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Comparison of the flexibility of standard Salesforce components and custom components in Lightning Web Components

Porównanie elastyczności standardowych komponentów Salesforce z niestandardowymi w Lightning Web Components

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Abstract
In modern business environments, flexibility and adaptability in customer relationship management solutions are increasingly important. This study examines the flexibility of Salesforce's standard components compared to custom-developed components in Lightning Web Components by assessing each type's customization and adaptability to business-specific needs. The research sets forth three primary hypotheses: that custom components are more adaptable to unique business requirements, that custom components enhance user satisfaction through better interface adaptation, and that they provide improved responsiveness across various devices. The methodology involved A/B testing with two groups, each evaluating either standard or custom Salesforce components on desktop and mobile devices. The evaluation focused on four flexibility metrics: CSS customizability, responsiveness, parameter flexibility, and user acceptability. Data collection included code analysis, component behavior observations, and user surveys. Findings indicate a significant flexibility advantage for custom components across all measured characteristics, confirming the hypotheses. In conclusion, the research demonstrates that custom components offer substantial flexibility benefits over standard components, particularly in enhancing user satisfaction and adaptability. These results suggest custom components are valuable for enterprises requiring high adaptability in their Salesforce solutions.

Keywords: Salesforce; Lightning Web Components; flexibility; component customization

Streszczenie
We współczesnym środowisku biznesowym elastyczność i zdolność do adaptacji w zarządzaniu relacjami z klientami zyskują na znaczeniu. Niniejsze badanie analizuje elastyczność standardowych komponentów Salesforce w porównaniu z komponentami tworzonymi na zamówienie w technologii Lightning Web Components, oceniając dostosowanie każdego z nich do specyficznych potrzeb biznesowych. Badanie stawia trzy główne hipotezy: że niestandardowe komponenty są bardziej dostosowane do unikalnych wymagań biznesowych, że zwiększają satysfakcję użytkowników dzięki lepszemu dopasowaniu interfejsu oraz że zapewniają lepszą responsywność na różnych urządzeniach. Metodologia obejmowała testy A/B z dwoma grupami, z których każda oceniała standardowe lub niestandardowe komponenty Salesforce na komputerach i urządzeniach mobilnych w czterech kategoriach elastyczności: dostosowywalność CSS, responsywność, elastyczność parametrów i akceptowalność przez użytkowników. Zbieranie danych obejmowało analizę kodu, obserwacje zachowania komponentów i ankiety użytkowników. Wyniki wskazują na istotną przewagę elastyczności komponentów tworzonych na zamówienie we wszystkich mierzonych charakterystykach, co potwierdza postawione hipotezy. Podsumowując, badanie wykazuje, że komponenty tworzone na zamówienie oferują znaczące korzyści w zakresie elastyczności w porównaniu do standardowych komponentów, szczególnie w aspekcie zwiększania satysfakcji użytkowników i zdolności do adaptacji. Wyniki sugerują, że komponenty niestandardowe są wartościowe dla przedsiębiorstw wymagających wysokiej adaptacyjności w rozwiązaniach Salesforce.

Słowa kluczowe: Salesforce; Lightning Web Components; elastyczność; dostosowanie komponentów

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1. Introduction

Salesforce is a leading global provider of cloud solutions with a specialization in Customer Relationship Management (CRM) systems [1]. The salesforce platform allows for companies to manage customer data, automate the sales processes, marketing as well as customer service and integrate with various external applications [2]. Salesforce platform has a variety of tools and services that help enterprises effectively manage their customer relationships and optimize business processes [4].

One main element in Salesforce platform is the Lightning Web Components (LWC) which facilitates the creation of dynamic and interactive web applications [5].

Standard Salesforce components are based on Salesforce Lightning Design System (SLDS) styles to ensure uniformity in the look and behavior of applications [6]. However, despite quick implementation and ready-to-use reasons behind them, standard components have some disadvantages too. They have inflexible SLDS styles that are hard to override and just limited number of attributes that complicates their

customization based on specific needs [7]. Consequently, when changes occur within the user interface e.g., increasing font size or adapting it for mobile view you are often required to rebuild standard components from scratch again [8].

However, custom LWC components are a lot more flexible. They come with customization features that allow for any number of attributes and dynamic styling to be specified [9]. SLDS Styles do not limit the custom components making them quite easy to adjust and extend as well. This means that on screens with limited dimensions, these components will not lose their appearance or functionality even if the font is increased [10].

To introduce the motivation behind this topic, it stems from the increasing demand for adaptable and user-centered CRM solutions that can seamlessly respond to diverse business needs in a dynamic digital environment. The following hypotheses aim to investigate standard and custom Lightning Web Components flexibility and customization capabilities on Salesforce platform Hypothesis:

- H1: Compared to standard Salesforce components, Custom Lightning Web Components bring about more adaptability regarding business specific requirements.
- H2: Through better interface adaptation responding effectively user needs, utilization of custom LWC enhances higher end-user satisfaction.
- H3: In contrast to standard Salesforce components, custom LWCs offer greater responsiveness in applications.

The main contribution of the paper is analysis and comparison regarding the flexibility between standard Salesforce components and custom-developed ones within the framework of Lightning Web Components.

2. Literature Review

Salesforce provides cloud CRM solutions, offering a large variety of tools supporting customer relationship management and business process automation. The platform is open to integration with other systems, so the tool can be very flexible in modern business. Todorić analyzes, in work [1], shows the place and role of Salesforce in the context of contemporary enterprises in relation to reducing operational costs and increasing revenues.

The works [2, 5, 7] focus on the application development process on the Salesforce platform. Gupta [2] describes the techniques of cloud application development using Salesforce.com and Force.com. He shows how to create custom applications on the Salesforce platform. Fawcett [5] explores standard and custom architecture and development practice on the Salesforce Lightning Platform. In [7], Weinmeister explains how to build applications on the Salesforce declarative tools in the creation of solutions without code writing.

The authors of article [4] contrast various low-code platforms - including Salesforce Lightning - to prove their efficiency in management of business processes. Their study shows that low-code platforms like Salesforce Lightning reduce development time and integration costs.

The literature [8–10] focuses on the application of custom Lightning Web Components. Shrivastava [8] views the practical aspects of applying the lightning components of Salesforce while showing great attention to their responsiveness and interactivity. [9] goes on to present a step-by-step comprehensive guide on Salesforce Lightning Web Components. It manifests advanced skills regarding LWC in relation to debugging, testing, and integration. The work [10] provides detailed instructions on how to develop LWC components.

The author highlights in work [6] how to apply DevOps practices within the Salesforce environment, emphasizing that implementing DevOps improves collaboration, reduces errors, and speeds up the delivery of high-quality applications. DevOps is a set of practices that combine software development and IT operations to enable faster and more reliable application delivery.

Similar research has been conducted in positions [12, 13], where authors discuss the role of user interface design and user experience in a Salesforce context. According to one of these authors [12], UI (User Interface) patterns should be consistent to create harmonious user experiences, while Franz and Kauer-Franz [13] present some data-driven approaches to UX design.

In the article [14], a delta modeling is proposed to manage user interfaces for web application product lines. Their research has shown that the combination of Model-Driven Engineering concepts with Software Product Line provides automatic generation and customization of User Interfaces.

In the work [15] is presented how to develop applications using Salesforce and tools for Lightning Web Components, showing how to use Salesforce in the creation of applications scalable and intuitive.

The authors [16] focus on how the DCDM (Data Cloud Data Model) architecture reduces integration and maintenance costs while improving system scalability and flexibility in article.

Researchers [17] developed and applied a framework to enhance agility within manufacturing companies. Using a three-phased, iterative approach, the framework assessed agility capabilities across areas such as product, process, and organization. Through practical case studies, the authors demonstrated how this approach could improve operational scalability, quality control, and responsiveness in dynamic market conditions.

Salesforce is a platform that is used to a great extent in making flexible and scalable applications. Equipped with the power of standard and custom-made components, it enables rapid deployment and customization to meet business needs in solutions. According to the authors' knowledge, no existing research has thoroughly addressed the flexibility differences between standard and custom Salesforce components.

3. Materials and Methods

3.1. Metrics

Flexibility refers to the extent with which Salesforce elements can be modified under different conditions and as required by the user without the need for significant reconstruction.

In this study, flexibility is measured based on the following four characteristics:

- C1: The number of CSS variables that can be customized,
- C2: The responsiveness of the components in case of a change in the mobile and desktop views,
- C3: The number of parameters passed to the component,
- C4: The level of acceptability based on user feedback regarding appearance, ease of use, and overall satisfaction.

C1, C2, and C3 which are related to CSS customization, responsiveness, and the number of configurable parameters will be evaluated through code analysis and observation of component behavior. These metrics assess how adaptable and customizable the components are under different conditions. Acceptability, will be measured through user feedback gathered via a post-experiment survey, focusing on appearance, ease of use, and satisfaction. Together, these metrics offer a comprehensive view of each component's flexibility.

Each characteristic aims to reach the highest possible value. The higher the values for these characteristics, the greater the flexibility of the components. Flexibility will be calculated using the following formulas, which have been defined by the authors:

$$Flexibility = f(C_1, C_2, C_3, C_4) \quad (1)$$

$$Flexibility^{j} = w_1 \times \frac{C_1^{j}}{\max(C_{1,}^{1} C_1^{2})} + w_2 \times \frac{C_2^{j}}{\max(C_{2,}^{1} C_2^{2})} + w_3 \times \frac{C_3^{j}}{\max(C_{3,}^{1} C_3^{2})} + w_4 \times \frac{C_4^{j}}{\max(C_{4,}^{1} C_4^{2})} \quad (2)$$

where C1, C2, C3, C4 are characteristic values, w_1, w_2, w_3, w_4 = 0.25 and j = 1, 2, refers to the group of components, where j = 1 represents standard components and j = 2 represents custom components.

The sum of all weights $\sum w_{1,2,3,4} = 1$, as all characteristics are given equal importance (0.25). This ensures that each feature contributes equally to the overall flexibility score.

The following formula is used to calculate the average score for characteristics C1, C2, and C3:

$$C_x = \frac{\sum_{i=1}^{n_x} l_{xi}}{n_x} \quad (3)$$

where x = 1, 2, 3, refers to the number of the calculated characteristic and n_x is the number of selected components. l_{xi} represents the result obtained by the component.

The following formula is used to calculate the average score for characteristic C4:

$$C_4 = \frac{\sum_{i=1}^{p} \sum_{j=1}^{q} o_{ij}}{pq} \quad (4)$$

where: i is the number of participants in the study, j is number of questions in survey, p is the number of participants, q is the number of questions and o_{ij} is the score given by participant i on question j.

3.2. Research Group

The research sample was divided into two groups following the A/B testing method, where each group would perform identical tasks but on different types of components. The first group tested standard Salesforce components, while the second group focused on custom LWC. According to Nielsen's study [19] on optimal sample sizes, each group was composed of 8 participants to maximize the reliability and depth of findings.

All participants were selected for their familiarity with Salesforce and LWC development, holding the Platform Developer I certification and no higher-level certifications. This ensured a consistent level of technical skill and familiarity across groups without introducing variances in expertise that could skew the analysis.

Homogeneity of the group meant all participants could perform the tests at a similar level of skills, which increased the reliability of the results obtained. This uniformity allowed for a more precise comparison of the flexibility and functionality of the standard and custom components under study.

3.3. Research Stand

The participant will sit in a small, neutrally colored room with artificial lighting to aid focus on the task. Seated in a swivel chair at a desk, the participant will have access to a keyboard, mouse, 27-inch monitor, and a high-performance desktop computer running Windows, equipped for setting up test applications. A mobile phone is also provided to test component flexibility on a mobile device.

The computer includes a Samsung 970 Evo Plus M.2 1TB drive, AMD Ryzen 9 5950X processor, Gigabyte B550 GAMING X V2 motherboard, 64GB RAM, and ASRock Radeon RX 6800 XT graphics card, with ENDORFY Navis F240 cooling.

The mobile device is an iPhone 15 with iOS 17.5.1, 128GB storage, 6.1" OLED display, 6GB RAM, and Apple A16 Bionic processor.

This setup offers optimal conditions for testing and analyzing the flexibility of both standard Salesforce

components and custom LWCs, aligning with current technological standards.

3.4. Research Objects

Standard Salesforce components are pre-designed User Interface (UI) elements with SLDS styling, offering limited customization. Their design follows the SLDS, ensuring visual consistency but restricting personalization. Standard components are available in Salesforce documentation [18].

LWC components are developed to meet the particular needs of users. They allow more flexibility in terms of style and additional attributes that will help better suit individual business needs.

In selecting research objects for standard Salesforce components and custom LWC, key criteria included practical applicability, focusing on commonly used business components, availability for Salesforce developers, and functional diversity to demonstrate the range of customization and limitations.

In the research, the following standard Salesforce components have been selected:

- Lightning Input: A checkbox input field allowing selection of options.
- Lightning Button: A clickable button for triggering actions.
- Lightning Slider: An adjustable slider for selecting numeric values.
- Lightning Combobox: A component that enables users to choose option from picklist.

On the other hand, custom LWC components include:

- Custom Input: A checkbox with enhanced customization options, allowing adjustments to the color and size of the checkbox element. Additionally, it supports styling for the selected icon.
- Custom Button: Designed for advanced customization, this button supports text styling and background options. Configurable padding, borders, rounded corners, and hover states make it highly responsive. It surpasses the standard Lightning Button, ideal for applications requiring rich text and detailed styling.
- Custom Slider: This slider offers flexible styling and advanced features, including a dynamic range indicator displaying the current value. Customizable colors, backgrounds, and shadows through CSS variables enhance visual control. It includes toggle functionality, validation, and adjustable value ranges, fitting scenarios that need precise input and adaptable styling.
- Custom Combobox: A highly customizable combobox with options for color scheme adjustments, selectable icons for open and closed states, rich text support for option descriptions, and optimized display for larger fonts, ensuring clear readability and a tailored visual experience.

In the research, standard Salesforce components were set to default, and custom LWCs were created from scratch using Visual Studio Code. Testing occurred on two Lightning pages: one with standard and one with custom components, within a dedicated Salesforce Sandbox with unique user accounts for each participant. Various browsers, devices, and tools like Chrome DevTools and Salesforce Lightning Inspector supported debugging and performance analysis.

These preparations of the research objects enabled a comprehensive analysis of flexibility in both kinds of components, thus forming a basis for further evaluation and comparisons.

3.5. Description of the Experiment

The experiment was designed to systematically compare the flexibility of standard Salesforce components and custom LWCs across desktop and mobile devices. Two groups of 8 participants each were involved: one group tested standard components, while the other worked with custom components. This setup ensured that each component type was evaluated under similar conditions.

First, participants logged into the Salesforce Sandbox environment on a desktop computer, using dedicated user accounts to maintain consistent testing parameters. Once logged in, they accessed designated test pages where they could view either standard or custom components, depending on their group assignment. Each participant initially examined the default appearance and functionality of the components at standard screen settings, paying attention to usability, responsiveness, and the overall look and feel on the desktop platform.

To familiarize themselves with the components, participants completed specific tasks designed to highlight each component's unique functionality. Tasks provide practical insights into how well each component could perform the intended functions and whether there were any constraints or usability issues.

Following the desktop testing, participants shifted to a mobile device to examine the components in a different context. They accessed the Sandbox environment on their phones and repeated the same set of tasks, observing how each component responded in both portrait and landscape orientations. Participants also adjusted font sizes to test the components' adaptability to mobile displays, assessing any differences in appearance or functionality.

After completing the desktop and mobile tests, participants will fill out a survey to capture their impressions of each component type's flexibility and functionality. The questionnaire will use a rating scale from 1 to 5, where 1 represents the lowest score and 5 the highest. Key areas of focus will include ease of customization, responsiveness to various display conditions, and overall user satisfaction. Feedback collected from both groups will provide a detailed comparative analysis of the flexibility offered by standard versus custom LWC components.

Tasks for participants are:

- Select the checkbox.
- Click the button.
- Adjust the response on the slider.
- Move 2 responses to the second column.

Survey for participants contains following questions:

- Q1: How would you rate the ease of using this component while performing tasks
- Q2: How would you rate the visual appeal and aesthetics of this component?
- Q3: How would you rate the comfort of working with these components?
- Q4: Is using these components enjoyable and convenient for you?
- Q5: What are your overall impressions of using these components?
- Q6: How likely is it that you would want to use similar components in the future?

3.6. Experiment Scenario

The detailed steps and actions for both groups are outlined in the experiment scenario – Table 1.

Table 1: Experiment scenario

Name: Component Acceptability Testing		
Objective: Verification of the acceptability of the created Salesforce components using devices with different resolutions during task execution.		
Initial Conditions: The user has received login credentials and access to the application on the Salesforce Sandbox, as well as to the testing devices.		
End Conditions: The survey has been completed by the participant.		
Number of users participating in the study: 8 (Group A)		
Steps		
No.	Task Description	Expected Outcome
1.	The user logs into the created Salesforce Sandbox account on the computer.	The user is logged in.
2.	The user navigates to the assigned application.	The user is in the application with components.
3.	The first task is displayed for the user to interact with the component.	The user begins the test on the computer.
4.	The component is displayed to the user.	The user interacts with the component to complete the task.
5.	The user has completed the task.	The user moves to the next task.
6.	The user completes the remaining tasks on the computer.	The user has completed all tasks on the computer.
7.	The user logs into the created Salesforce Sandbox account on the mobile device.	The user is logged in.
8.	The first task is displayed for the user to interact with the component.	The user begins the test on the mobile device.
9.	The component is displayed to the user.	The user interacts with the component to complete the task.
10.	The user has completed the task.	The user moves to the next task.
11.	The user completes the remaining tasks on the mobile device.	The user has completed all tasks on the mobile device.
12.	The user receives a survey to complete.	The user completes the survey.

4. Results

4.1. C1: The Number of CSS Variables That Can Be Customized

This metric evaluates the flexibility of components by measuring how many CSS variables can be customized for each component. It reflects the control developers have over the styling of both standard and custom components.

The number of customizable CSS variables for each component type is presented in Table 2. The data compares the customization options available between standard and custom components. This analysis is based on the Salesforce documentation review [18].

Table 2: The number of CSS variables can be customized

Name of component	Type of component	
	Standard components	Custom components
Input	2	18
Button	4	8
Slider	3	11
Combobox	3	12
Sum	12	49

4.2. C2: Responsiveness of the Components

This metric assesses how well each component adapts to different screen sizes, including mobile, tablet, and desktop views. A value of 1 indicates that the component

is responsive and functions correctly across various screen resolutions, while 0 means it does not.

Table 3 presents the responsiveness of components. Responsiveness was tested across the following screen resolutions: 430px x 932px, 2560px x 1440px.

Table 3: Responsiveness of the components

Name of component	Type of component	
	Standard components	Custom components
Input	1	1
Button	0	1
Slider	1	1
Combobox	0	1
Sum	2	4

4.3. C3: Number of Parameters Passed to the Component

The ability to pass parameters to a component plays a significant role in its flexibility. Each component allows for a specific number of parameters to be passed, which influences how it can be customized or extended.

The number of parameters passed to each component, comparing standard components with custom components is shown in Table 4. This analysis is based on the Salesforce documentation review [18].

Table 4: The number of parameters passed to the component

Name of component	Type of component	
	Standard components	Custom components
Input	8	19
Button	10	17
Slider	10	22
Combobox	12	18
Sum	40	76

4.4. C4: The Level of Acceptability Based on User Feedback

Acceptability was assessed through a survey, where participants rated components based on appearance, ease of use, and overall satisfaction. The feedback was collected using a 1 to 5 scale, with 1 being the lowest level of acceptability and 5 the highest. Average survey question scores are presented in Figure 1.

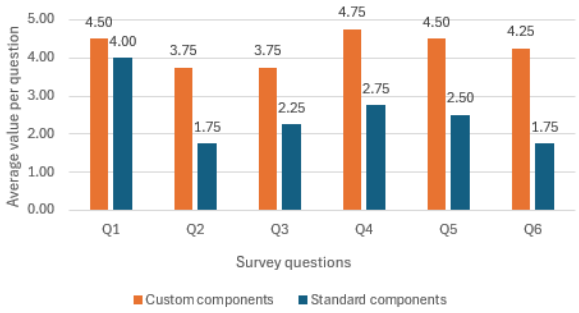

Figure 1: Average survey question scores.

4.5. Summary

This section provides an overview of the flexibility results for both standard and custom components based on the analysis of key characteristics. The characteristics were evaluated and summarized in a Table 5 that includes the total calculated values for each component type.

Table 5: Summary of Flexibility Characteristics for Standard and Custom Components

Characteristic	Characteristics of change	Values		Unit of measure
		Standard components	Custom components	
C1	max	14	26	pcs
C2	max	2	4	pt
C3	max	10	26	pcs
C4	max	120	204	pt

To visually represent the results, a chart (Figure 2) is included, showing the average values for considered characteristics. This highlights the differences between the component types for each characteristic.

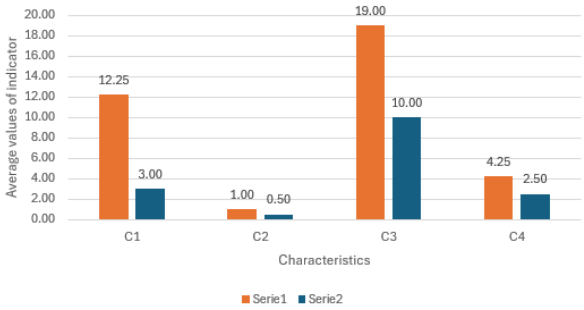

Figure 2: Average results of characteristics.

Additionally, the final numbers of flexibility score, which combines all four characteristics (according to Formula (2)), is displayed in Figure 3. This overall score helps in determining which component type demonstrated greater flexibility in various conditions.

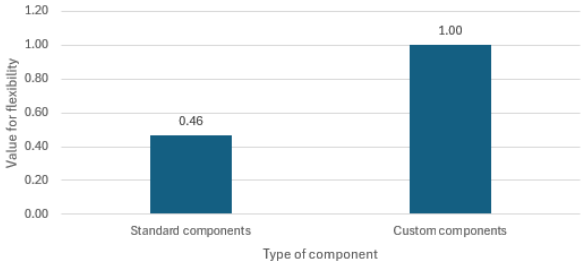

Figure 3: Flexibility index chart.

This data provides a clear comparison between standard and custom components, offering insights into the flexibility and adaptability of each type within the tested scenarios.

5. Discussion

The main objective of this study was to evaluate and compare the flexibility of standard Salesforce components and custom LWC in terms of adaptability, responsiveness, and customization. This research aimed to determine whether custom LWC offered more flexibility compared to standard components, thus providing better user satisfaction and adaptability to business needs.

The results showed that custom LWC consistently outperformed standard components across all metrics. Custom components were approximately 75% better in C1, indicating a significant improvement in the ability to customize styles. For C2, custom components were 50% more responsive compared to standard components, demonstrating their superior adaptability to different screen sizes. In terms of C3, custom LWC allowed for 90% more parameters to be passed, providing greater customization capabilities. Finally, for C4, custom components scored 70% higher in user satisfaction, reflecting their better overall usability and appearance.

The calculated flexibility index also showed a huge difference between the two groups, with custom components being more than twice as flexible as standard components. The differences were further highlighted in the summary of flexibility characteristics, where custom components consistently demonstrated better adaptability across all metrics, as illustrated in Table 2, Table 3, and Table 4, as well as Figure 1 and Figure 2.

These findings align with previous research, such as that presented in [14], which discussed the effectiveness of model-driven engineering for user interface customization. The results of this study confirmed that using custom LWC enhances flexibility and responsiveness, similar to the benefits observed in [14] with delta modeling for customizable user interfaces. Furthermore, this study's findings are consistent with Shrivastava's observations in [8], which emphasize the benefits of using custom components for improved responsiveness and interactivity.

In relation to the stated hypotheses, the results support all three hypotheses. H1, which posited that custom LWC offer greater adaptability for business-specific requirements compared to standard components, was confirmed by the significant increase in C1, C2, and C3, as illustrated in Table 5 and Figure 2. H2, which suggested that better interface adaptation in custom LWC would result in higher user satisfaction, was also supported by the survey results (C4), where custom components received higher scores, as shown in Figure 1. Finally, H3, which proposed that custom components provide greater responsiveness compared to standard components, was confirmed by the higher C2 values observed for custom LWC, as illustrated in Table 4.

In conclusion, this study demonstrated that custom LWC offer significant advantages in terms of flexibility, responsiveness, and user satisfaction compared to standard Salesforce components. These results underscore the importance of component customization to meet specific business needs and enhance user experience. The findings are consistent with existing literature, indicating that investing in custom component development may be more beneficial for organizations looking to improve the adaptability and usability of their Salesforce applications.

6. Summary

The study aimed to assess and compare the flexibility of standard Salesforce components and custom LWC components, focusing on adaptability, responsiveness, and customization. The goal was to determine if custom LWCs provide greater flexibility, enhancing user satisfaction and meeting business needs more effectively than standard components.

The study's limitations include the focus on a homogenous group of participants, each with a Platform Developer I certification, and a survey-based methodology with a limited sample size, potentially narrowing the generalizability of results. Furthermore, the analysis was restricted to four components, which limits insights to a subset of Salesforce tools. Future studies could address these limitations by including a broader participant pool, increasing the sample size, and analyzing a wider range of components to validate and extend these findings across more varied use cases in Salesforce.

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