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The Popularity Analysis of Web Frameworks and Libraries Among the Largest Companies Listed on the NYSE, NASDAQ, and GPW: A Study of websites of the 50 largest companies from the USA and Poland*

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Abstract

The aim of this article is to analyze the popularity of selected tools used for website development among the largest companies listed on the NYSE, NASDAQ, and Warsaw Stock Exchange (GPW). The study covers technologies such as React, Vue.js, WordPress, Ruby on Rails, and Angular, which are popular tools for building web applications and content management. The article includes a literature review on the popularity of these technologies and compares findings with the authors' own research conducted on the websites of the 50 largest companies from the USA and Poland. The analysis revealed that in the USA, the dominant technology was React, present on the websites of 18 out of 50 examined companies, while in Poland, there was no clear leader, although technologies such as WordPress, Vue.js, and ZURB Foundation enjoyed relative popularity. The research results indicate a wide variety of technological solutions employed, suggesting that each company selects technology according to its specific needs. This article fills a gap in the literature by offering a rare analysis of technological preferences among corporations, which may serve as a valuable resource for IT professionals and companies considering the implementation of similar solutions.

Keywords: Web frameworks, corporate technology analysis, technology stack

Introduction

The objective of this publication was to examine the frequency of use of various popular frameworks and libraries for website development, with particular focus on analyzing the popularity of the following tools: React, Vue.js, WordPress, Ruby on Rails, and Angular from the perspective of large commercial enterprises listed on the NYSE and NASDAQ in the United States and, for comparison, on the Warsaw Stock Exchange (GPW) in Poland. Specifically, we aimed to verify the hypothesis that React.js was the most popular tool in 2024. The article fills a research gap, as we did not find publications analyzing the applications of front-end technologies in commercial enterprises. The only statistics we found pertained to queries related to specific technologies on Stack Overflow and the number of GitHub

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repositories. In our opinion, studies conducted on actual enterprises not only provide a realistic depiction of the popularity of various technologies but also allow for the analysis of trends.

Literature Review

Research on the popularity of selected web development tools appears in numerous publications, sometimes as a primary research topic and other times as part of discussions about the similarities and differences among these tools. Notable publications that focus on analyzing the popularity of these tools include works by Swacha and Kulpa, Kaluza and Troskot, and Awasthi.

Swacha and Kulpa (2023) examined the popularity of various web frameworks based on new GitHub repositories and the number of questions on StackOverflow. The researchers analyzed ten frameworks (Node.js, React.js, jQuery, Angular, Vue.js, ASP.NET, Django, Flask, Laravel, Ruby on Rails) and found that React.js was the most popular in 2022. Kaluza and Troskot (2018) studied the popularity of frameworks such as Angular, React.js, Vue.js, Backbone.js, Ember.js, and KnockOut.js on GitHub, noting that Angular was dominant in 2018. They also discussed the usefulness of Angular, React, and Vue for single-page and multi-page web applications. Kniazev (2023) examined the general popularity of JavaScript-based frameworks by studying tools used by JS developers in different countries and deployment providers. According to Awasthi (2022), Angular's peak popularity was in 2017-2018, after which it began to lose ground to React.js, based on Stack Overflow queries. Similarly, Naik (2024) noted that React remained the most popular framework on Stack Overflow in 2024, with Angular being the second most popular.

Most publications on React, Vue, Angular, and other similar tools focus not on the popularity of individual solutions but rather on comparing their features and properties, analyzing which factors to consider when choosing a technology. Such works include Rathinam (2023), Kaur & Tiwari (2023), Tjandra Negara et al. (2022), Awasthi et al. (2022), Naik (2024), Singh et al. (2023), Tong et al. (2023), Bielak et al. (2022), Diniz-Junior et al. (2022), Bogusz et al. (2024), DYMORA et al. (2023), Skrzypiec & Plechawska-Wójcik (2023), and Гумарова et al. (2023). These studies measure the speed and efficiency of completing specific tasks and assess the difficulty of learning each tool.

When it comes to the latest changes in front-end technologies, overviews of new technologies are provided by, among others, by Stefanova (2024) and Skowyra (2024). According to their research, in 2024, front-end technologies are focused on improving performance, accessibility, and code maintainability. Emerging styling solutions and component libraries, such as HTMLX, Shadcn UI, Radix UI, Ark UI, Panda CSS, Meta's StyleX and Squeezy with Wedges introduce unique approaches to interface design and web development. Artificial Intelligence (AI) plays a pivotal role in advancing front-end development, enabling the creation of more dynamic and responsive interfaces (Naik, 2024). AI-powered tools like GitHub Copilot or no code AI tools such as Builder.co, V0, Locofy assist developers by automating various tasks and speeding up development processes. The integration of AI in designing and building websites allows for real-time adaptation to user behavior, delivering personalized content and interactions. It is expected that AI's growing influence will further drive the adoption of technologies like machine learning and natural language processing to better understand user needs.

According to 2023 JavaScript Rising Stars, top front-end solutions which are used currently by developers include (in descending order representing popularity): React, htmx, Svelte, Million, Vue.js, Angular, Solid and Qwik.

In summary, front-end technologies in 2024 are evolving to provide tools for creating fast, responsive, and efficient applications. The latest trends prioritize performance, accessibility, and maintainability, with AI at the forefront, automating processes and enhancing personalization.

Two conclusions emerge from the literature analysis. First, analysis of framework popularity appears relatively infrequently in the literature. Second, we did not find any study that specifically examines the popularity of these solutions on corporate websites. In our view, this information is valuable as it shows the technological stack that large corporations use for web development, indicating which frameworks are practically applied in the corporate world. Thus, the purpose of our research was to fill this gap and verify the previously stated hypothesis.

Research Methodology

The tools used to build websites vary widely: some are classified as frameworks, others as libraries, some as CMSs (Content Management Systems), and some are strictly front-end (without a back-end), while others provide both front-end and back-end capabilities. Nonetheless, several names dominate job postings, appearing with notable frequency, including React, Vue, WordPress, Angular, and Ruby on Rails. These tools are used for website development, though they differ significantly in terms of ease of use and other characteristics. Table 1 provides a comparison of selected features.

Table 1: Comparison of Web Development Tools: React, Vue, WordPress, Ruby on Rails, and Angular

Criterion	React	Vue	WordPress	Ruby on Rails	Angular
Type	JavaScript library for UI development	JavaScript framework for UI	CMS written in PHP	MVC framework in Ruby	JavaScript-based MVC framework
Year of Release	2013	2014	2003	2004	2010
Creator	Facebook (Meta)	Evan You	Matt Mullenweg and Mike Little	David Heinemeier Hansson	Google
Version Count	18 (up to 2023)	3 major versions	Hundreds (6 major versions)	7 major versions	15 (up to 2023)
Backward Compatibility	Partial, depends on version	Partial, depends on version	Partial, updates needed	Typically maintained	Partial, depends on version
Language	JavaScript / JSX	JavaScript	PHP	Ruby	TypeScript / JavaScript
Methodology	Declarative components	Reactive components	Modules, plugins, and themes	MVC (Model-View-Controller)	Components with MVVM architecture
Single-Page (SPA)	Yes, but also usable in MPA	Primarily SPA, but MPA possible	No	No	Yes
Component Creation	JSX components, inline styling	HTML templates with optional JS	Blocks and widgets	Views and controllers in MVC	Components with HTML and TS logic
Component Support	Yes	Yes	Yes (blocks, widgets)	Yes (views and modules)	Yes
Typical Applications	SPAs, mobile apps with React Native	SPAs, mobile apps	Blogs, business sites, e-shops	Full web applications	SPAs and enterprise projects
Rendering	Client-Side Rendering (CSR), SSR	CSR and SSR with Nuxt.js	Server, static, and dynamic	Server-side rendering	Mainly CSR, SSR possible
Popularity	Highly popular	Growing	Most popular CMS	Less popular than JS frameworks	Popular, especially in corporates
Learning Curve	Moderate, requires JSX and React ecosystem	Beginner-friendly	Easy for beginners	Requires Ruby and MVC knowledge	Relatively steep, requires TS
Support	Facebook and community	Community, supported by Evan You	Community, Automattic	Open-source community	Google
Community Resources	Very large community	Large community	Very large community	Strong community	Very large community
Security	Potential CSR vulnerabilities	Potential CSR vulnerabilities	Varies with plugins	High, protects against XSS	Good, but CSRF risks
Performance	High performance in SPAs	Optimized through reactivity	Varies with plugins	High performance for full web apps	High, optimized codebase
CSS/Animation Support	Supports CSS, Anime, Velocity, Bootstrap	Supports CSS, Anime, Velocity, Bootstrap	Primarily CSS and Bootstrap	Mainly CSS and Bootstrap	Supports CSS, Anime, Velocity, Bootstrap

Criterion	React	Vue	WordPress	Ruby on Rails	Angular
Backend/Database	No	No	Yes	Yes	No
Cloud Integration	AWS, GCP, Azure, Vercel, Netlify	AWS, GCP, Azure, Vercel, Netlify	WP Engine, AWS, GCP, Azure	Heroku, AWS, GCP, Azure	AWS, GCP, Azure
Popularity Trend	Rising	Rising	Stable	Declining, but stable	Stable to slightly rising

source: Rathinam (2023), Kaur & Tiwari (2023), Tjandra Negara et al. (2022), Awasthi et al. (2022), Naik (2024), Singh et al. (2023), Tong et al. (2023), Bielak et al. (2022), Diniz-Junior et al. (2022), Bogusz et al. (2024), DYMORA et al. (2023), Skrzypiec & Plechawska-Wójcik (2023), and Гумарова et al. (2023).

The oldest tool among the analyzed web development tools is WordPress, created in 2003 by Matt Mullenweg and Mike Little. Ruby on Rails emerged a year later, in 2004, as a project by David Heinemeier Hansson. In 2010, Google released Angular, which became the first popular JavaScript framework based on MVC. In 2013, Facebook introduced React, and a year later (2014), Vue was developed by Evan You.

In terms of classification, WordPress stands out as a content management system (CMS) written in PHP, while React and Vue are more specialized tools: React as a JavaScript library and Vue as a JavaScript framework for building user interfaces (UIs) with an emphasis on components. Ruby on Rails and Angular are more comprehensive MVC frameworks, with Rails written in Ruby and Angular in JavaScript (primarily TypeScript—a strongly typed language similar to JavaScript).

Among the frameworks analyzed, React and Vue are most similar to each other. Both are used to create UIs and are mainly employed in single-page applications (SPAs), although they can also be used in multi-page applications (MPAs). The encapsulation within a selected HTML element often allows React to implement additional small functionalities on sites written in other frameworks or tools. Both React and Vue are component-based, enabling modular and dynamic UI building, which enhances flexibility. React and Vue are also front-end frameworks and can work with any backend since they operate at the application layer focused on user interactions rather than server logic.

Angular, in some respects, resembles React and Vue since it is also a JavaScript framework based on components, widely used in SPAs. Like React and Vue, Angular is commonly used in front-end projects and enables high interactivity and application performance. However, Angular differs in architecture, as it follows the MVVM (Model-View-ViewModel) pattern and is more comprehensive than React and Vue, making it suitable for creating large-scale enterprise applications. Unlike the simpler structures of React and Vue, Angular has a steeper learning curve and requires knowledge of TypeScript, making it somewhat more challenging for developers.

WordPress and Ruby on Rails are similar in their approach to application architecture. Both are used to build complete web applications and support a more traditional multi-page application (MPA) approach. WordPress and Ruby on Rails also have built-in backend support, meaning they can handle both application logic and database management, which is lacking in strictly front-end frameworks like React, Vue, and Angular. WordPress is a CMS often used to manage content on websites, blogs, and e-commerce platforms, while Ruby on Rails is an MVC framework designed to build complete web applications, including more complex systems such as startup and business applications.

Thus, similar frameworks can be grouped as follows:

React and Vue: front-end, lightweight, flexible, popular in SPAs.

Angular: somewhat similar to React and Vue but more complex and enterprise-oriented.

WordPress and Ruby on Rails: comprehensive back-end frameworks, supporting MPAs and database integration.

WordPress has had the most releases, numbering in the hundreds, though major updates fall into six larger versions. Most frameworks maintain backward compatibility; however, WordPress sometimes requires additional plugin updates. React has 18 versions but varies in backward compatibility based on the version. Vue offers three main versions, which are also partially compatible. Ruby on Rails has seven versions, which typically retain compatibility, while Angular offers partial compatibility and often requires adjustments during updates.

React and Vue are based on JavaScript, with React utilizing JSX as a specific language for component description. Angular mainly uses TypeScript, providing additional typing capabilities compared to JavaScript. WordPress is written in PHP and requires knowledge of this language for creating plugins and themes, while Ruby on Rails uses Ruby, known for its readability and simplicity.

React and Vue use components as the foundational building blocks of applications, but they differ in approach: React employs declarative components, while Vue is reactive. React's declarative approach describes how the UI should look in a given application state rather than managing updates and rendering logic directly (characteristic of the imperative approach). In declarative programming, developers define "what" they want to achieve, while React updates the interface as the state or data changes. React is also reactive, responding to component state changes. When a component's state or properties change, React automatically re-renders it, allowing for dynamic UI updates. Angular uses components with an MVVM architecture, facilitating the creation of more complex applications. WordPress uses blocks and widgets, a less complex system but sufficient for many CMS applications. In Ruby on Rails, components primarily consist of views and controllers aligned with the MVC architecture.

React, Vue, and Angular are well-suited for creating single-page applications (SPAs), although React and Vue can also be used in multi-page applications (MPAs). WordPress and Ruby on Rails are more geared toward traditional multi-page applications (MPAs).

WordPress and React lead in popularity—WordPress is the most popular CMS worldwide, while React is one of the most frequently chosen tools for modern UI development. Vue is gaining popularity, especially among startups and independent developers. Ruby on Rails is no longer as popular as it once was but is still used in technology startups. Angular is widely used in large companies, though it requires knowledge of TypeScript, making it harder to learn compared to Vue.

All the tools analyzed have well-developed documentation and support on popular forums and platforms like Stack Overflow and GitHub. WordPress and React have some of the largest communities, making them more accessible in terms of resources and support. Vue also has a large community, while Ruby on Rails and Angular have smaller but still active and well-supported communities.

Ruby on Rails and Angular provide robust security. Rails is known for its protection mechanisms against XSS and SQL Injection attacks. WordPress is vulnerable to attacks, particularly when outdated plugins are used. Security in React and Vue depends on client-side implementation, which may involve risks in client-side rendered applications (CSR).

React, Vue, and Angular offer high performance, especially in SPAs, where quick UI response is essential. WordPress has moderate performance, dependent on the number of plugins used. Ruby on Rails performs well in web applications with high server-side requirements.

All frameworks support popular CSS libraries and animation tools such as Anime, Velocity, and Styled Components. WordPress often uses Bootstrap and classic CSS for styling websites.

WordPress and Ruby on Rails are naturally integrated with databases—WordPress mainly uses MySQL or MariaDB, while Rails works with MySQL and PostgreSQL. React, Vue, and Angular do not have built-in database support but can integrate with any database via an API.

React, Vue, and Angular are highly responsive and support modern techniques for building responsive user interfaces. WordPress has limited reactivity, and Rails offers a medium level of reactivity that can be enhanced through additional JavaScript implementations.

All frameworks are available for free, although WordPress and Ruby on Rails have paid plugins and add-ons. React, Vue, and Angular do not have paid modules, making them more uniform within the open-source ecosystem.

In the commercial sector, React and Angular are considered the most popular, due to their capabilities for creating web and mobile applications. WordPress is often used by small and medium-sized businesses as a content management platform. WordPress is also popular among educational and government institutions because it is easy to implement and offers many useful plugins for content management. Other frameworks are less commonly used in these sectors.

For personal blogs and sites, WordPress dominates, except among developers who choose React and Vue to showcase portfolios and present their own projects.

To verify the popularity of these frameworks, we examined the websites of the largest 50 companies listed on the NYSE, NASDAQ, and GPW using the Chrome extension "Wappalyzer" and additionally searched for information about the technology stack used by the examined companies through Google searches.

Presentation of Research Results

Table 2 presents our research findings, listing the frameworks and libraries found on the websites of the largest corporations in the USA and Poland. In addition to the five previously mentioned tools, we documented other libraries and frameworks identified on these sites (such as jQuery, GSAP, Nuxt.js, Next.js, Emotion, ASP.NET, Handlebars, Adobe Client Data Layer, and even Java).

This comprehensive data offers a clear view of the technology stacks used by major corporations, showcasing the wide array of tools and technologies applied beyond the primary frameworks examined in this study.

Table 2: Comparison of tools for creating websites: React, Vue, WordPress, Ruby on Rails, and Angular on the websites of the 50 largest companies listed on NASDAQ and NYSE

Company	Technologies	Security
Nvidia	React, React Router, Mustache, GSAP, JQuery, core-js	Akamai Bot Manager
Apple	Preact	HSTS
Microsoft	Adobe Experience Manager, Lodash, lit-html, lit-element, LazySides, core-js, Jquery	Akamai Bot Manager, HSTS
Google (Alphabet)	Angular, Polymer, Whatlit-html, lit-element, Hammer.js	reCAPTCHA, HSTS
Amazon	Perl, jsp, core-js, jQuery, Civic Theme, Amazon own framework, Ruby, React	HSTS
Meta	React, Marko, Node.js, core-js	HSTS
Taiwan Semiconductors	GSAP, Swiper, jQuery	Cloudfare Bot Management, HSTS
Berkshire Hathaway	Vue.js, jQuery, PHP	HSTS
Tesla	React, Lozad.js, Lodash, PHP	Akamai Bot Manager, HSTS
BroadCom	React, jQuery, Docker, Javascript	Cloudfare Bot Management, HSTS
Eli Lilly	Vue.js, Nuxt.js, jQuery, core-js	Cloudfare Bot Management, HSTS, reCAPTCHA
Walmart	React, Next.js,	PerimeterX, Akamai Bot Manager
JPMorgan Chase	React, React Native, Angular,	HSTS
Visa	Angular, Zone.js, Vue.js, jQuery, core-js	HSTS, Akamai Bot Manager
UnitedHealth	React, Handlebars, Preact, Modernizr, jQuery, core-js	HSTS
ExxonMobil	Microsoft ASP-NET	HSTS, Akamai Bot Manager
Oracle	React, Next.js, Boomerang, jQuery, core-js	Akamai Bot Manager
Mastercard	React, Redux, JavaScript	HSTS, Akamai Bot Manager
Costco	Microsoft ASP-NET, Moment.js, jQuery, FancyBox	HSTS, reCAPTCHA
Home Depot	React, Next.js,	HSTS
Procter & Gamble	React, Next.js, crypto.js, LazySizes	reCAPTCHA, HSTS
Johnson & Johnson	GSAP	HSTS, Akamai Bot Management
Novo Nordisk	Vue.js, Moment.js, core-js, Boomerang, Axios, jQuery	HSTS
AbbVie	RequireJS, JavaScript, core-js, jQuery	HSTS, reCAPTCHA
Bank of America	Marko, Node.js, web-vitals, Lodash, crypto-js	HSTS
Netflix	Emotion, React, Lodash	HSTS

Company	Technologies	Security
Salesforce	RxJS, Boomerang	HSTS, Akamai Bot Manager
Chevron	GSAP, Microsoft ASP.NET, Splide, jQuery	HSTS
SAP	Handlebars, Adobe Client Data Layer, Boomerang, Loadable-Components, Hammer.js, core-js, jQuery	HSTS, Akamai Bot Manager
Coca-Cola	Adobe Client Data Layer, core-js, Swiper	HSTS, reCAPTCHA
T-Mobile	Alpine.js, web-vitals, Lodash	HSTS, Akamai Bot Manager, reCAPTCHA
ASML	React, Next.js, Next.js	HSTS, reCAPTCHA
Merck	WordPress	HSTS
AMD	Vue.js, Handlebars	HSTS
Accenture	GSAP, Adobe Client Data Layer	HSTS
Nvidia	React, Mustache, GSAP	Akamai Bot Manager
Toyota	RequireJS	HSTS
Wells Fargo	Marko	HSTS, Akamai Bot Manager
Cisco	Java, Jquery	HSTS
Pepsi	core-js, Swiper, jQuery	?
Linde	React, Handlebars, Preact, Modernizr, jQuery, core-js	HSTS
Adobe	React, core-js, Boomerang	HSTS, Akamai Bot Manager
Novartis	PHP, jQuery	HSTS
Blackstone	WordPress, GSAP	HSTS, Cloudfare Bot Management
Thermo Fisher	Java, ZURB Foundation, Bootstrap	HSTS, Akamai Bot Manager
McDonalds	React, jQuery, core-js	HSTS
ServiceNow	Java, core-js, lit-html, lit-element, Boomerang, jQuery	HSTS, Akamai Bot Manager
Morgan Stanley	Java, core-js, lit-html, lit-element, Boomerang, jQuery	HSTS, Akamai Bot Manager
American Express	Emotion, Java, jQuery, core-js	HSTS, Akamai Bot Manager
AstraZeneca	Handlebars, Java, Moment.js, jQuery, Modernizr	HSTS

Source: own elaboration.

The analysis of Table 2 reveals that the most commonly used tool for creating corporate websites was React (used by 18 companies), followed by GSAP (7), Next.js (6), Vue.js (5), Angular (3), Preact (3), Adobe Client Data Layer (3), Microsoft ASP.NET (3), WordPress (2), Nuxt.js (1), and ZURB Foundation (1). jQuery appeared very frequently (21 times), as did core-js (19 times), Java (6 times), Handlebars (5 times), Lodash (5 times), lit-element (3 times), lit-html (3 times), and Modernizr (3 times).

What was particularly interesting to us was that a relatively large number of companies (24 out of 50 surveyed) did not use any of the frameworks discussed in the publication. Table 2 highlights the diversity of technologies and solutions employed on corporate websites, demonstrating that there is no single dominant stack being used. This is fascinating as it showcases the numerous directions in which web development tools are evolving.

Table 3: Comparison of web development tools: React, Vue, WordPress, Ruby on Rails, and Angular on the websites of the 50 largest companies listed on the Warsaw Stock Exchange (GPW)

Company	Technologies	Security
Banco Santander SA	React, Handlebars, Hammer.js, Moment.js, Preact, Modernizr, jQuery, core-js	HSTS
UniCredit SpA	Swiper, Moment.js, jQuery, Bootstrap	HSTS, Akamai Bot Manager, reCAPTCHA
CEZ a.s.	Javascript, lit-html, lit-element, jQuery, FancyBox, core-js, Bootstrap	HSTS, reCAPTCHA
PKO BP SA	React, Next.js, JSS, Emotion, core-js	HSTS
Orlen SA	Adobe Client Data Layer, LazySizes, core-js	HSTS

Company	Technologies	Security
Santander Bank Polska SA	core-js, Swiper, Lodash	Imperva, HSTS
Bank Pekao SA	Swiper, jQuery, core-js, ZURB Foundation	HSTS
Dino Polska SA	React, Handlebars, Hammer.js, Moment.js, Preact, Modernizr, jQuery, core-js	HSTS
ALLEGRO.EU	PHP, AOS	HSTS
PZU SA	jQuery, core-js	HSTS
ING Bank Śląski SA	lit-html, core-js, jQuery	Imperva, HSTS
KGHM Polska Miedź SA	jQuery, PHP	HSTS
LPP SA	WordPress, PHP, Swiper, lit-html, lit-element, core-js, jQuery	HSTS
mBank SA	core-js, FancyBox, jQuery	HSTS
MOL Magyar Olaj-és Gázipari Részvénytársaság	Vue.js, lit-html, lit-element, Lodash, jQuery, core-js, Axios	HSTS, reCAPTCHA
Zabka Group SA	WordPress, PHP, Splide	
KRKA dd	Vue.js, Nuxt.js, Swiper, Select2, jQuery, core-js, Bootstrap	reCAPTCHA
CD Projekt SA	WordPress, PHP, Swiper, core-js, jQuery	reCAPTCHA
PGE Polska Grupa Energetyczna SA	core-js	HSTS
BNP Paribas Bank Polska SA	Selectize, jQuery, Bootstrap	Imperva, HSTS
Budimex SA	WordPress, Swiper, AOS, Select2, jQuery, core-js, PHP	HSTS
Alior Bank SA	java, Moment.js, lit-html, lit-element, Modernizr, jQuery, ZURB Foundation	HSTS
CCC SA	toastr, GSAP, ScrollMagic, Lodash, jQuery, FancyBox	HSTS, Cloudfare Bot Management, reCAPTCHA
Bank Handlowy SA	Java, JSObservable, JSViews, Boomerang, Slick, jQuery, JsRender	HSTS
Bank Millennium SA	lit-html, lit-element, core-js, Browser-update.org, Axios	HSTS
Orange Polska SA	React, Emotion, Next.js, Preact, web-vitals, MobX, core-js, Lodash	HSTS
Pepco Group BV	WordPress, PHP, core-js, Swiper, jQuery, Bootstrap	
Immofinanz AG	Vue.js, Nuxt.js, Swiper, core-js	HSTS, reCAPTCHA
Kruk SA	Node.js, PHP, Preact, Moment.js, Modernizr, jQuery, core-js, Select2	HSTS
XTB SA	Vue.js, Lodash, LazySizes, jQuery, core-js, Element UI	b.d.
Cyfrowy Polsat SA	core-js, jQuery, ZURB Foundation	b.d.
Asseco Poland SA	jQuery, core-js, PHP	HSTS, reCAPTCHA
Benefit Systems SA	Vue.js, Nuxt.js, Swiper, Preact, core-js	reCAPTCHA
Inter Cars SA	React, Vue.js, Next.js, lit-html	HSTS
Grupa Kęty SA	WordPress, GSAP, PHP, Swiper, Moment.js, LightBox, jQuery	HSTS
Tauron Polska Energia SA	Require.js, MicrosoftASP.NET, lit-html, lit-element, LazySizes, core-js, OWL Carousel, Moment.js, jQuery	b.d.
ENEA SA	SweetAlert, FancyBox, Slick, jQuery, Bootstrap	HSTS, reCAPTCHA
Polenergia SA	WordPress, PHP, Swiper, Moment.js, jQuery, Bootstrap	HSTS, reCAPTCHA
Energa SA	ZURB Foundation, jQuery	HSTS
Dom Development SA	GSAP, Microsoft ASP.NET, lit-html, lit-element, core-js	HSTS
AmRest Holdings SE	Lodash, jQuery, core-js, Bootstrap	HSTS
Kernel Holding SA	WordPress, PHP, Modernizr, jQuery, Isotope, FancyBox, core-js	
Grupa Pracuj SA	Lodash, Hammer.js, web-vitals	HSTS
Neuca SA	Vue.js, Swiper, core-js	HSTS
CPI FIM SA	Swiper, Moment.js, jQuery, Bootstrap	HSTS
Jastrzębska Spółka Węglowa SA	PHP, Slick, jQuery, Bootstrap	HSTS
Auto Partner SA	WordPress, PHP, Swiper, core-js, jQuery	HSTS, reCAPTCHA

Company	Technologies	Security
Comarch SA	Swiper, Moment.js, lit-html, List.js, jQuery, core-js	HSTS
Develia SA	WordPress, Socket.io, Node.js, PHP, Bootstrap, AOS, Select2, lit-html, lit-element, Lodash, jQuery	reCAPTCHA
Globe Trade Centre SA	React, Handlebars, Hammer.js, Moment.js, Preact, Modernizr, jQuery, core-js	HSTS

Source: own elaboration.

Analysis of Table 3 reveals that the most popular web development technology was WordPress (10 companies), primarily used for blogs, followed by Vue.js (7), React (6), and Preact (6), with a total of 8 companies using either React or Preact. Other technologies included ZURB Foundation (4), Microsoft ASP.NET (1), and Adobe Client Data Layer (1). jQuery appeared in as many as 36 companies, core-js in 33, Swiper in 16, PHP in 15, lit-html in 11, Moment.js in 11, Modernizr in 6, FancyBox in 5, Hammer.js in 4, Select2 in 4, and ZURB Foundation also in 4 companies. Less frequently used were Slick, AOS, GSAP, Handlebars, Nuxt.js, LazySizes, and Next.js (each appearing 3 times). Interestingly, technologies not covered by our primary research appeared in 27 out of 50 companies.

Conclusions and Final Remarks

In summary, this study shows notable similarities in the web development technologies used by stock-listed companies in the USA and Poland, particularly the widespread use of React (and its lightweight version, Preact) and the relatively high, though less dominant, popularity of Vue.js. Other tools were significantly less popular, although WordPress-based sites were found, which is surprising given the simplicity of this solution.

When comparing countries, React clearly dominates in the USA (18 out of 50 companies), whereas it is less popular in Poland (8 out of 50). Technologies more popular in Poland than in the USA included Vue.js, ZURB Foundation, and WordPress. The most surprising finding was the wide variety of solutions used, with nearly every company employing a slightly different combination of libraries and frameworks, though some common choices were evident.

There is substantial similarity between the frontend technologies used in both countries, but the proportion of technologies used varies significantly. React was the clear leader in the USA, while no single technology dominated in Poland. Ruby appeared only once, despite its recognition as the fourth most profitable technology for web development (used by companies like Airbnb, Fiverr, Shopify, Basecamp, GitHub, Dribble, Twitter, SoundCloud, Zendesk, and Hulu).

The article illustrates how performance, developer familiarity, and security concerns influence the adoption of front-end technologies among leading companies listed on stock exchanges such as the NYSE, NASDAQ, and GPW. Performance is a critical factor, with frameworks like React and Vue being preferred for their ability to optimize single-page application efficiency. Developer familiarity also plays a significant role, as tools with robust community support, such as React and WordPress, are easier to learn and implement. Security flaws, particularly in client-side rendering or plugin usage (as seen in WordPress), can hinder broader adoption, especially for enterprise applications.

Practical advice for developers includes selecting tools that align with their project requirements. For instance, React and Angular are ideal for enterprise-level SPAs, while WordPress remains a strong choice for CMS-driven sites. Developers are encouraged to prioritize frameworks with active community support and consider security implications to ensure robust and scalable solutions.

If an attempt were made to predict changes in the popularity of individual frameworks in the future (which stems from the literature review), it seems that front-end technologies fulfilling key business requirements—such as high performance, scalability, AI integration, and personalized user experiences—will dominate. React and its ecosystem are likely to maintain their leading position, driven by strong community support, flexibility, and compatibility with AI-driven tools. Similarly, Vue.js, known for its simplicity and efficiency, is gaining traction among startups and smaller firms. As its ecosystem evolves, including tools like Nuxt.js, Vue could see broader adoption in larger enterprises. Frameworks like Next.js, offering server-side rendering (SSR) and static site generation, are expected to become increasingly appealing for businesses seeking fast and scalable applications. Lightweight solutions such as Svelte and Solid.js, with their focus on performance and minimal browser load, could gain popularity for highly

responsive applications. AI-powered tools like Builder.ai and Locofy will likely shape future trends by enabling rapid prototyping and optimization, accelerating the adoption of modern frameworks. Additionally, technologies supporting Progressive Web Apps (PWAs), such as Angular and Workbox, are anticipated to grow in prominence as businesses prioritize offline functionality and native-like experiences. Finally, WebAssembly (Wasm) is poised to play a critical role in high-performance applications, such as gaming, multimedia processing, and real-time analytics, offering a competitive edge in resource-intensive scenarios. We believe that the frameworks and technologies that effectively combine speed, flexibility, scalability, and adaptability to evolving market demands are going to lead, with developer accessibility and AI integration playing pivotal roles in shaping their future adoption.

It is worth noting that the research has several limitations that should be acknowledged. First, it relies primarily on descriptive data without employing statistical validation to verify patterns or disparities across regions. Incorporating statistical methods could have provided more robust insights into the observed trends. Second, the study focuses exclusively on the 50 largest companies in each region, which may not represent the broader landscape of technology adoption among smaller corporations or across diverse industry sectors. This limited scope might overlook trends or preferences prevalent in other organizational sizes or niches. Future studies could address these limitations by incorporating a statistically significant sample size and including a wider range of companies across different sectors to enhance the generalizability of the findings.

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Use of AI: we used chatGPT to improve the translation of selected sentences in the article.

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