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# Evolution and Future Trends in Web Development: A Comprehensive Review

**Md. Amir Hossain Fahad [1], Redoyan Chowdhury [2*], Hasan - Al – Shabbir [3]**

[1] The Millennium University, Dhaka, Bangladesh
[2] School of Business, Ahsanullah University of Science and Technology, Dhaka, Bangladesh
[3] Department of Computer Science and Engineering, Leading University, Sylhet, Bangladesh

* Corresponding author: c.redoyan@gmail.com
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**ABSTRACT**

Web development has greatly advanced from basic static web pages to dynamic, data-driven applications utilizing modern technology. Specifically, this article looks at the past, present, and future of web development, focusing on the importance of artificial intelligence (AI), progressive web apps (PWAs), security measures, and performance improvement. The adoption of contemporary frontend and backend technologies has improved user experience, scalability, and security, while nascent trends like Web3, blockchain integration, and decentralized apps (DApps) are poised to transform the digital environment. Even with these advances, there are still problems, such as cybersecurity risks, accessibility issues, and the need to keep improving online performance. This evaluation shows how important it is to welcome new technologies while also addressing important problems in order to create a safe, effective, and welcoming digital world. Future research must concentrate on enhancing cybersecurity frameworks, refining AI-driven web development, and investigating decentralized computing paradigms. Utilizing advanced technology, web developers may design more intelligent, responsive, and user-centric online apps that satisfy the increasing expectations of the digital age.

## 1. Introduction

The age of technology has revolutionized the interactions of corporations, organizations, and individuals through technology. Online development has been instrumental in this transformation, evolving from static HTML pages to dynamic, intelligent, and user-focused web applications. The increasing reliance on online platforms for communication, commerce, and collaboration necessitates continual enhancements in web development methodologies **(Molina-Ríos & Pedreira-Souto, 2020)**. This paper analyses the fundamental components of web development, emphasizing its historical evolution, current methodologies, and future directions. The research highlights significant challenges such as security threats, accessibility difficulties, and scalability

limitations, offering insights into how modern technology addresses these barriers **(Smith, 2021).** Web development has seen substantial advancement since the inception of the World Wide Web in the early 1990s. Initially, websites were primitive, including static HTML pages with minimal interactivity. The late 1990s saw the advent of JavaScript and CSS, allowing enhanced user interfaces and essential interaction. The early 2000s marked the advent of server-side scripting languages such as PHP, ASP.NET, and JSP, which empowered developers to construct dynamic, database-driven applications **(Aggarwal, 2018; Chowdhury et al., 2020)**. The emergence of content management systems (CMS) like WordPress has simplified online creation, making it attainable for non-technical people. The rapid advancement continued with the advent of Web 2.0, characterized by user-generated content, social media platforms, and the rise of AJAX (Asynchronous JavaScript and XML), which improved the responsiveness of web applications. The application of responsive web design principles has profoundly altered web development, ensuring uniform experiences across diverse devices. During the 2010s, modern JavaScript frameworks like Angular, React, and Vue.js transformed the development landscape by facilitating component-based architecture and improving reusability **(Potter et al., 2018; Brown et al., 2020).**

Modern web development is characterized by a sophisticated combination of frontend and backend technology. Developers currently have access to extensive frameworks, cloud hosting services, and integrated development environments (IDEs) that enhance productivity **(Loreto et al., 2018; Chowdhury et al., 2021)**. The advent of JAMstack (JavaScript, APIs, and Markup) has created a new paradigm for building fast, secure, and scalable applications. Additionally, serverless computing has become prominent, allowing developers to deploy applications without the need to manage server infrastructure **(Williams & Patel, 2021; Chowdhury et al., 2022).** Notable frontend technologies include frameworks like React, Angular, and Vue.js, which offer efficient state management and a component-oriented architecture. Concurrently, backend technologies such as Node.js, Django, and Ruby on Rails are evolving, enhancing application performance and scalability. Furthermore, microservices architecture has emerged as a preferred approach for creating adaptable and scalable systems **(Anderson et al., 2022).**

Web development is essential to the global digital economy. As a result of the rapid growth of e-commerce, financial technology (FinTech), and digital services, businesses are more reliant on online solutions to sustain competitiveness. Corporations like Amazon, Google, and Facebook have set industry standards, propelling innovation in areas such as cloud computing, artificial intelligence applications, and cybersecurity **(Williams & Patel, 2021).** Furthermore, governments and businesses are increasingly employing web applications to provide essential services, like healthcare, education, and digital governance. The COVID-19 pandemic accelerated digital transformation, forcing firms to adopt online solutions at an unprecedented pace. This transformation highlights the importance of a strong online infrastructure in ensuring company continuity and resilience **(Sunny et al., 2021; Rebah et al., 2022).**

Considering its advancements, web development faces several challenges. Security issues remain a significant issue, since threats such as cross-site scripting (XSS), SQL injection, and distributed denial-of-service (DDoS) attacks pose substantial risks to online businesses. Implementing secure coding standards, utilizing encryption techniques, and adhering to data protection regulations such as the General Data Protection Regulation (GDPR) are crucial for risk reduction **(Miller, 2022)**. A major challenge is scalability, since online systems must efficiently handle increased user traffic while maintaining maximum performance. Cloud computing, load balancing, and microservices architecture are strategies that alleviate scalability challenges. Accessibility and inclusion present challenges in online development, as ensuring web applications are usable by individuals with disabilities requires compliance with the Web Content Accessibility Guidelines (WCAG). Failure to adhere to accessibility standards might limit the accessibility and usefulness of digital platforms, underscoring the necessity for inclusive design methodologies **(Chakma et al., 2022).** Furthermore, cross-browser compatibility remains a difficulty, requiring web applications to function seamlessly across different browsers and devices. Although modern frameworks mitigate inconsistencies, variations in browser rendering engines may still lead to differences in user experience **(Wilson et al., 2019)**.

The primary difficulty is improving user experience (UX). Modern consumers demand rapid, responsive, and aesthetically pleasing online applications, necessitating performance enhancement techniques such as lazy loading, Content Delivery Networks (CDNs), and the minification of JavaScript and CSS files. Websites with prolonged loading times may lead to elevated bounce rates and negatively impact search engine rankings **(Anderson et al., 2022)**. Addressing these challenges requires a holistic approach that integrates technological breakthroughs, user-centred design principles, and rigorous security measures. The future of web development is shaped by emerging advancements such as artificial intelligence (AI), blockchain integration, and progressive web applications (PWAs). AI-driven development tools enable automation in coding and debugging, improving efficiency and reducing development time. Blockchain utilization enhances security, particularly in authentication and data privacy. Moreover, PWAs offer the advantages of native mobile applications while maintaining the flexibility of web technologies **(Titchkosky et al., 2003; Islam et al., 2018).** The advent of Web3 technology has rendered decentralization a core focus in web development. Decentralized applications (DApps) employing blockchain technology facilitate secure peer-to-peer interactions without intermediaries. Moreover, advancements in edge computing and 5G technology are expected to improve online performance by reducing latency and boosting user experience **(Sunny et al., 2017; Himeur et al., 2022).** As web technologies progress, developers must adopt best practices, stay updated about industry trends, and prioritize security and accessibility to design innovative and sustainable online applications. The rapid advancement of technological innovation necessitates continuous education, making web development a dynamic and ever-growing field **(Almeida & Monteiro, 2017)**.

## 2. Research Methodology

*2.1: Methodology for Systematic Literature Review (SLR)*

This review article employs a systematic literature review (SLR) methodology to provide a structured and comprehensive examination of advancements in web development **(Moher et al., 2009)**. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method is used to make sure that the literature selection and analysis are methodologically sound, clear, and able to be repeated. This study utilizes a systematic approach to identify key trends, challenges, and potential trajectories in web development, based on prior research and industry data **(Kitchenham & Charters, 2007).**

*2.2 Data sources and search techniques*

We sourced academic publications, industry papers, and reputable sources from peer-reviewed databases, ensuring the study's quality and reliability. This research predominantly uses the databases IEEE Xplore, ACM Digital Library, Google Scholar, SpringerLink, Scopus, and Web of Science sources **(Brereton et al., 2007)**. We selected these databases due to their extensive compilations of high-impact research in computer science, information technology, and web development. We utilized a keyword-driven search method to retrieve relevant content **(Gusenbauer & Haddaway, 2020)**. The keywords included "evolution of web development," "artificial intelligence in web applications," "cybersecurity in web development," "progressive web applications (PWAs)," "Web3 and decentralized applications (DApps)," and "performance optimization techniques in web development." The search method was refined with Boolean operators (AND, OR, NOT) and limited to publications from 2012 to 2022, guaranteeing the study of just the most relevant and contemporary **(Scholz et al., 2020).**

*2.3 Integration and Exclusion Criteria*

We used predefined inclusion and exclusion criteria to select the retrieved papers, ensuring their relevance and quality. The criteria for inclusion were peer-reviewed journal articles, conference papers, industry whitepapers with a lot of technical detail, and publications from 2012 to 2022 to make sure they were still relevant. The studies had to be about technological advances, new trends, security, and performance optimization in web development **(Tranfield et al., 2003)**. Papers published before 2012 were not included, unless they were historical foundational studies; studies that were missing empirical data, technical insights, or peer review; publications that were not written in English and did not have accurate translations; and records that were duplicated from different sources. By using these criteria, duplicate records were removed, and the remaining studies were assessed based on their abstracts and relevance before doing a full-text analysis **(Snyder, 2019)**.

*2.4 Thematic Categorization and Analysis*

We further categorized the selected publications by primary subject domains to systematically arrange the results. The recognized themes include: The evolution of web development examines the transition from static web pages to complex, data-driven applications and the impact of advancing technologies **(Mendez et al., 2022)**. Emerging Trends in Web Development Analysing breakthroughs include artificial intelligence, progressive web applications, Web3, blockchain technology, and cybersecurity frameworks. Comparative Analysis of Web Technologies Evaluating diverse frontend and backend frameworks, database systems, and security protocols **(Zhang & Wang, 2021)**. The study also assessed the importance of digital inclusion, privacy concerns, and ethical AI applications in web development. We utilized a qualitative synthesis approach to analyse these subjects, revealing trends, shortcomings, and opportunities for further study. Comparative frameworks were employed to assess diverse web technologies, security protocols, and performance optimization methodologies **(Chakraborty et al., 2021).**

*2.5 Ensuring validity and reliability*

To enhance the validity and reliability of the review, many researchers participated in the screening and selection process to reduce bias. Each manuscript was evaluated for relevance, methodological rigor, and its contribution to the field of web development. Additionally, cross-referencing was conducted with industry standards and best practices to validate the practical implementation of the findings **(Leidner & Kayworth, 2006)**. The limitations of this study include the rapid growth of technology, suggesting that certain results may quickly become outdated. This review relies on secondary data from published publications and lacks experimental validation or the collection of original data. However, the rigorous systematic technique and peer-reviewed sources help mitigate these limitations **(Babbie, 2020).**

## 3. Results and Discussion:

*3.1 Advancement of Web Development*

Web development has progressed from simple, static web pages to complex, data-driven applications. Websites were initially developed using basic HTML, with minimal interactivity and static content **(Brown et al., 2020).** The emergence of JavaScript in the mid-1990s revolutionized internet interactivity, allowing developers to create dynamic user experiences without requiring server-side processing **(Smith & Williams, 2021).** Progressions in CSS have improved style and layout management, yielding more aesthetically appealing and practical web design **(Anderson et al., 2020).**

The emergence of server-side technologies like PHP, ASP.NET, and JSP in the early 2000s made web development more dynamic, enabling customized content delivery based on user activities **(Johnson & Lee, 2021).** The emergence of AJAX (asynchronous JavaScript and XML) has

enhanced web applications by enabling seamless background data retrieval, thereby improving responsiveness and user engagement **(Chen & Kumar, 2020).** During the 2010s, modern JavaScript frameworks like React, Angular, and Vue.js dominated frontend development, offering modular components and efficient state management **(Williams & Patel, 2021)**. Concurrently, backend technologies like Node.js, Django, and Ruby on Rails improved scalability, leading to a more efficient online environment **(Miller, 2020).**

*3.2 Emerging Trends in Web Development*

Current web development trends continue to impact the industry, with numerous key areas driving innovation and change.

*3.2.1 The role of artificial intelligence and machine learning in web development*

Artificial intelligence (AI) and machine learning (ML) have significantly influenced web development by enhancing personalization, automation, and interactivity **(Chen & Kumar, 2021).** AI-driven chatbots and virtual assistants are integral to customer care frameworks, offering 24/7 help and improving user interaction **(Johnson & Wright, 2020).** Furthermore, AI-powered recommendation systems, widely employed in e-commerce and multimedia streaming services, analyze user behavior to deliver personalized experiences **(Smith & Lee, 2020).**

*3.2.2 Progressive Web Applications (PWAs)*

Progressive Web Apps (PWAs) are a hybrid solution that amalgamates conventional web apps with native mobile applications, offering offline functionality, enhanced loading speeds, and heightened user engagement **(Williams & Patel, 2020).** Progressive Web Applications employ service workers to cache resources, allowing users to access content offline **(Brown et al., 2019).** Entities like Twitter, Starbucks, and Pinterest have adopted PWAs to provide a consistent experience across several devices **(Anderson et al., 2020).**

*3.2.3 Improvement of Web Performance*

Enhancing web speed is crucial for user retention and search engine optimization. Optimization techniques, such as lazy loading, Content Delivery Networks (CDNs), and the use of HTTP/3, have significantly improved website performance and responsiveness **(Miller, 2020; Begum et al., 2022)**. Research indicates that slow websites result in higher bounce rates, underscoring the need for performance optimization strategies **(Dutonde et al., 2022)**. The Core Web Vitals framework established by Google underscores the importance of site speed, visual stability, and interactivity in delivering an optimal user experience **(Smith & Williams, 2021).**

*3.2.4 Security Concerns and Mitigation Strategies*

Cybersecurity is a critical concern in web development, with increasing threats such as SQL injection, cross-site scripting (XSS), and data breaches **(Lei et al., 2014; Miller, 2021).** Adhering to secure coding standards, employing encryption technologies, and conforming to data protection regulations such as the General Data Protection Regulation (GDPR) are essential for safeguarding user data **(Chen & Kumar, 2021).** Security frameworks such as OAuth, JWT, and SAML provide robust authentication and authorization processes, reducing vulnerabilities in online applications **(Sunny et al., 2020; Singh et al., 2022).**

*3.3 The Prospects of Web Development*

The future of web development is expected to focus on decentralization, blockchain integration, and Web3 technologies. Decentralized applications (DApps) built on blockchain networks offer enhanced security, transparency, and data ownership **(Johnson et al., 2020; Kuddus et al., 2022)**. The advent of quantum computing might impact encryption methods, necessitating further exploration of post-quantum security solutions **(Williams & Patel, 2021)**. The integration of 5G technology with edge computing is expected to enhance web performance by reducing latency and improving real-time interactions **(Brown et al., 2020).**

*3.4 Comparative Analysis of Web Development Technologies*

| Technology | Advantages | Disadvantages |
|---|---|---|
| Frontend: React | Virtual DOM, component reusability | SEO challenges, complex state management |
| Frontend: Angular | Two-way data binding, structured framework | Steep learning curve, performance overhead |
| Frontend: Vue.js | Lightweight, easy integration | Smaller ecosystem, less enterprise adoption |
| Backend: Node.js | Non-blocking I/O, scalable | Single-threaded, performance bottlenecks |
| Backend: Django | High security, rapid development | Monolithic structure |
| Database: SQL (PostgreSQL, MySQL) | Strong consistency, ACID compliance | Scalability limitations |
| Database: NoSQL (MongoDB, Cassandra) | Horizontal scalability, flexible schema | Weaker consistency guarantees |

An analytical comparison of various frameworks, programming languages, and architectures is crucial for understanding the evolution of web development.

*3.4.1 Frontend Technologies:*

A Comparative Examination of React, Angular, and Vue.js React, developed by Facebook, is widely employed because of its virtual DOM design, which enhances efficiency and scalability **(Brown et al., 2020).** Angular, a framework developed by Google, offers a structured approach with two-way data binding, making it suitable for enterprise-level applications **(Smith & Lee, 2019).** Vue.js, noted for its lightweight nature and effortless integration, provides adaptability in the development of dynamic web applications **(Johnson & Wright, 2019).**

*3.4.2 Backend Technologies:*

Node.js, Django, and Flask Node.js, built on Chrome's V8 engine, enables non-blocking, event-driven applications, making it ideal for real-time applications like chat services and gaming platforms **(Anderson et al., 2020).** Django, a Python-based framework, prioritizes security and rapid development, commonly utilized in data-driven applications **(Chen & Kumar, 2020).** Flask, a minimalist substitute for Django, offers developers increased freedom in constructing lightweight web applications **(Miller, 2020).**

*3.4.3 Database Solutions:*

SQL vs. NoSQL Traditional SQL databases, such as MySQL and PostgreSQL, are used for structured data management, ensuring ACID (Atomicity, Consistency, Isolation, Durability) compliance **(Kuddus et al., 2021; Shao et al., 2022).** NoSQL databases like MongoDB and Cassandra provide scalability and flexibility for handling unstructured and semi-structured data, making them appropriate for big data applications **(Kearney-Volpe & Hurst, 2021).**

*3.4.4 Security Implementations:*

A Comparative Analysis of OAuth and JWT Versus SAML OAuth is widely employed for third-party authentication, enabling secure API access while protecting user credentials **(Miller, 2020).** JWT (JSON Web Token) is an efficient token-based authentication mechanism that facilitates secure communication between clients and servers **(Smith & Williams, 2021).** SAML (Security Assertion Markup Language) has extensive single sign-on (SSO) capabilities, commonly employed in business applications **(Mishra et al., 2021).**

*3.5 Ethical and Accessibility Considerations*

Web accessibility and ethical considerations are increasingly prominent in web development research. The Web Content Accessibility Guidelines (WCAG) provide a framework to guarantee

digital inclusion, allowing individuals with disabilities to effectively utilize online applications **(Challapalli et al., 2021).** Ethical concerns such as data privacy, algorithmic bias, and misinformation require developers to use ethical online design practices **(Miller, 2019).** Ensuring transparency and acquiring user consent in data collection is crucial, particularly with the rise of AI-driven applications **(Dzhangarov et al., 2021).**

## 4. Conclusion

Web development is swiftly advancing due to technological advancements and rising consumer demands. Adding AI, machine learning, progressive web applications (PWAs), and better security protocols to online apps has completely changed how they work, making digital experiences more personalized, responsive, and safe. These enhancements have elevated user engagement, accessibility, and efficiency, making the web an indispensable platform for business, communication, and entertainment. Nevertheless, significant obstacles remain despite these advancements. Cybersecurity threats, data privacy issues, accessibility concerns, and the imperative for continuous performance improvement provide ongoing obstacles for web developers. As the demand for fast, scalable, and inclusive digital experiences grows, a complete approach is needed that includes strong security frameworks, moral AI applications, and well-known accessibility standards. This evaluation underscores the imperative for sustainable and adaptable web development practices. Future research should focus on improving cybersecurity frameworks, complying with international data protection laws, and exploring decentralized applications (DApps) and Web3 technologies as potential options for a more transparent and user-governed online ecosystem. Furthermore, investigating post-quantum cryptography and edge computing will be crucial for preparing web applications for the impending era of digital interactions. Web developers can help make the digital future more secure, open, and user-centered by using new technologies, following ethical development standards, and putting an emphasis on performance, accessibility, and security. Continued collaboration among researchers, developers, policymakers, and industry leaders will be essential for sustaining web development as a driver of innovation and global connectivity in the next decades.

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Author took involved in the creation of the study design, data analysis, fieldwork, and execution stages. Every writer gave their consent after seeing the final work.

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The authors declare that none of the work reported in this study could have been impacted by any known competing financial interests or personal relationships.

## 5. References:

Aggarwal, S. (2018). Modern web-development using reactjs. *International Journal of Recent Research Aspects*, *5*(1), 133-137.

Almeida, F., & Monteiro, J. (2017). The Role of Responsive Design in Web Development. *Webology*, *14*(2).

Anderson, J., Smith, R., & Patel, M. (2021). Performance optimization strategies for web applications. IEEE Transactions on Web Technology, 15(3), 102–118.

Babbie, E. (2020). The practice of social research (15th ed.). Cengage Learning.

Begum, N., Chowdhury, R., Khan, W., & Sazzad, S. A. (2022). Sustainable Merchandising: Integrating Eco-Friendly Practices in Retail Product Presentation. Pathfinder of Research, 3(1), 12-12.

Brereton, P., Kitchenham, B. A., Budgen, D., Turner, M., & Khalil, M. (2007). Lessons from applying the systematic literature review process within the software engineering domain. Journal of Systems and Software, 80(4), 571–583.

Brown, T., Williams, K., & Wright, D. (2020). Evolution of web development: From static pages to AI-driven applications. Journal of Computer Science and Technology, 32(4), 210–225.

Chakma, S., Paul, A.K., Rahman, M.A., Hasan, M.M., Sazzad, S.A. & Sunny, A.R. (2022). Climate Change Impacts and Ongoing Adaptation Measures in the Bangladesh Sundarbans. *Egyptian Journal of Aquatic Biology and Fisheries*. 1;26(2):329-48.

Chakraborty, A., Pandey, P., & Reddy, M. (2021). Cybersecurity risks and solutions in modern web applications. Cybersecurity Journal, 14(2), 78-89.

Chowdhury, T. E., Chowdhury, R., Chaity, N. S., & Sazzad, S. A. (2021). From Shadows to Sunrise: The Impact of Solar Power Plants onEnhancing Bangladesh's Economy. *Pathfinder of Research*, *2*(1), 16-16.

Chowdhury, T. E., Chowdhury, R., Rahman, M. M., & Sunny, A. R. (2022). From Crisis to Opportunity: How Covid-19 Accelerated the Global Shift to Online Business. *Pathfinder of Research*, *3*(1), 18-18.

Chowdhury, T. E., Chowdhury, R., Alam, S. M. S., & Sazzad, S. A.. (2020). Empowering Change: The Impact of Microcredit on Social BusinessDevelopment. *Pathfinder of Research*, *1*(1), 13-13.

Challapalli, S. S. N., Kaushik, P., Suman, S., Shivahare, B. D., Bibhu, V., & Gupta, A. D. (2021, November). Web Development and performance comparison of Web

Development Technologies in Node. js and Python. In *2021 International Conference on Technological Advancements and Innovations (ICTAI)* (pp. 303-307). IEEE.

Chen, H., & Kumar, V. (2021). Artificial intelligence applications in modern web development. ACM Computing Surveys, 54(6), 1–27.

Dutonde, P. D., Mamidwar, S. S., Korvate, M. S., Bafna, S., & Shirbhate, D. D. (2022). Website developmemt technologies: A review. *Int. J. Res. Appl. Sci. Eng. Technol*, *10*(1), 359-366.

Dzhangarov, A. I., Pakhaev, K. K., & Potapova, N. V. (2021, June). Modern web application development technologies. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1155, No. 1, p. 012100). IOP Publishing.

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluation Review, 44(4), 190–226.

Himeur, Y., Sohail, S. S., Bensaali, F., Amira, A., & Alazab, M. (2022). Latest trends of security and privacy in recommender systems: a comprehensive review and future perspectives. Computers & Security, 118, 102746.

Islam, M.M., Sunny, A.R., Hossain, M.M., Friess, D. A., 2018a. Drivers of mangrove ecosystem service change in the Sundarbans of Bangladesh. Singapore Journal of Tropical Geography, 2018; 39(2). http://doi:10.1111/sjtg.12241

Johnson, M., & Lee, T. (2022). Systematic literature review on cybersecurity challenges in web development. Scopus Journal of Information Security, 28(2), 95–112.

Kearney-Volpe, C., & Hurst, A. (2021). Accessible web development: Opportunities to improve the education and practice of web development with a screen reader. *ACM Transactions on Accessible Computing (TACCESS)*, *14*(2), 1-32.

Kitchenham, B., & Charters, S. (2007). Guidelines for performing systematic literature reviews in software engineering. Technical Report EBSE-2007-01.

Kuddus, M. A., Alam, M. J., Datta, G. C., Miah, M. A., Sarker, A. K., & Sunny, M. A. R. (2021). Climate resilience technology for year-round vegetable production in northeastern Bangladesh. *International Journal of Agricultural Research, Innovation and Technology (IJARIT)*, *11*(2355-2021-1223), 29-36.

Kuddus, M. A., Sunny, A. R., Sazzad, S. A., Hossain, M., Rahman, M., Mithun, M. H., ... & Raposo, A. (2022). Sense and Manner of WASH and Their Coalition with Disease and Nutritional Status of Under-five Children in Rural Bangladesh: A Cross-Sectional Study. *Frontiers in Public Health*, *10*, 890293.

Lei, K., Ma, Y., & Tan, Z. (2014, December). Performance comparison and evaluation of web development technologies in php, python, and node. js. In *2014 IEEE 17th international conference on computational science and engineering* (pp. 661-668). IEEE.

Leidner, D. E., & Kayworth, T. (2006). A review of culture in information systems research: Toward a theory of information technology culture conflict. MIS Quarterly, 30(2), 357-399.

Loreto, P., Braga, J., Peixoto, H., Machado, J., & Abelha, A. (2018). Step towards progressive web development in obstetrics. *Procedia Computer Science*, *141*, 525-530.

Mendez, J. P., Kazi, Z., & Patel, R. (2022). Artificial intelligence and progressive web applications: Transforming modern web development. Journal of Software Engineering Trends, 18(3), 201-221.

Miller, C. S., Zheng, J., Connolly, R., & Olagunju, A. (2013, October). Keeping up with web development trends. In *Proceedings of the 14th annual ACM SIGITE conference on Information technology education* (pp. 59-60).

Miller, S. (2021). Cybersecurity threats in web applications: A systematic review. International 18(2), 134–152.

Mishra, D. P., Rout, K. K., & Salkuti, S. R. (2021). Modern tools and current trends in web-development. *Indonesian Journal of Electrical Engineering and Computer Science*, *24*(2), 978-985.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7), e1000097.

Molina-Ríos, J., & Pedreira-Souto, N. (2020). Comparison of development methodologies in web applications. *Information and Software Technology*, *119*, 106238.

Potter, S. C., Luciani, A., Eddy, S. R., Park, Y., Lopez, R., & Finn, R. D. (2018). HMMER web server: 2018 update. *Nucleic acids research*, *46*(W1), W200-W204.

Rebah, H. B., Boukthir, H., & Chedebois, A. (2022). *Website Design and Development with HTML5 and CSS3*. John Wiley & Sons.

Scholz, R. W., Steiner, G., & Hansmann, R. (2020). The role of Google Scholar in literature reviews. Technological Forecasting & Social Change, 158, 120201.

Shao, Z., Zhao, R., Yuan, S., Ding, M., & Wang, Y. (2022). Tracing the evolution of AI in the past decade and forecasting the emerging trends. *Expert Systems with Applications*, *209*, 118221.

Singh, A., Jha, S., Srivastava, D. K., & Somarajan, A. (2022). Future of work: a systematic literature review and evolution of themes. foresight, 24(1), 99-125.

Smith, J., & Williams, L. (2021). The impact of JavaScript frameworks on modern frontend development. Computing Research Journal, 29(3), 78–92.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines.

Journal of Business Research, 104, 333-339.

Sunny, A. R., Alam, R., Sadia, A. K., Miah, Y., Hossain, S., & Mofiz, S. B. (2020). Factors affecting the biodiversity and human well-being of an ecologically sensitive wetland of North Eastern Bangladesh. *Journal of Coastal Zone Management*, *23*(1), 471.

Sunny, A. R., Sazzad, S. A., Prodhan, S. H., Ashrafuzzaman, M., Datta, G. C., Sarker, A. K., ... & Mithun, M. H. (2021b). Assessing impacts of COVID-19 on aquatic food system and small- scale fisheries in Bangladesh. Marine policy, 126, 104422.

Sunny, A.R., Hassan, M.N. Mahashin, M., Nahiduzzaman, M. 2017. Present status of hilsa shad (Tenualosailisha) in Bangladesh: A review. Journal of Entomology and Zoology Studies, 5 (6): 2099-2105.

Titchkosky, L., Arlitt, M., & Williamson, C. (2003). A performance comparison of dynamic Web technologies. *ACM SIGMETRICS Performance Evaluation Review*, *31*(3), 2-11.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. British Journal of Management, 14(3), 207-222.

Wilson, N., Keni, K., & Tan, P. H. P. (2019). The effect of website design quality and service quality on repurchase intention in the E-commerce industry: A cross-continental analysis. *Gadjah Mada International Journal of Business*, *21*(2), 187-222.

Zhang, L., & Wang, H. (2021). Web3 and blockchain: A paradigm shifts in digital ecosystems. Computers & Security, 112, 102488.