

# INCORPORATING CROSS-CULTURAL DESIGN INTO THE USER INTERFACE

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## ABSTRACT

*This paper focuses on the significance of culturally tailored digital products for Arabic-speaking users, examining how cultural relevance influences user satisfaction and engagement. This research study aimed to provide guidelines for incorporating cross-cultural designs in interfaces for Arabic-speaking users. Utilizing Hofstede's cultural dimensions as a framework, the study employs A/B testing, surveys, and interviews to reveal the importance of cultural inclusivity in interface design. The finding of this research demonstrated that the ease of understanding and interaction with digital products varies for native Arabic speakers and that feature and functionality requirements differ based on users' nationality. This, in turn, highlighted the pivotal role of culturally adapted UI/UX in improving user experience, advocating for digital products that are both empathetic and inclusive. By emphasizing cultural considerations, this research contributes to the broader discourse on creating user-centric digital environments that resonate with a diverse global audience, aiming to enhance connectivity between brands and their diverse user bases.*

## KEYWORDS

*Cross-Cultural Design, User Interface (UI), Cultural Adaptation, Hofstede's Cultural Dimensions*

## 1. INTRODUCTION

The advent of global digitalization necessitates an understanding of cross-cultural design in user interfaces to cater to diverse user bases effectively. The historical context of interface design underscores the dominance of Western-centric models, which fail to address the cultural nuances of global audiences. The globalization of software development has been significantly influenced by American companies, yet the need for localization to meet global market demands is evident [1]. The concept of localization extends beyond mere translation, incorporating cultural markers and design elements to enhance usability and user satisfaction across different cultures [2].

In the field of human-computer interaction, the significance of designing User Interfaces (UI) that resonate with end-users' needs cannot be overstated. Essential attributes such as simplicity and intuition are key to mitigating user dissatisfaction [3, 4]. Moreover, a successful UI must navigate the complex terrain of users' perceptual, cognitive, and cultural preferences [5, 6]. Within the rapidly expanding e-commerce sector, which Brohan [7] notes has grown from 9.2 million to over 26.5 million sites from 2019 to 2023, the role of UI becomes even more pivotal. This surge underscores a global shift towards online shopping, spurred by technological advancements, and underscores the urgency for e-commerce platforms to prioritize user-friendly and culturally sensitive UI designs to cater to a diverse and expanding online marketplace.

The need for cultural adaptation, or localization, in UI design emerges as a critical consideration in this context. Localization extends beyond mere translation; it encompasses adapting to cultural nuances, local regulations, and market trends to offer a tailored product experience in specific regions [8].

This adaptation process involves refining language, visual elements, symbols, and colors to align with local preferences, thus creating an experience that feels native to the user. Effective localization embeds cultural nuances into the product's core, enhancing user engagement and satisfaction [9, 10, 11]. Research by Boshers [12] supports this statement, revealing distinct preferences among users from different cultural backgrounds in terms of website design, navigation, and content presentation, which in turn influences their satisfaction and loyalty towards digital platforms.

Recent research has further explored the influence of cultural dimensions on the design of Arabic websites, indicating a preference for culturally relevant features among Arabic users. However, there is a recognized gap in precision and empirical data, suggesting the need for more in-depth studies involving direct engagement with users to gather comprehensive insights [13].

Furthermore, the adaptation of user interfaces to cater to the specific cultural context of Arabic-speaking users presents unique challenges and opportunities. The Arabic language's right-to-left reading pattern, along with cultural nuances such as the importance of color symbolism and the preference for certain navigational structures, necessitates a nuanced approach to interface design. Research exploring the design preferences of Arabic-speaking users highlights the importance of considering these cultural and linguistic characteristics to ensure the usability and accessibility of digital platforms [12, 13].

In the context of Arabic-speaking users, the adaptation of user interfaces goes beyond simple translation, requiring careful consideration of cultural norms, values, and the right-to-left reading pattern. Research has emphasized the necessity of cultural sensitivity in design to foster usability and satisfaction among Arabic users. These studies have revealed the intricate relationship between cultural expectations and design preferences, illustrating the importance of localized content and culturally relevant design elements in creating inclusive and accessible digital environments [11, 14].

The significance of cross-cultural considerations in user interface design is increasingly acknowledged in the domain of global digital product development. A pivotal aspect of this discourse involves the application of Hofstede's cultural dimensions framework, which offers a systematic approach to understanding and integrating cultural differences in design practices [15, 16].

Studies have employed Hofstede's dimensions to explore cultural influences on design preferences across different populations, underscoring the critical role of cultural insights in creating user-centered digital environments. These investigations reveal that design elements which resonate with the cultural expectations of users can significantly enhance user engagement and satisfaction, emphasizing the necessity of cultural adaptation in the design process [17].

Furthermore, the impact of cultural dimensions on user preferences and behaviors extends to e-commerce and web design, as demonstrated by research undertaken on localization strategies [10, 18, 19]. These investigations shed light on the critical role of cultural adaptation in driving user engagement and satisfaction in digital platforms, particularly in the context of the Arabic-speaking market. The research underscores the potential for localized design to enhance the effectiveness of

e-commerce platforms, suggesting that cultural considerations are integral to the success of online businesses in culturally diverse markets.

One of the key Hofstede dimensions of this theory used in this paper is individualism vs. collectivism [15].

- Individualism refers to societies where the ties between individuals are loose. In these cultures, people are expected to look after themselves and their immediate family only. Personal achievements and individual rights are highly valued. Examples of individualistic societies include the United States, Canada, and Western European countries. In these cultures, the emphasis is on personal freedom, self-reliance, and individual initiative.
- Collectivism describes societies where individuals are integrated into strong, cohesive in-groups, often extended families, which continue protecting them in exchange for unquestioning loyalty. In collectivist cultures, the group's needs and goals are prioritized over individual desires. Countries such as China, Japan, and many African and Latin American nations exemplify collectivist societies. Here, harmony, group cohesion, and loyalty are paramount.

The implications of this dimension are profound in various aspects of life, including workplace dynamics, educational systems, and interpersonal relationships – and in this paper user experience. Another of Hofstede's cultural dimensions used in this analysis is the Masculinity vs. Femininity dimension, which explores the distribution of emotional roles between the genders and the value placed on traditionally masculine or feminine traits within a society [15, 16].

- Masculinity in this context refers to cultures that value traits such as assertiveness, competitiveness, and material success. In these societies, gender roles are more distinct, with men expected to be ambitious and focused on career achievements, while women are often seen as nurturing and concerned with quality of life. Countries like Japan, Germany, and the United States typically score high on the masculinity scale.
- Femininity describes cultures that prioritize traits such as cooperation, modesty, and care for the weak. In these societies, gender roles are more fluid, and both men and women are encouraged to be nurturing and supportive. Scandinavian countries like Sweden and Norway are examples of feminine cultures, where the emphasis is on work-life balance, equality, and quality of life.

The implications of this dimension are significant in various domains, including workplace dynamics, education, and social policies – and again, in this paper, user experience.

This paper embarks on an exploration of incorporating cross-cultural design in UIs, particularly focusing on the needs of Arabic-speaking users. Guided by Hofstede's cultural dimensions theory, which asserts that cultural values significantly influence user behavior and preferences in digital, this paper aims to examine the nuances of UI design across cultural boundaries.

This approach ensures that digital products are accessible, intuitive, and engaging for users worldwide [15, 20]. Through incorporating these insights, the paper aims to highlight the critical role of cross-cultural design in developing UIs that cater to the diverse needs of the global user base, contributing to the creation of more inclusive and culturally resonant digital products.

As digital landscapes grow increasingly diverse, tailoring digital products to the cultural preferences and expectations of users from various backgrounds becomes essential. By achieving

this, companies can deliver a user experience that is both familiar and personalized, enhancing engagement and conversion rates while fostering brand loyalty.

## 2. METHODOLOGY

This research employed a mixed-method approach to explore the ease of interaction and understanding of digital products by native Arabic speakers, focusing on UI layout orientation and cultural variations in feature preferences. The study aimed to test hypotheses concerning the impact of Right-To-Left (RTL) versus Left-To-Right (LTR) layout designs in Arabic and English, respectively, and examine feature and functionality preferences among users based on nationality. The experiment involved two primary hypotheses:

- Hypothesis ( $H_1:1$ ) - Native Arabic speakers find it easier to understand and interact with digital products designed in a right-to-left layout in the Arabic language compared to a left-to-right layout in the English language.
- Null Hypothesis ( $H_1:0$ ) - There is no difference in the ease of understanding and interaction for native Arabic speakers between digital products designed in a right-to-left layout in the Arabic language and a left-to-right layout in the English language.
- Hypothesis ( $H_2:1$ ) - There is a differentiation in feature and functionality requirements in digital products among Arabic-speaking users based on their nationality.
- Null Hypothesis ( $H_2:0$ ) - There is no differentiation in feature and functionality requirements in digital products among Arabic-speaking users based on their nationality.

The rationale behind these hypotheses stems from the recognition of cultural and linguistic factors shaping user interaction patterns. By examining user preferences and performance in RTL vs. LTR layouts and exploring nationality-based variations in feature requirements, this research aims to offer insights into culturally sensitive UI/UX design practices. It incorporates Hofstede's cultural dimensions to contextualize findings, seeking to provide actionable recommendations for creating more inclusive and user-centric digital products for the global Arabic-speaking population [15, 16].

### 2.1. Research Design

Participants proficient in both Arabic and English were recruited for experimental A/B testing sessions with an e-commerce mobile application interface in both languages. The design integrated quantitative measures such as task completion time and error rates with qualitative insights from post-testing questionnaires and interviews.

Finding participants who were fluent in both Arabic and English for an experiment was quite challenging since the pool of bilingual individuals proficient in both languages is relatively small compared to monolingual speakers. Additionally, these bilingual individuals often belong to specific demographics, such as expatriates, international students, or professionals in certain fields, making them potentially harder to reach. Furthermore, cultural and social factors may influence their willingness to participate in research, as some may have reservations about the nature of the study or concerns about privacy

Consequently, although the researchers employed targeted recruitment strategies to successfully engage bilingual participants, only eighteen individuals, averaging 24 years old, participated in the study. These bilingual participants, selected for their relevance to the study's linguistic criteria, represented a range of experiences and backgrounds, enhancing the diversity of perspectives on the UI designs tested.

Hence it was also decided to employ a broader data collection strategy through a mixed-method survey disseminated across social media platforms, leveraging Hofstede's cultural dimensions to assess variations in user requirements by nationality.

## 2.2. Data Collection

The study commenced with pre-testing questionnaires to collect demographic insights, followed by A/B testing to quantitatively evaluate user interactions. Post-testing questionnaires and open-ended interviews provided qualitative feedback on user preferences and experiences. Additionally, a mixed-method survey expanded the investigation into cultural influences on feature preferences.

## 2.3. Experiment Setup

Testing sessions were held in a controlled setting using a clickable prototype displayed on a mobile device. Researchers focused on usability assessment and feedback collection, ensuring a comprehensive evaluation of the user experience.

For the purpose of this research study, an e-commerce mobile application was developed in Figma with both English and Arabic language interfaces (Figure 1). All experimental participants were asked to perform a series of tasks in this bilingual e-commerce mobile application. The tasks included:

- Task 1 - Sign up and create an account in the Figma application.
- Task 2 - Navigate to men's wear and select suits from the categories.
- Task 3 - Select the Brioni brand suit and change the size to medium (Figure 1).
- Task 4 – Place the order of medium-size Brioni brand suits.

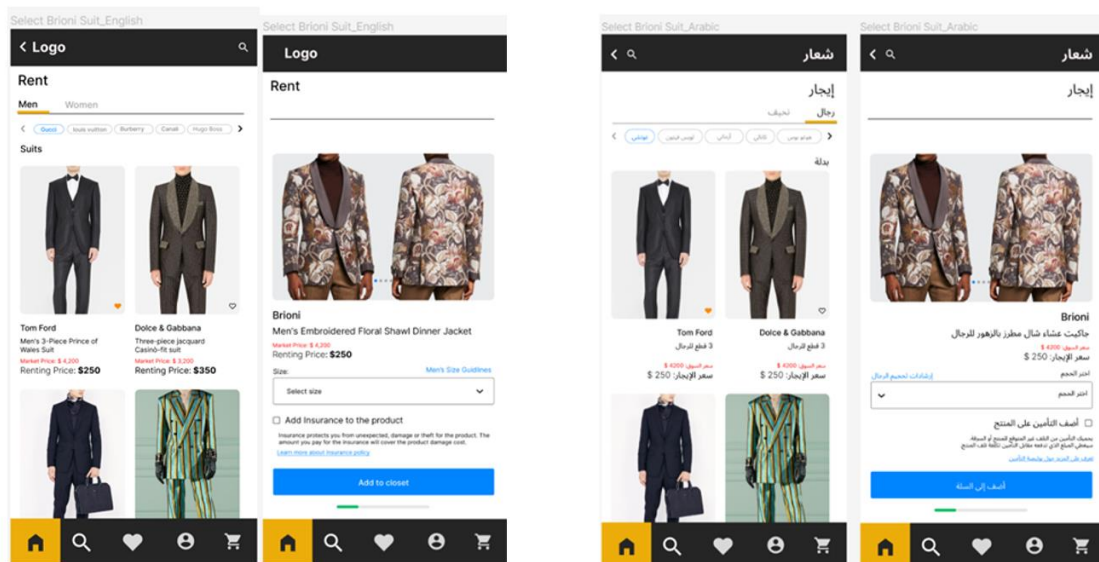


Figure 1: Experimental Figma prototype interface used in the experiment (English and Arabic)

After the participant completed all the four tasks in the Arabic language user interface, the participants then repeated the tasks using the English language user interface. Once all the tasks were completed in both languages, participants completed a post-test survey and were interviewed by the researchers on their experiences with the two interfaces.

## 2.4. Experimental Setup Limitations

When conducting an experiment to evaluate the differences between Arabic and English speakers using a particular interface, several limitations or shortcomings related to the experimental platform or system can arise [21, 22]:

- *Language Support*: The platform may not fully support both languages equally, leading to inconsistencies in user experience. For example, Arabic is written from right to left, which can cause alignment and display issues if the interface is not properly localized.
- *Font and Typography*: The default fonts used in the interface might not be optimized for Arabic script, resulting in readability issues. Arabic characters can be more complex and require specific fonts to ensure clarity.
- *Input Methods*: The system might not accommodate different input methods effectively. Arabic speakers might use different keyboards or input methods that the platform does not support well, leading to frustration and errors.
- *Cultural Context*: The interface might include icons, symbols, or metaphors that are culturally specific to English speakers and not easily understood by Arabic speakers. This can affect the usability and intuitiveness of the interface.
- *Technical Performance*: The platform might have performance issues such as slower load times or higher error rates when switching between languages. This can be particularly problematic if the system is not optimized for handling multiple languages simultaneously.
- *Testing Environment*: The experimental setup might not accurately reflect real-world usage conditions. For instance, if the experiment is conducted in a controlled environment, it might not account for the diverse contexts in which users typically interact with the interface.
- *User Feedback Mechanisms*: The system might not have robust mechanisms for collecting and analyzing feedback from users in both languages. This can lead to a lack of actionable insights and hinder the ability to make meaningful improvements.
- *Accessibility Features*: The platform might lack adequate accessibility features for both language groups, such as screen readers or text-to-speech options, which can disproportionately affect users with disabilities.

Addressing these limitations requires careful planning and consideration of the unique needs of both Arabic and English speakers to ensure a fair and effective evaluation of the interface.

## 3. DATA ANALYSIS

A rigorous analysis of the experimental data collected from the participants was undertaken. The data was synthesized using descriptive statistical analyses, and the results are presented using tables, graphs, and result discussions. The analysis encompassed measures such as means, standard deviations, and confidence intervals, delivering a comprehensive view of participants' task performances.

### 3.1. Experimental Results

A paired samples t-test was conducted to compare the number of errors made by experimental participants in both the Arabic and English language across different tasks.

A paired sample t-test was deemed to be particularly useful in this experiment since two related groups were being compared. This provided control for individual variability, as each subject served as their own control. Additionally, the paired sample t-test, in this instance, has more

statistical power than an independent samples t-test since it accounted for the correlation between paired observations. This means it was more likely to detect a true effect if one existed.

Another factor which led to the choice of a paired sample t-test over other statistical test was that the assumptions are generally simpler to meet compared to other methods. The primary assumptions being that the differences between pairs are normally distributed and that the pairs are randomly selected. The results of the t-test calculations are shown in Table 1.

- For Task 1, the t-value is 2.364, with 17 degrees of freedom and a p-value of 0.015. The mean difference between errors made in Arabic and English is 0.389, with a standard error of 0.164. The 95% confidence interval for the mean difference is 0.103 to infinity. The Cohen's d effect size is 0.557, with a standard error of 0.298. The 95% confidence interval for Cohen's d is 0.132 to infinity.
- For Task 2, the t-value is 3.500, with 17 degrees of freedom and a p-value of 0.001. The mean difference between errors made in Arabic and English is 0.778, with a standard error of 0.222. The 95% confidence interval for the mean difference is 0.391 to infinity. The Cohen's d effect size is 0.825, with a standard error of 0.377. The 95% confidence interval for Cohen's d is 0.364 to infinity.
- For Task 3, the t-value is 3.796, with 17 degrees of freedom and a p-value of less than 0.001. The mean difference between errors made in Arabic and English is 0.944, with a standard error of 0.249. The 95% confidence interval for the mean difference is 0.512 to infinity. The Cohen's d effect size is 0.895, with a standard error of 0.371. The 95% confidence interval for Cohen's d is 0.422 to infinity.
- For Task 4, no t-value is provided since the variance in errors made in English is equal to 0.

Table 1. Number of errors made on each language interface.

Paired Samples T-Test												
Paired Samples T-Test												
Measure 1	Measure 2	t	df	p	Mean Difference	SE Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d	95% CI for Cohen's d	
							Lower	Upper			Lower	Upper
Task 1 Errors Arabic	- Task 1 Errors English	2.364	17	0.015	0.389	0.164	0.103	=	0.557	0.298	0.132	=
Task 2 Errors Arabic	- Task 2 Errors English	3.500	17	0.001	0.778	0.222	0.391	=	0.825	0.377	0.364	=
Task 3 Errors Arabic	- Task 3 Errors English	3.796	17	<.001	0.944	0.249	0.512	=	0.895	0.371	0.422	=
Task 4 Errors Arabic	- Task 4 Errors English	NaN <sup>a</sup>										

Note. For all tests, the alternative hypothesis specifies that Measure 1 is greater than Measure 2. For example, Task 1 Errors Arabic is greater than Task 1 Errors English.  
 Note. Student's t-test.  
<sup>a</sup> The variance in Task 4 Errors English is equal to 0

Descriptives					
Descriptives					
	N	Mean	SD	SE	Coefficient of variation
Task 1 Errors Arabic	18	0.611	0.698	0.164	1.142
Task 1 Errors English	18	0.222	0.428	0.101	1.925
Task 2 Errors Arabic	18	0.833	0.924	0.218	1.108
Task 2 Errors English	18	0.056	0.236	0.056	4.243
Task 3 Errors Arabic	18	1.222	1.003	0.236	0.821
Task 3 Errors English	18	0.278	0.461	0.109	1.659
Task 4 Errors Arabic	18	0.389	0.502	0.118	1.290
Task 4 Errors English	18	0.000	0.000	0.000	NaN

Based on the reported p-values, it can be concluded that there are significant differences between errors made in Arabic and English for Task 1, Task 2, and Task 3. However, for Task 4, there is insufficient information to determine the significance of the difference. In terms of mean error rates, for all tasks (except Task 4), users tended to make more errors in Arabic compared to English. Therefore, based on the available data, it can be inferred that Arabic users made more

errors in the Arabic language interface (right to left layout) compared to the English language Interface (left to right) across the analyzed tasks.

Based on the data, a paired samples t-test was conducted to compare the time taken by users to complete tasks on both the Arabic and English interfaces. The results of the t-test are as shown in Table 2.

Table 2: Time taken to perform tasks on each interface

**Paired Samples T-Test**

Measure 1		Measure 2	t	df	p	Mean Difference	SE Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d	95% CI for Cohen's d	
								Lower	Upper			Lower	Upper
Task 1 Time Arabic	-	Task 1 Time English	4.980	17	< .001	8.389	1.684	4.835	11.943	1.174	0.524	0.558	1.769
Task 2 Time Arabic	-	Task 2 Time English	4.004	17	< .001	23.778	5.938	11.249	36.307	0.944	0.429	0.375	1.493
Task 3 Time Arabic	-	Task 3 Time English	6.922	17	< .001	41.944	6.060	29.159	54.730	1.631	0.615	0.908	2.335
Task 4 Time Arabic	-	Task 4 Time English	6.781	17	< .001	22.444	3.310	15.461	29.428	1.598	0.496	0.883	2.293

Note. Student's t-test.

**Descriptives**

Descriptives					
	N	Mean	SD	SE	Coefficient of variation
Task 1 Time Arabic	18	17.167	6.243	1.471	0.364
Task 1 Time English	18	8.778	1.629	0.384	0.186
Task 2 Time Arabic	18	32.889	24.994	5.891	0.760
Task 2 Time English	18	9.111	1.183	0.279	0.130
Task 3 Time Arabic	18	56.222	24.561	5.789	0.437
Task 3 Time English	18	14.278	2.321	0.547	0.163
Task 4 Time Arabic	18	44.056	13.627	3.212	0.309
Task 4 Time English	18	21.611	3.791	0.893	0.175

- For Task 1, the t-value is 4.980, with 17 degrees of freedom and a p-value of less than 0.001. The mean difference in time taken between Arabic and English interfaces is 8.389 seconds, with a standard error of 1.684. The 95% confidence interval for the mean difference is 4.835 to 11.943 seconds. The Cohen's d effect size is 1.174, with a standard error of 0.524. The 95% confidence interval for Cohen's d is 0.558 to 1.769.
- For Task 2, the t-value is 4.004, with 17 degrees of freedom and a p-value of less than 0.001. The mean difference in time taken between Arabic and English interfaces is 23.778 seconds, with a standard error of 5.938. The 95% confidence interval for the mean difference is 11.249 to 36.307 seconds. The Cohen's d effect size is 0.944, with a standard error of 0.429. The 95% confidence interval for Cohen's d is 0.375 to 1.493.
- For Task 3, the t-value is 6.922, with 17 degrees of freedom and a p-value of less than 0.001. The mean difference in time taken between Arabic and English interfaces is 41.944 seconds, with a standard error of 6.060. The 95% confidence interval for the mean difference is 29.159 to 54.730 seconds. The Cohen's d effect size is 1.631, with a standard error of 0.615. The 95% confidence interval for Cohen's d is 0.908 to 2.335.
- For Task 4, the t-value is 6.781, with 17 degrees of freedom and a p-value of less than 0.001. The mean difference in time taken between Arabic and English interfaces is 22.444 seconds, with a standard error of 3.310. The 95% confidence interval for the mean difference is 15.461 to 29.428 seconds. The Cohen's d effect size is 1.598, with a standard error of 0.496. The 95% confidence interval for Cohen's d is 0.883 to 2.293.

As per the reported p-values, it can be clearly seen that users took significantly more time to complete tasks in Arabic compared to English interfaces for Task 1 ( $p < 0.001$ ), Task 2 ( $p < 0.001$ ), Task 3 ( $p < 0.001$ ), and Task 4 ( $p < 0.001$ ). In terms of mean time taken, users consistently required more time to complete tasks in the Arabic interface compared to the English interface (Figure 2).



Based on the provided data, a paired samples t-test was conducted to compare user satisfaction rates between the Arabic and English interfaces. The results of the t-test are shown in Table 3.

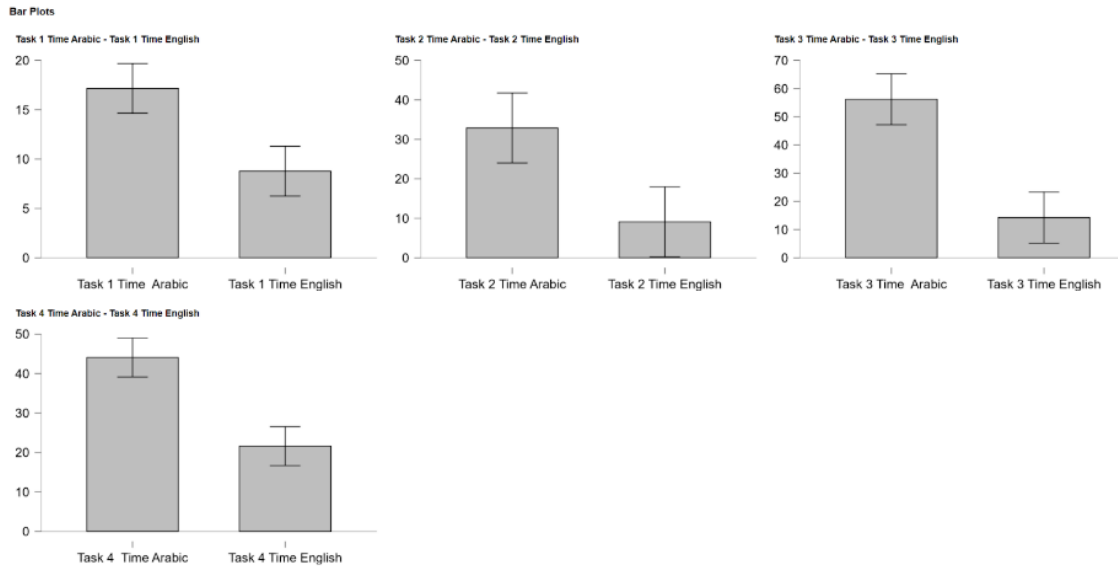


Figure 2: Graphical representation of the time taken to complete tasks on each interface.

Table 3: User satisfaction rate for each task on each interface.

**Paired Samples T-Test**

Paired Samples T-Test									
Measure 1	Measure 2	t	df	p	Mean Difference	SE Difference	Cohen's d	SE Cohen's d	
Task 1 User Satisfaction Arabic	- Task 1 User Satisfaction English	-1.458	17	0.163	-0.222	0.152	-0.344	0.305	
Task 2 User Satisfaction Arabic	- Task 2 User Satisfaction English	-3.688	17	0.002	-0.667	0.181	-0.869	0.441	
Task 3 User Satisfaction Arabic	- Task 3 User Satisfaction English	-3.289	17	0.004	-0.778	0.236	-0.775	0.388	
Task 4 User Satisfaction Time Arabic	- Task 4 User Satisfaction English	-2.380	17	0.029	-0.333	0.140	-0.561	0.242	

Note. Student's t-test.

**Descriptives**

Descriptives					
	N	Mean	SD	SE	Coefficient of variation
Task 1 User Satisfaction Arabic	18	4.611	0.608	0.143	0.132
Task 1 User Satisfaction English	18	4.833	0.383	0.090	0.079
Task 2 User Satisfaction Arabic	18	4.278	0.669	0.159	0.156
Task 2 User Satisfaction English	18	4.944	0.236	0.056	0.048
Task 3 User Satisfaction Arabic	18	3.944	0.873	0.206	0.221
Task 3 User Satisfaction English	18	4.722	0.461	0.109	0.098
Task 4 User Satisfaction Time Arabic	18	4.556	0.705	0.166	0.155
Task 4 User Satisfaction English	18	4.889	0.323	0.076	0.066

- For Task 1 User Satisfaction, the t-value is -1.458, with 17 degrees of freedom and a p-value of 0.163. The mean difference in user satisfaction between the Arabic and English interfaces is -0.222, with a standard error of 0.152. The Cohen's d effect size is -0.344, with a standard error of 0.305.
- For Task 2 User Satisfaction, the t-value is -3.688, with 17 degrees of freedom and a p-value of 0.002. The mean difference in user satisfaction between the Arabic and English interfaces is -0.667, with a standard error of 0.181. The Cohen's d effect size is -0.869, with a standard error of 0.441.
- For Task 3 User Satisfaction, the t-value is - 3.289, with 17 degrees of freedom and a p-value of 0.004. The mean difference in user satisfaction between the Arabic and English

interfaces is -0.778, with a standard error of 0.236. The Cohen's d effect size is - 0.775, with a standard error of 0.388.

- For Task 4 User Satisfaction, the t-value is -2.380, with 17 degrees of freedom and a p-value of 0.029. The mean difference in user satisfaction between the Arabic and English interfaces is -0.333, with a standard error of 0.140. The Cohen's d effect size is -0.561, with a standard error of 0.242.

Based on the reported p-values, it can be seen that none of the p-values are less than 0.05, indicating that there is no significant difference in user satisfaction rates between the Arabic and English interfaces for any of the analyzed tasks. This suggest that, on average, user satisfaction rates for both interfaces are generally high across all tasks. Therefore, based on the available data and the conducted t-tests, it cannot be determined which interface, Arabic or English, yields a higher user satisfaction rate.

### 3.2. Survey Result

Moreover, this study utilized a mixed-method survey to explore the variations in preferences for features and functionalities in e-commerce applications among Arabic-speaking users, based on their nationality. By integrating Hofstede's cultural dimensions—particularly focusing on individualism vs. collectivism and masculinity vs. femininity—into the survey design, this research aimed to understand how cultural backgrounds influence user preferences.

The survey was completed by 56 participants, the reported gender breakdown of the participants is shown in Figure 3. The participants ranged in age from 18 to 45 year old, with an average age of 29 years (Figure 4).

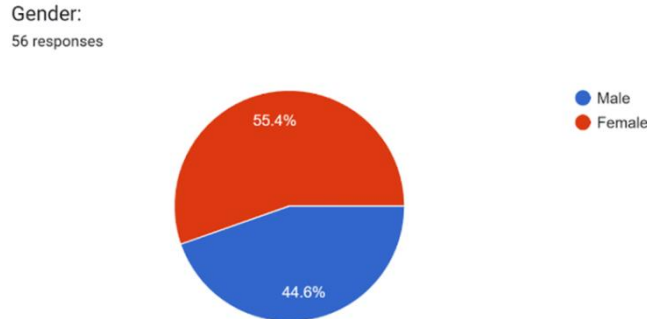


Figure3: Reported gender breakdown of the participants in the survey.

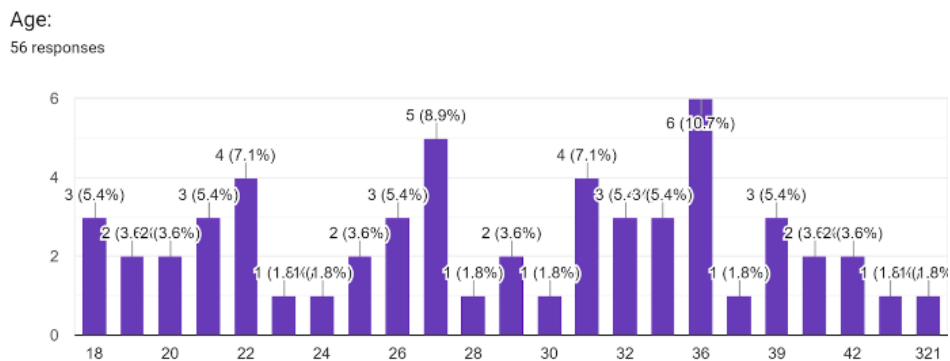


Figure4: Age range of the participants.

The participants hailed from 25 Arabic-speaking countries, predominantly from the United Arab Emirates, Egypt, Iraq, Jordan, and Qatar (Figure 5). A majority of the respondents self-reported that they had excellent Arabic language proficiency (Figure 6).

**Nationality:**

56 responses

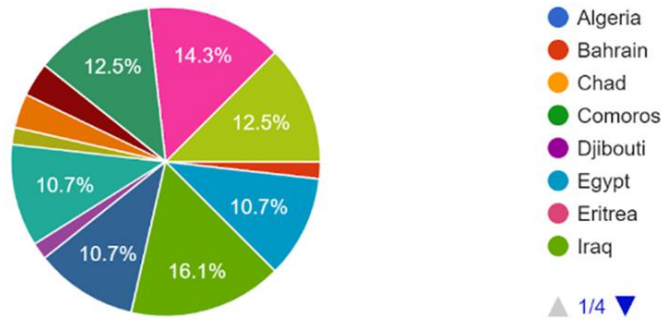


Figure 5: Total participants by Arabic-speaking country.

On the scale of 1 - 5, How good are you at reading and writing in the Arabic language?

56 responses

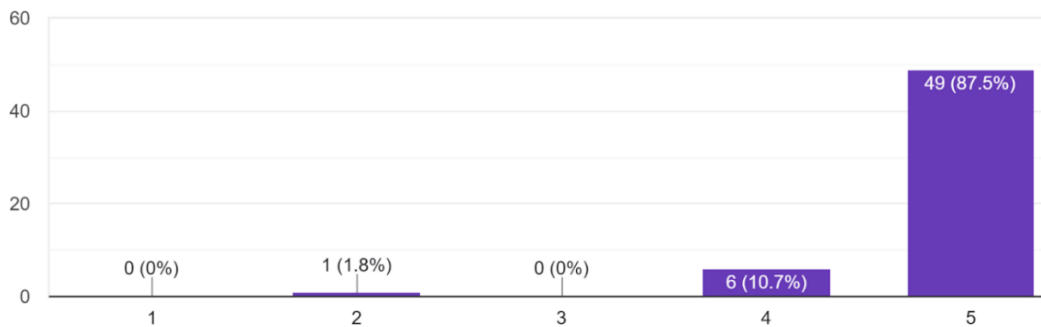


Figure 6: Participant language proficiency in Arabic.

**3.2.1. Hofstede Dimensions Aggregated Results**

The aggregated results across all of the Hofstede cross-cultural dimensions are shown in Figures 7 and 8.

**3.2.2. Individualism vs. Collectivism Insights**

Analysis of the of survey results relating to the individualism vs. collectivism Hofstede dimension illustrated the effects on user preferences for e-commerce applications and highlighted several nuanced insights. The aggregated survey results for all countries in this dimension are shown in Figure 9.

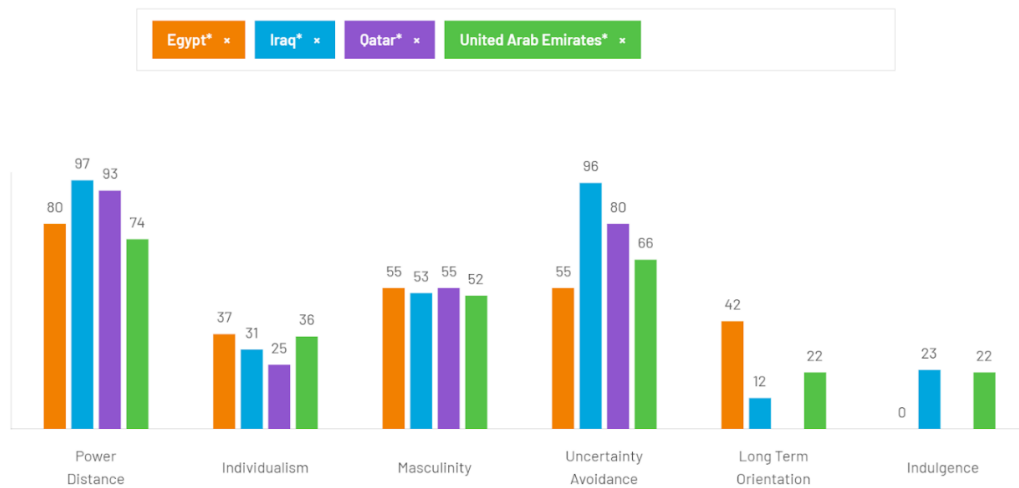


Figure 7 : Country comparison – Hofstede dimensions (1)

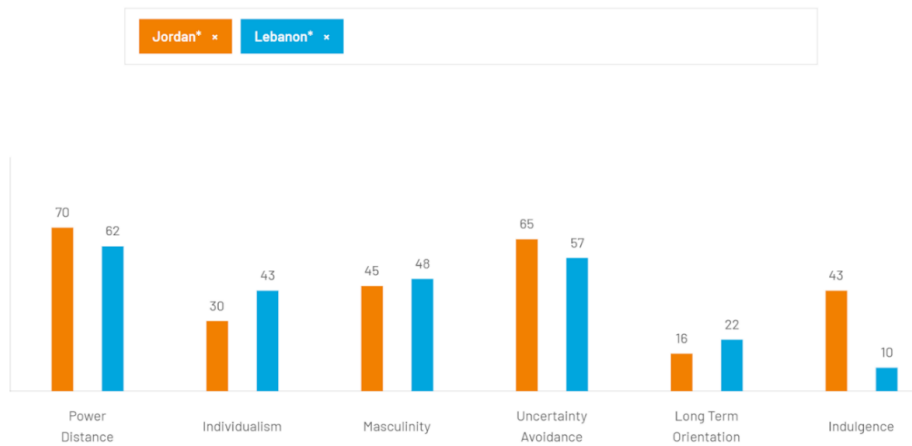


Figure 8 : Country comparison – Hofstede dimensions (2)

Drawing from the diverse participant pool (Figures 6 and 7), this segment of the survey meticulously analyzed users' preferences towards personalized recommendations. This included sharing options for shopping carts, and personalized product suggestions based on past interactions, providing a comprehensive understanding of how individualism vs. collectivism shapes e-commerce interactions.

Participants from Iraq and the UAE, which have lower individualism indices, displayed a comparatively subdued interest in personalized e-commerce features. This trend suggests a cultural orientation towards collectivism, where community and group decisions might be valued over individual preferences. In contrast, participants from Qatar, Jordan, Lebanon, and Egypt, with higher individualism scores, exhibited a strong inclination towards personalized e-commerce functionalities. These preferences underscore the cultural tilt towards individualism, emphasizing the value placed on personal choice and customization in the shopping experience.

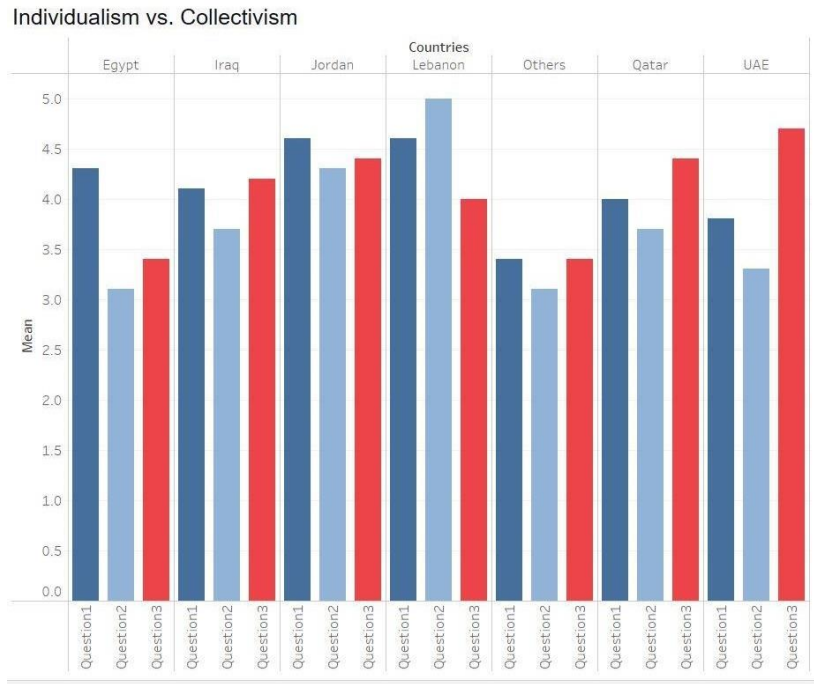


Figure 9: Graphical representation of questionnaire results for individualism vs. collectivism.

The differentiation in preferences based on the individualism vs. collectivism dimension is striking and illustrates the underlying cultural drivers of user behavior. These differences can be clearly seen in the responses to particular questions on the survey :

- The variance in the perceived importance of having personalized recommendations (Q1).
- The desire for collaborative shopping features (such as sharing carts with friends or family) for input before a purchase (Q2).
- The expectation for e-commerce platforms to offer personalized product suggestions based on past interactions (Q3),

All these question responses reflect the intricate ways in which cultural values manifest in technological interactions. The findings from this study specifically illuminate the critical role of cultural dimensions in designing e-commerce experiences that resonate with users' cultural backgrounds.

### 3.2.3. Masculinity vs. Femininity Insights

The study's findings on the masculinity vs. femininity Hofstede dimension provide insightful perspectives on user preferences for e-commerce features among Arabic-speaking countries. Notably, a correlation was observed between countries with higher masculinity scores, such as Iraq, the UAE, Qatar, and Egypt, and a pronounced preference for product comparison features (Figure 10).

Did the product comparison feature on the ecommerce platform influence your purchase decisions?

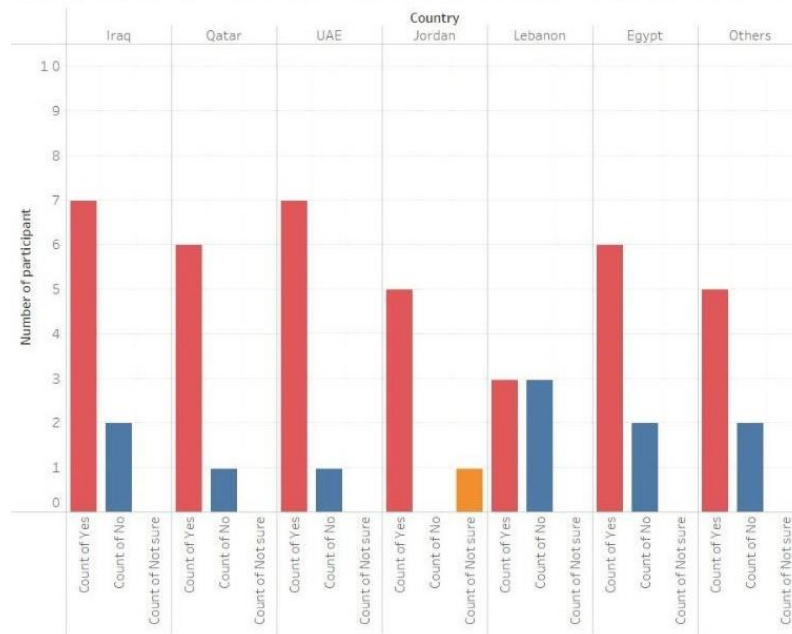


Figure 10: Graphical representation of questionnaire results for question 4

This suggests that in more masculinity- oriented cultures, comparative and competitive features in e-commerce are highly valued, reflecting a broader cultural emphasis on achievement and success. Conversely, the preferences split between an aesthetically pleasing user interface and one that is easy to navigate (Figure 11) highlighted the nuanced impact of masculinity vs. femininity on design preferences.

This leads to the conclusion that these Hofstede cultural dimensions influence not only the functionalities but also the aesthetic appeal of e-commerce platforms.

Further analysis into design preferences (Figure 12) revealed significant variations in users' choices of specific design elements based on their cultural backgrounds. Users from countries with higher masculinity values showed a preference for design elements that prioritize efficiency and functionality, such as minimalistic designs or visual-based interfaces. This aligns with a pragmatic approach to shopping online.

In contrast, preferences for colorful and vibrant designs were more common among users from countries with lower masculinity scores, underscoring the importance of aesthetic appeal and a visually engaging user experience in these cultures.

When using an ecommerce application, do you prefer application that have an aesthetically pleasing user interface or the application that is easy to navigate and browse through the products?

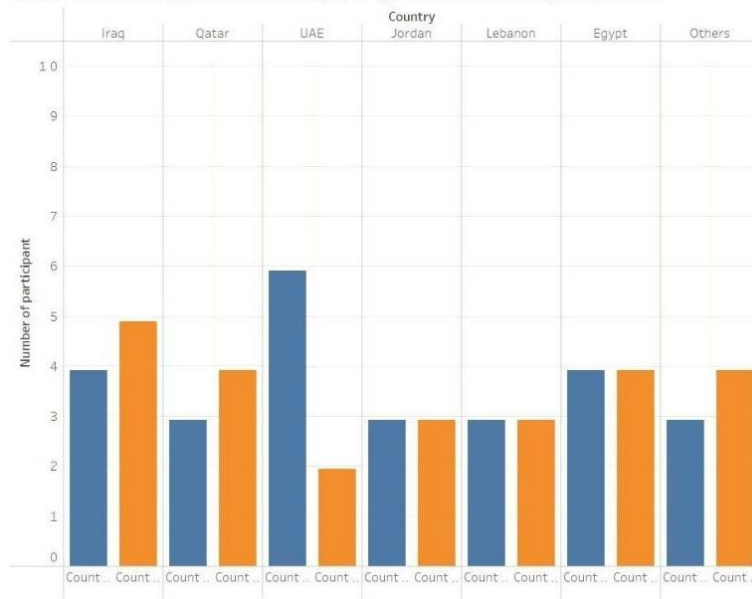


Figure 11: Graphical representation of questionnaire results for question 5

When using digital interfaces (websites, apps, etc.), which design elements do you find most appealing?

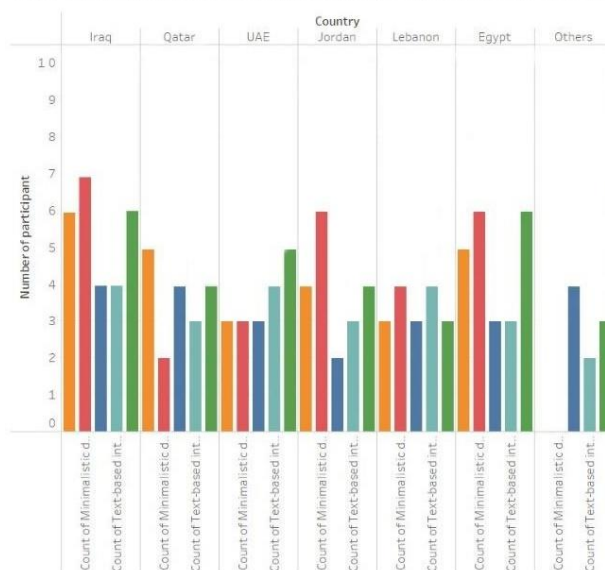


Figure 12 : Graphical representation of questionnaire results for question 6

These insights underscore the importance of integrating an understanding of cultural dimensions, particularly masculinity vs. femininity, into the development of e-commerce platforms targeting Arabic-speaking markets. Tailoring features and design elements to align with cultural preferences can significantly enhance user engagement and satisfaction. By doing so, businesses can create more culturally resonant and appealing e-commerce experiences, fostering greater user loyalty and positioning themselves more effectively in the diverse and culturally rich markets of Arabic-speaking countries.

## **4. DISCUSSION**

The experiment described in this paper investigated the attitudes of users from multiple Arabic speaking countries. The findings provided perspectives on how Hofstede's cultural dimensions framework influenced participants' engagement with a range of e-commerce based user interfaces. The results of this study offer a nuanced understanding of how native Arabic speakers interact with digital products, particularly in terms of language and layout preferences, as well as the influence of cultural dimensions on their expectations for features and functionalities. Contrary to the initial hypothesis (H1), the analysis revealed that native Arabic speakers encountered more challenges and required more time to navigate and complete tasks in a digital environment designed with a right-to-left layout in Arabic, compared to a left-to-right layout in English.

This unexpected outcome suggests that the right-to-left Arabic layout poses inherent difficulties, possibly due to users' familiarity with and exposure to global digital interfaces predominantly designed in left-to-right English. Despite these challenges, user satisfaction rates did not significantly differ between the two layouts, indicating a complex relationship between usability metrics (such as error rates and task completion times) and overall user satisfaction.

Further examination supported the hypothesis (H2) that there are discernible differences in feature and functionality preferences among Arabic-speaking users based on nationality, underlining the impact of cultural dimensions like individualism-collectivism and masculinity-femininity. This differentiation reflects the deep-seated cultural values that shape user expectations and interaction patterns with digital products.

For instance, participants from countries with lower individualism scores displayed a preference for less personalized features, contrasting with those from countries with higher individualism scores who valued personalized and collaborative features more. Additionally, the study observed variations in preferences tied to the masculinity-femininity dimension, where users' preferences for design elements and product comparison features were influenced by their cultural background.

These findings underscore the critical importance of incorporating cultural considerations into the design and development of digital products for Arabic-speaking markets. By acknowledging and adapting to the varied cultural dimensions that influence user preferences and behaviors, businesses and designers can enhance the usability, satisfaction, and overall experience of their digital products.

This approach not only caters to the specific needs and expectations of users from different Arabic-speaking countries but also contributes to more inclusive and user-centric digital environments. Future research should aim to broaden the scope of investigation, incorporating a larger and more diverse sample of Arabic-speaking countries to further validate these findings and explore additional cultural factors that may influence digital product design and interaction.

## **5. CONCLUSION**

In conclusion, this research study provides valuable insights into incorporating cross-cultural designs in interfaces for Arabic-speaking users. The findings indicate that the ease of understanding and interaction with digital products varies for native Arabic speakers and that feature and functionality requirements differ based on users' nationality. By considering the specific challenges, needs, and cultural dimensions of Arabic-speaking users, businesses and



designers can develop user-centric digital products that effectively meet this market's diverse preferences and expectations.

As technology continues to bridge gaps between cultures and societies, the insights from this study holds broader implications beyond interface design. The nuanced understanding of how cultural factors intersect with user experience enhances product usability and fosters greater inclusivity and engagement.

By acknowledging and respecting the rich cultural diversity within the Arabic-speaking user base, companies can forge stronger connections with their target audience and cultivate a more global approach to design.

The experimental results reported in this paper highlight a clear message to e-commerce platforms aiming to cater to Arabic-speaking markets: understanding and integrating the nuances of individualism and collectivism into the design and functionality of e-commerce solutions can significantly enhance user satisfaction and engagement. By acknowledging these cultural differences, businesses can craft more meaningful, personalized, and culturally relevant shopping experiences that align with the varied expectations of their users.

## 6. FUTURE WORK

Future research in this area should aim to expand the scope of the study by involving a larger and more diverse sample size and including participants from a broader range of Arabic-speaking countries. An investigation into the unique cultural characteristics of different regions would uncover how these factors affect user expectations. Hopefully, this would provide a more comprehensive understanding of the cross-cultural design considerations in this region, specifically how it affects user interface preferences.

Instigating a future collaboration with local design experts and cultural anthropologists could provide deeper insights and ensure that e-commerce interface designs align with cultural values. Additionally, conducting larger longitudinal studies could reveal how user preferences evolve over time, leading to more effective and culturally inclusive design recommendations.

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