure the safety of website, you can use SSL certificate which initiate secure session with browsers. SSL certificate needs to be purchased from the third-party vendors before you are going to start the installation process. Situation with Joomla is similar, there are also a huge number of plugins and extensions which can cause bad consequences. Joomla has their own "Joomla Force SSL", which allows you to activate SSL certificate without any additional extension installation. The human factor plays an important role in website development using HTML, CSS, JavaScript, because everything depends on developer's competence and especially security of the created website. There are much more difficulties that inexperienced developer can deal with during the process or after the website is out. For example, if there are mistakes in code in access control, which identifies problems associated with unauthorized user access to information and functions, depending on the granted role, the website will be vulnerable. WordPress and Joomla as CMS have benefits in that case. I assigned 3 points to WordPress and Joomla, and 1 point to JavaScript.

5. Support and community

If you are having problems with your WordPress site, it is easy to connect with the multi-million community of developers and users who are already using and developing the system. Help can be found in official WordPress docs, reference guides, blogs, and any site building and web design forum. If there is something you do not know or you have any problems, you can quickly find a solution. Joomla also provides a great help portal for answering technical questions. For more online help, you can join a large community of users on the forums, sign up for newsletters and chat rooms. Paid expert support on Joomla is more expensive compared to WordPress.

JavaScript has also a large community and support, where you can find solutions of your problems. Considering that all the information for all the alternatives are available for

users, I assigned the points following way: WordPress and JavaScript get the max points – 3 and Joomla got 2 points, because paid expert support is more expensive.

Table 2 - Decision matrix analysis

		WordPress	Joomla	JS		
Beneficial	Required skills	3	2	1	x max	3
Beneficial	Popular blogging solutions	3	2	1	x max	3
Beneficial	Templates/Themes	3	3	0	x max	3
Beneficial	Security	3	3	1	x max	3
Beneficial	Support and Community	3	2	3	x max	3

Source: own processing

In order to make all criteria comparable , it is nessecary to do normalization. In beneficial criteria all the perfomance values in each cells are supposed to be divided by the maximum value X max. Table below represents the normalised decision matrix.

Table 3 - Maximized decision matrix analysis

		WordPress	Joomla	JS		
Beneficial	Required skills	1	0,66667	0,33333	x max	3
Beneficial	Popular blogging solutions	1	0,66667	0,33333	x max	3
Beneficial	Templates/Themes	1	1	0	x max	3
Beneficial	Security	1	1	0,33333	x max	3
Beneficial	Support and Community	1	0,66667	1	x max	3

Source: own processing

Next step is to assign the weightages to the criteria based on the importance level of each criteria. In this case, I assigned the same weightages to all the criteria – 20 %, because all of them are on the same level of importance. The website which will be created after the determining the optimal approach is supposed to be the website for the photographer and it is very important to make a research and get to know which one from the alternatives is most widely used to create this type of website. Once the weightages are assigned, performance values in each cell should be multiplied by the assigned weightage in the rows. The outputs are represented in the following weighted normalized decision matrix table.

Table 4 - Weighted normalised decision matrix

Weightage			WordPress	Joomla	JS		
20%	Beneficial	Required skills	0,2	0,13333	0,06667	x max	3
20%	Beneficial	Popular blogging solutions	0,2	0,13333	0,06667	x max	3
20%	Beneficial	Templates/Themes	0,2	0,2	0	x max	3
20%	Beneficial	Security	0,2	0,2	0,06667	x max	3
20%	Beneficial	Support and Community	0,2	0,13333	0,2	x max	3

Source: own processing

Table 5 - Performance score of decision matrix

Weightage			WordPress	Joomla	JS		
20%	Beneficial	Required skills	0,2	0,13333	0,06667	x max	3
20%	Beneficial	Popular blogging solutions	0,2	0,13333	0,06667	x max	3
20%	Beneficial	Templates/Themes	0,2	0,2	0	x max	3
20%	Beneficial	Security	0,2	0,2	0,06667	x max	3
20%	Beneficial	Support and Community	0,2	0,13333	0,2	x max	3
		Performance score	1,000	0,800	0,400		

Source: own processing

And the last step is to add all weighted normalized performance value of each alternative to get a performance score.

As a result of multi-criteria decision analysis the best optimal solution for approaches to website development is the first alternative – WordPress.
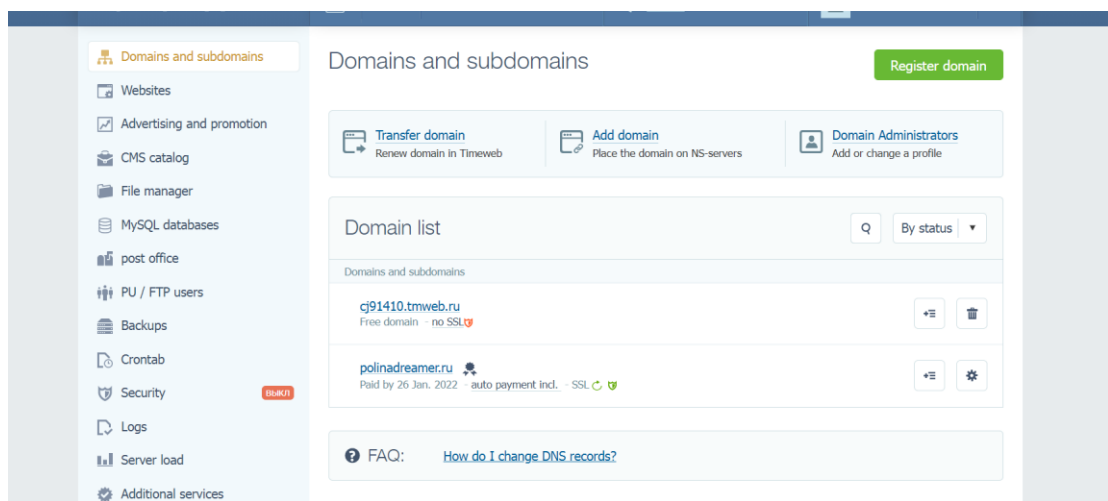
So, that is why the website will be created with WordPress.
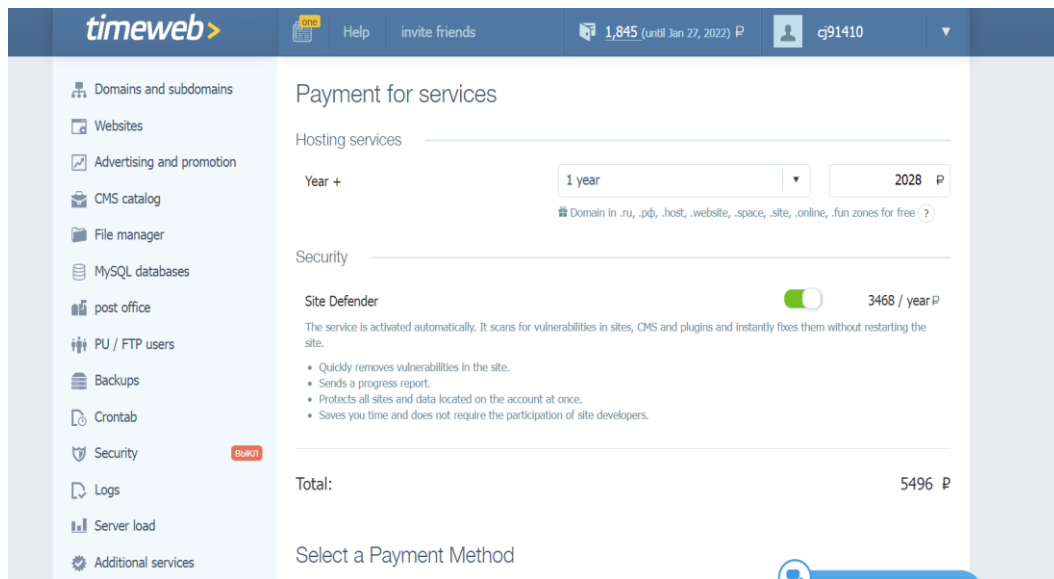
4.2 Website development

Domain name and hosting

The first thing that is necessary for the website existence is a domain name and web hosting. For this purpose, will be used https://hosting.timeweb.ru/. When choosing a domain, you need to choose a simple and concise domain from which visitors will know which pages they have just reached. The domain name "polinadreamer.ru" was selected and approved for the website and web hosting was bought for one year.

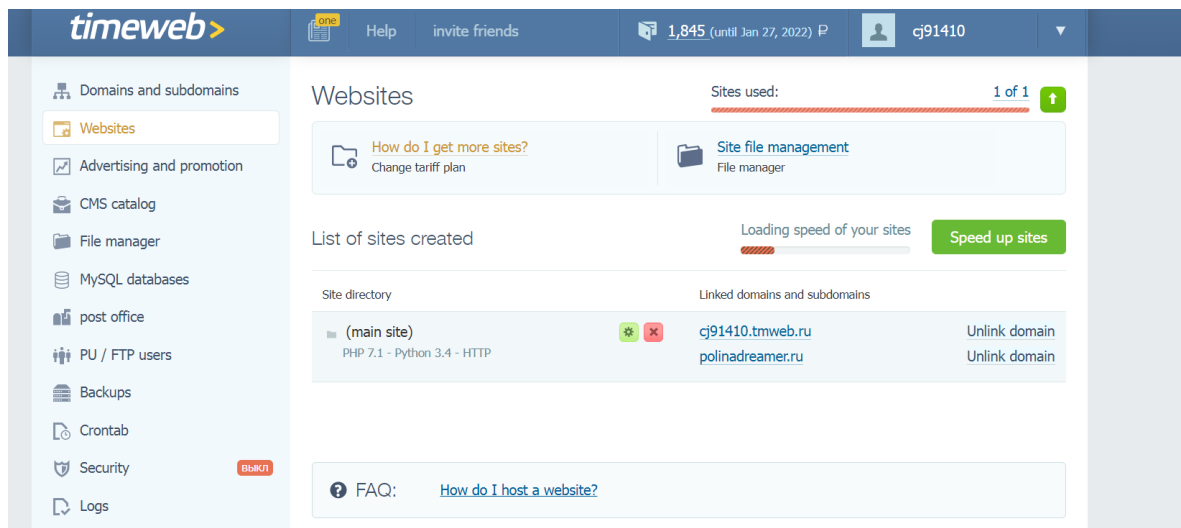**Figure 7 - Timeweb Domain list**

Source : own processing

Figure 8 - Timeweb Payment for services

Source: own processing

Next step is to go to WordPress official webpages https://wordpress.org/ and download the last version of the Wordpress 5.6.2. Once the installation procedure is done , there is possibility to start working on the website itself.
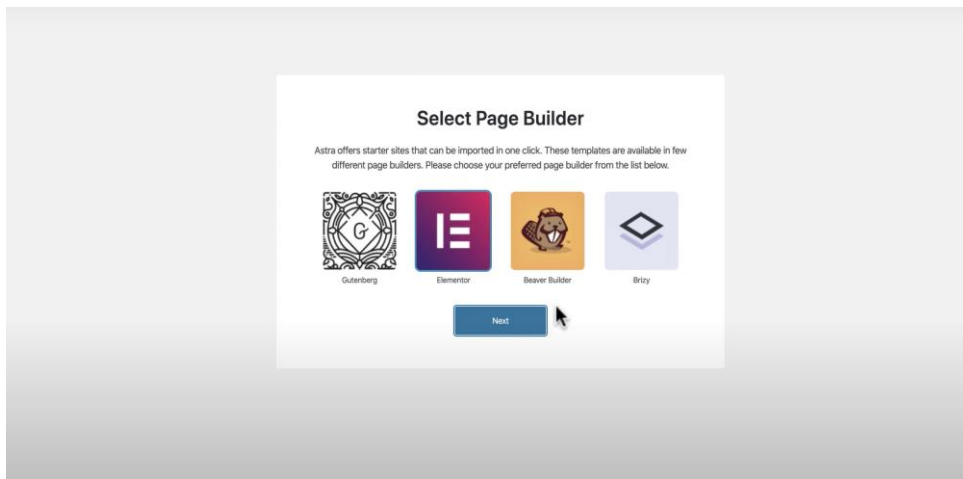
Figure 9 - Timeweb Websites

Source: own processing

By using the link from the "Websites" , you will be moved to the main page blog's WordPress dashboard. In short, it is the administration panel of the website from which the user can watch the activity on the website, create new posts and pages, upload photos to your media library and so on.

There are huge number of free and paid themes for creating a blog, but in order to save money, a free theme will be chosen. It is better to immediately approach this issue thoroughly, so as not to change half of the site not waste precious time. Based on the previous experiences, Astra was chosen for the work. To install the theme, it is necessary to install astra.zip from the https://wpastra.com/pricing/ and go to the "Appearance" section, and then select the "Themes", click on "Add new " and "Upload theme" astra.zip. Once the theme has been installed, click on the button "Activate".

The theme was activated and now what is need to be done is go to "Appearance" section and click on "Astra Option ". Astra offers a free library of Starter Templates, but firstly, click on the link "Install plugin" and select Elementor Page Builder.

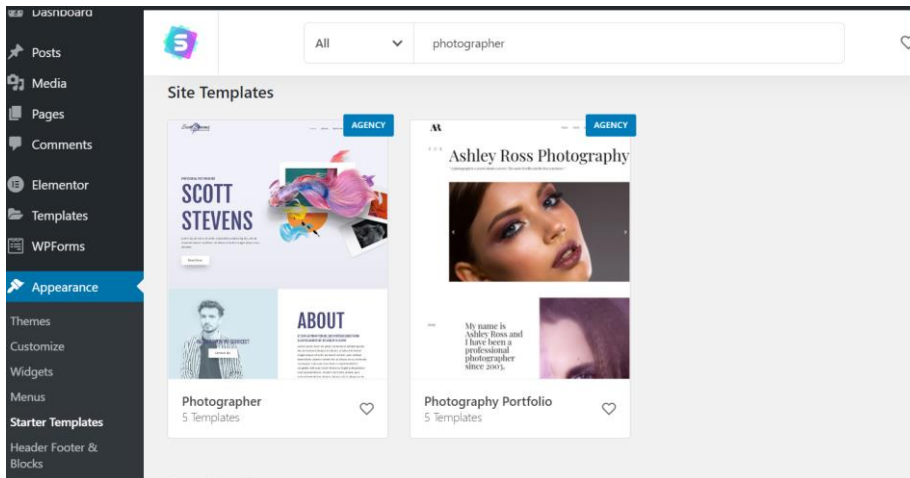**Figure 10 - Select page builder WordPress**

Source: own processing

There are plenty of different templates for the website , it is important to choose template , which will meet the requirements. So, there are two options : the first one is to choose paid template and the second is to look for free template, which can be changed later on .
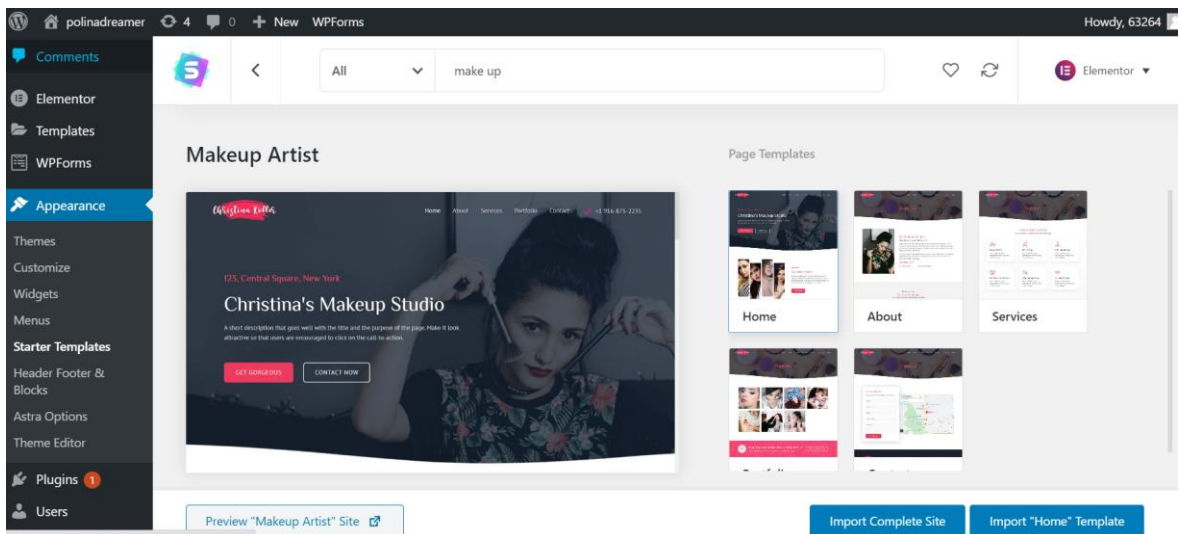Here, you can see two paid templates for the photographer .

Figure 11 - Appearance WordPress

Source: own processing

And also there is one template for Makeup Artist , which is very easy to change and the advantage is that it is free. The last step before starting work with the template is to click on "Import Complete Site".

Figure 12 - Appearance WordPress

Source: own processing

Now, it is possible to edit to fill the home page up. It can be edited with Elementor through Edit Image Box.
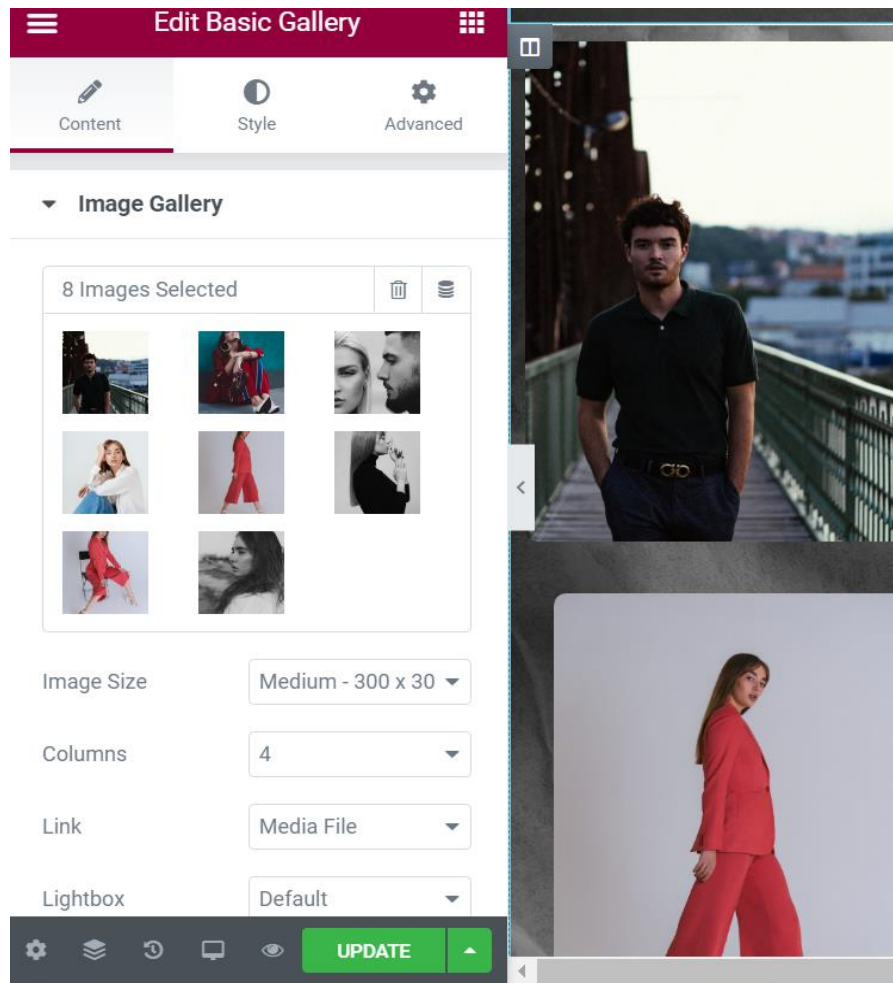
Figure 13 - Edit Image Box

Source: own processing

Also, it is very important to fill up the portfolio. To upload the images, I opened the portfolio section in the elementor, went to "Content" and clicked to "Image gallery" to insert media to the library. Once images are chosen, click to "Insert media" and "Update".

Figure 14 - Elementor Edit Basic Gallery

Source: own processing

5 Results and Discussion

Based on the literature review and gained knowledges during the theoretical part in the thesis, the goals were achieved. By using multi-criteria decision analysis, the optimal approach to website development was determined and implemented in practice. WordPress was the optimal solution to create website. It worth mentioning that WordPress is open-friendly for beginners. The installation process was very easy, and it does not take so much to start working on the website itself. WordPress dashboard is also easy to manage even though you do not have previous experience. The advantage is that there is a huge amount available information to solve the problems or if you do not know how to do something during the process.

The only thing that could be done another way is that I chose the free version of theme and the theme was not meant for the photographer and I had to change the content of the pages. Next time, I would go for paid themes, because there are much more suitable themes for photographers and there will be no need to change so much the content and it will safe your time.

5 criteria were chosen to define the optimal solution, but I was thinking about adding more criteria, for example, number of plugins / extensions. Unfortunately, I could not find exact number of plugins for the third approach (HTML, CSS, JavaScript).

Also, in my opinion, multi-criteria decision analysis could be more accurate in case, if all the alternatives were CMSs, so it would be more objective and comparable to each other. But the objective was to compare the manual coding without templates using markup languages and programming languages with content management systems.

6 Conclusion

The main objective of the thesis was to compare different approaches to website creation and find the optimal one based on selected criteria. Approaches that were considered to website development: creating website by using WordPress, Joomla or creating website by using HTML, CSS, and JavaScript without using any existing templates.

Theoretical part describes all the chosen approaches to website development and provides with all necessary information according to this topic. Also, multi-criteria decision analysis was considered in the first part of the thesis, so it can be used in the practical part while finding the optimal solution. Available approaches to website development were analyzed based on literature review.

In the practical part, the optimal solution was chosen based on the selected criteria. And goal was achieved by using multi-criteria decision analysis. The best approach for this case is to create website with WordPress. According to the results of the multi-criteria decision analysis, the website was created with WordPress and implementation was partially described in this part of the thesis.

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