From User Experience Evaluation to Design Guidelines for E-Commerce Websites

Layla Hasan, Beatrice Lim Pei Ying
Faculty of Computing, Universiti Teknologi Malaysia, Johor, Malaysia

***Abstract*—The evolution of the Internet and advances in information technology have significantly transformed business practices, leading to widespread e-commerce website development. To succeed in a competitive environment, website owners and designers must ensure that their e-commerce websites provide positive user experiences (UX). This research proposes UX guidelines for e-commerce websites, comprising 27 categories: 20 pragmatic features and 7 hedonic features. The guidelines were developed by evaluating the UX of two local e-commerce websites (Shopee and Lazada) and two international websites (Amazon and Alibaba), using a questionnaire completed by 200 participants to collect both quantitative and qualitative data. Results revealed common UX problems across all websites, including hedonic issues such as unattractive design and pragmatic issues such as poor usability, unclear layout, lack of user-friendliness, non-intuitive design, poor performance, and disorganization. Unique UX problems were also observed: some hedonic and pragmatic issues were specific to local websites, while certain pragmatic issues were unique to international websites. For Amazon, quantitative analysis showed the highest average rating for hedonic and pragmatic metrics at 3.87 out of 5, while qualitative analysis identified the least number of UX issues (13 in total: 1 hedonic and 12 pragmatic).**

Keywords*—User experience; UX guidelines; e-commerce websites; Malaysian e-commerce; hedonic features; pragmatic features

I. Introduction

The sustained technological advancement of information technology and the consequences of the COVID-19 pandemic increased the number of e-commerce websites globally and made online shopping very popular among users worldwide. E-commerce is an emerging business concept designed for buying, selling, or exchanging products, services, and information via the Internet. There are many advantages of e-commerce, including cost reduction, expanding distribution networks, and expanding current business models [1]. For a business that is established through the Internet using a website, such a seller no longer needs to build a physical store to do business, and there will also be no physical interaction between the seller and the buyer [2]. Furthermore, people are using e-commerce more often to avoid going out to crowded areas. Due to this, users may find it easier to shop at home online, where the environment is more comfortable. This resulted in it becoming a new habit even after the pandemic was over. This change in habit is partly due to e-commerce businesses allowing users to choose and buy a variety of products provided at online stores at anytime and anywhere [3].

There has been a significant evolution of e-commerce market worldwide and as well as in Malaysia [2, 4] and there have been many websites that have been created for e-commerce [1]. The market's growth in Malaysia was driven by many factors, including increasing Internet penetration, rising smartphone usage, diffusion of major brand platforms, evolving customer behaviors, strong government support, and improved financial tools [5,6,7]. These factors improved buyers' trust and increased sellers' diversity and therefore contribute to the expansion of the e-commerce market share in Malaysia. According to IMARC Group [5], in 2004, the e-commerce market size in Malaysia reached USD 80.40 billion, and it is expected to grow significantly to reach USD 961.88 billion by 2033, showing a growth rate (CAGR) of 28.17% during 2025-2033.

With a growing number of new competitors in the e-commerce industry, this has driven existing e-commerce companies to develop new strategies to sustain their leadership and success in the e-commerce industry. There are several factors that influence the success of e-commerce websites in the competitive environment [8]. One such key factor that should be considered on e-commerce websites if they are to compete and be successful is user experience (UX). User experience is an extension of interactive technology that generalizes the experience of how users interact with interactive technologies, as it involves the quality and functionality of the product regarding users' needs. User experience (UX) covers the experience and preferences that build up in the process of the user using or interacting with a user interface in a real-life situation [9]. It comprises the user's experience in terms of feeling, thinking, and perceiving, as well as the physical and mental reactions that occur in each step (i.e., before, during, and after) interacting with a user interface [9,10]. Therefore, the experience generated is responsible for the success of a user interface [11]. User experience is influenced by two categories of attributes in the user interface, which are hedonic and pragmatic. Hedonic attributes relate to features on the user interface that influence the emotions and feelings of the users when interacting with the interface [12, 13, 14]. Examples of hedonic features are: novelty, luxuriousness, attractiveness, delicacy, which helps in creating a delightful experience as these increase customer loyalty to a level that is more than satisfactory [15]. Pragmatic attributes, however, relate to features on the user interface which describe the utility or functionality and usability of the interface. They influence the difficulty in achieving task-related goals with efficiency and effectiveness [14, 16, 17]. Examples of pragmatic features are: simplicity, efficiency, learnability, user support, and a focus on goal-related functions or design issues.

The rapid growth of e-commerce has made user experience (UX) a critical factor in the success of online platforms. Despite its importance, several gaps exist in current research. Few studies have developed comprehensive UX guidelines that include both pragmatic and hedonic attributes from users' perspectives, which could be used to improve local e-commerce websites in Malaysia. In addition, limited research systematically examines and compares the UX of both local and international e-commerce websites, identifies issues affecting user interaction, and highlights differences between these contexts.

The aim of this research is to develop UX guidelines that foster positive user experiences. The primary focus is on evaluating both local and international e-commerce platforms to identify common and unique UX issues and to derive actionable guidelines. The specific objectives are:

- To examine the user experience of both local and international e-commerce websites.
- To compare the UX issues identified on these websites.
- To develop UX guidelines based on the comparison of issues affecting user experience.

This research will address the identified gaps in the literature by investigating, identifying, and comparing detailed UX issues related to both pragmatic and hedonic features on local and international e-commerce websites. The primary contribution of this research is the development of UX guidelines based on a comparative analysis.

The developed guidelines, which include key hedonic and pragmatic features, can be used to improve local e-commerce websites—especially in Malaysia—so they can better compete with international platforms. In addition, these guidelines can be applied to examine and enhance the UX of any e-commerce website, whether local or international. Furthermore, the results of this research will provide the owners of the four e-commerce websites studied (two local and two international) with comprehensive insights into UX issues on their sites, which can be addressed to improve the overall user experience.

The novelty of this research lies in its combined focus on both pragmatic and hedonic UX attributes, the comparative evaluation of local and international e-commerce platforms, and the development of comprehensive UX guidelines derived from mixed quantitative and qualitative analyses. Unlike previous studies, this work will provide an integrated, user-centred set of actionable guidelines tailored to the Malaysian context while remaining applicable to global e-commerce environments.

The remainder of this study is organized as follows: Section II reviews the related work. Section III describes the research methodology, including the selection of websites, participants, and data collection instruments. Section IV presents the quantitative and qualitative findings, while Section V discusses the key UX issues identified across local and international platforms. Section VI proposes the UX guidelines derived from the analysis. Finally, Section VII concludes the study with its contributions, limitations, and recommendations for future research.

II. Literature Review

Earlier research has been conducted to examine the user experience (UX) on e-commerce websites by employing various evaluation methods. One of these studies employed user testing, eye tracking, and questionnaires to assess the UX of e-commerce websites [18]. They found that the following attributes influenced the experience of users while interacting with the websites: usability, interface design, and user performance. The results also shed light on significant issues on the e-commerce websites which affected most of the users. These included: poor organization, unclear layout, and poor quality of content. Similarly, another research employed user testing and questionnaire methods to examine the user experience of three cosmetic e-commerce websites [19]. The results highlighted the significant issues on the websites that influenced the users' experience while interacting with the websites, and which had a significant effect on their satisfaction. These are related to: logical page order that makes sense, the availability of product variations shown by the image, relevant product summary information, the capability to save customer information for future purchases, the availability of comparison for the products with options, and the availability of recommendations for similar products.

Other research also employed the user testing and heuristic evaluation methods to evaluate the user experience of three e-commerce websites [20]. The findings highlighted issues on the websites, which influenced the experience of the users while interacting with the websites. These included: unavailability of an internal search function; unsuitable design of the product page; and not easy to navigate. Furthermore, another research used questionnaires to investigate the users' experience of e-commerce websites [1]. The research highlighted the following significant features on e-commerce websites, which influenced the users' experience while interacting with the websites: effective search functions; intuitive interface; easy access; clear navigation; fast loading; adequate information; the availability of relevant user reviews; the availability of ratings; flexibility; fast delivery time; security; support of refunds; and general services. Similarly, other research used questionnaires and interviews to examine the user experience of e-commerce websites [21]. The findings indicated that insufficient product information was the most critical issue on the websites, which most affected the experience of users while interacting with the website.

Alternatively, Mominzada et al. [22] investigated the relationship between gamification and user experience in a gamified e-commerce platform. It proposed a user experience conceptual model in a gamified e-commerce platform that aimed to investigate the influence of gamification on user experience and identify the after-effects of a gamified e-commerce platform. A quantitative research approach was used to statistically test and validate the user experience conceptual model, while an online survey questionnaire was used to collect the related data. The results showed that the user experience of e-commerce websites was greatly affected by gamification; user satisfaction and purchasing attitude increased with the implementation of a gamified user experience. The findings also indicated that positive user experience of the e-commerce websites influenced positively the following: user satisfaction

and attitude towards the websites; brand love and loyalty to the websites; positive word of mouth regarding the websites; and user intention to buy from the websites. Other research examined the effect of some features of e-commerce websites on the user experience (UX) of the website from users' perspectives [23]. They found that security, privacy, interactivity, and having sufficient information about products were the key attributes that influenced user experience on e-commerce websites.

However, other studies suggested heuristics that can be used as a tool for evaluators to assess the attributes of e-commerce websites that may influence the user experience. One of these studies developed a tool consisting of 64 heuristics divided into six categories according to the buying decision process [24]. Another study suggested user experience (UX) heuristics based on the general heuristics suggested by Nielsen's heuristics. However, special attributes suiting e-commerce websites were added to the heuristics, including: security of transactions and support for various payment methods [25]. Also, another research suggested 43 significant attributes on e-commerce websites to obtain a positive user experience (UX) based on the literature [26]. The attributes included: aesthetic design; quality content; easy navigation; easy to use; easy to understand; quick loading time; efficiency; information structure; consistency; security; easy transaction; familiarity; internal search; simplicity; and easy to learn. Alternatively, other research employed a questionnaire to evaluate the user experience for any web-based and mobile-based application [27]. The questionnaire used six categories: attractiveness, efficiency, perspicuity, dependability, stimulation, and novelty.

The literature summarized above identified key features on e-commerce websites which could be considered to result in a good user experience, while other studies identified many user experience issues on e-commerce websites that affected users' interactions with the websites. However, these studies did not take into consideration the two aspects or perspectives of the user experience of a system (website), which are related to pragmatic and hedonic issues. They identified the user experience features or issues without categorizing or considering whether they related to pragmatic or hedonic qualities or attributes. However, there are a few studies that have evaluated the user experience on e-commerce websites and identified specific pragmatic and hedonic issues that affect the user while interacting with the websites.

For example, Hellianto et al. [15] employed questionnaires to assess the influence of hedonic and pragmatic attributes on the user experience of e-commerce websites. The findings identified the following hedonic issues, which influenced the user experience: pleasure, self-satisfaction, simplicity, and delicacy. The work also identified the following pragmatic metrics that influenced the user experience: directness, simplicity, and informativeness. Also, Ritonummi and Niininen [28] used questionnaires and a cognitive walkthrough to evaluate the user experience of an e-commerce website. The findings highlighted the following pragmatic issues, which affected the user experience while interacting with the website: difficulty in finding information, low contrast, small fonts, and difficulty in navigating throughout the website. They also identified the following hedonic issues which affected the user experience while interacting with the website: innovativeness and user catching. Similarly, Febriandika et al. [29] evaluated the effect of hedonic and pragmatic features on the user experience of e-commerce websites. The results showed that the following hedonic features of an e-commerce website influenced the user experience while interacting with its attractive designs, entertaining features, and gamification. The results also showed that good user experience on an e-commerce website influenced trust in the website. Furthermore, Hasan [30] employed questionnaires and semi-structured interviews to investigate pragmatic and hedonic issues which affected the user experience on e-commerce websites while interacting with the websites. This work categorized the identified issues into major and minor. The findings highlighted major pragmatic issues on the websites, including: insufficient product information; lack of accurate delivery information; slow page download time; and lack of support of various delivery methods. The findings also highlighted major hedonic issues on the websites, including: an unenjoyable experience and failing to meet user expectations. In another research, Hasan [31] used questionnaires and semi-structured interviews to examine common and unique pragmatic and hedonic issues on e-commerce websites which affected the user experience while interacting with the websites. The results highlighted several common pragmatic issues on the websites, including poor structure and insufficient product information, as well as unique pragmatic issues on the websites, which included: confusing navigation and missing recommendations for complementary products. The results also highlighted several common hedonic issues on the websites that includes: unattractive and uncreative design, and unique hedonic issues on the websites, including a lack of motivation.

The literature review shows that there are few research studies which suggest comprehensive user experience guidelines and include important pragmatic and hedonic attributes on e-commerce websites from users' perspectives, which could be used to develop positive user experiences on local e-commerce websites in Malaysia or to evaluate and improve the user experience of local e-commerce websites. Also, there is a lack of research that investigates and compares the user experience issues related to pragmatic and hedonic features on local e-commerce websites and international e-commerce websites.

III. Methodology

This research aims to develop guidelines based on a comparison of user experience (UX) issues identified on local and international e-commerce websites. Fig. 1 illustrates the research framework employed. This section describes the selection of e-commerce websites, participant recruitment, data collection procedures, and data analysis methods.

A. Website Selection

To achieve the research objectives, four e-commerce websites were selected: two local and two international. The local websites, Shopee and Lazada, were chosen for being the largest, most popular, and frequently used e-commerce platforms in Malaysia and Southeast Asia. The international websites, Amazon (Western origin) and Alibaba (Eastern origin), were selected for being globally large, early-established, successful, and widely recognized [32].

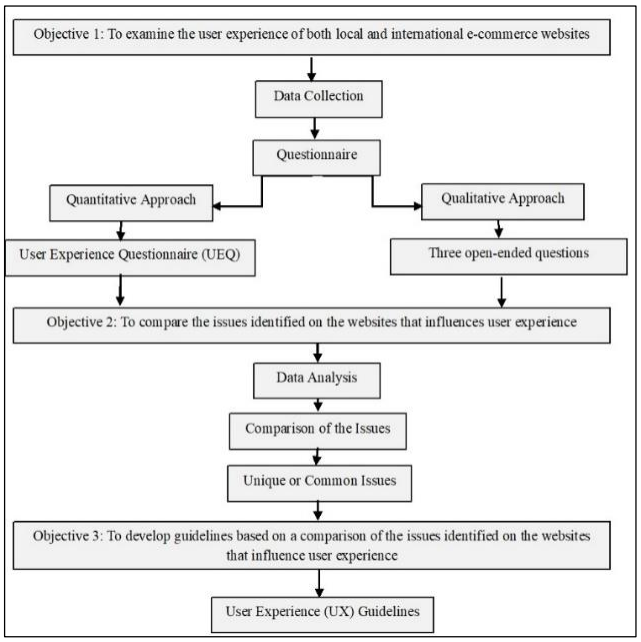

Fig. 1. Research framework.

B. Participants

The target participants were late teenagers, young adults, and middle-aged adults (aged 18–50), as they are more likely to be tech-savvy, frequent Internet users, and potential online shoppers. A recruitment invitation was prepared, including the research title, purpose, required tasks, estimated time to complete the tasks, confidentiality assurance, and researcher contact information. The invitation was sent to staff at two libraries (the University of Technology Malaysia library and a State library), who then distributed it to patrons via email and Telegram. A convenience sampling method was used due to its affordability, practicality, and efficiency [34, 35]. Although this method may introduce sampling bias, it was deemed appropriate for the exploratory nature of this study.

C. Data Collection

1) Questionnaire design: Data were collected using four questionnaires, one per website, to evaluate participants' UX. Questionnaires were chosen for their efficiency, flexibility, and ease of analysis [1,15,18,19,21,28,30,31]. A combination of quantitative and qualitative data was collected to capture both measurable metrics and descriptive user experiences. Each questionnaire had three sections:

a) Participant background: collecting demographic information and prior experience with the website.

b) Quantitative UX assessment: adapted from the User Experience Questionnaire (UEQ) [33], which measures six scales (attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty). A total of 23 questions covered 9 hedonic and 13 pragmatic attributes, rated on a five-point Likert scale.

c) Qualitative UX assessment: three open-ended questions invited participants to describe their experiences, including prior usage stories or first impressions, satisfaction/dissatisfaction with features, and satisfaction/dissatisfaction with functions.

2) Procedure: Each participant explored one e-commerce website and attempted to complete a purchase task. Afterward, they completed the corresponding questionnaire. A total of 200 participants were involved, with 50 participants evaluating each website.

D. Data Analysis

1) Quantitative analysis: Descriptive statistics, including averages and percentages, were used to summarize participant demographics and prior experience. Likert scores were analyzed for each statement to measure responses to the 23 UX attributes. Scores of 1–2 were considered negative, 4–5 positive, and 3 neutral. Average Likert scores for hedonic and pragmatic attributes across the four websites were calculated and are presented in Section IV.

2) Qualitative analysis: Qualitative responses were analyzed to identify UX issues related to hedonic and pragmatic features for each website. These issues were compared across websites to identify common and unique UX problems. In total, 24 UX categories were derived (3 hedonic and 21 pragmatic attributes), as detailed in Section IV. The insights from this analysis were then used to develop UX guidelines, presented in Section VI.

IV. Results

This section presents the results obtained from the analysis of the quantitative and qualitative data collected from the questionnaires for the four e-commerce websites (Shopee, Lazada, Amazon and Alibaba). Concerning the participants' background and experience, a total of 200 volunteers participated in this research; each website was evaluated by 50 participants. The age of the participants varied from 19 years and below 50 years old and above. Table I shows the five age groups of the participants, the percentage of participants in each age group who evaluated the user experience for each website, and the average percentage of participants for each age group. Table I reveals that most of the participants were aged 20 to 29 years old (67%), while the lowest percentages of the participants (6.5%) were aged 40 to 49 years old.

Regarding the participants' usage experience with the website, which they were asked to evaluate, the results showed that:

- All 50 participants had experience of using the Shopee website;
- 88% of the 50 (44) participants had experience of using the Lazada website, while 12% (6) of the participants had not used the Lazada website before;
- Most of the participants (64% of the 50 (32)) had not used the Amazon website, while 36% (18) of the participants had experience of using the Amazon website;

- Most of the participants (72% (36)) had not used the Alibaba website, while 28% (14) participants had experience of using the Alibaba website.

TABLE I. AGE GROUPS OF THE PARTICIPANTS, PERCENTAGE OF PARTICIPANTS WHO EVALUATED EACH WEBSITE, AND AVERAGE PERCENTAGE FOR PARTICIPANTS PER AGE GROUP

Age Group	Website	Percentage (%)	Average Percentage (%)
19 and below	Shopee	0	7.5
	Lazada	12	
	Amazon	4	
	Alibaba	14	
20 - 29	Shopee	46	67
	Lazada	66	
	Amazon	80	
	Alibaba	76	
30 - 39	Shopee	28	11.5
	Lazada	14	
	Amazon	2	
	Alibaba	2	
40 - 49	Shopee	16	6.5
	Lazada	2	
	Amazon	6	
	Alibaba	2	
50 and above	Shopee	10	7.5
	Lazada	6	
	Amazon	8	
	Alibaba	6	

The quantitative results obtained from the analysis of the 23 questions related to the 23 metrics of the user experience (UX) of the tested websites, specifically, the 9 hedonic and 14 pragmatic metrics, are presented in Table II. These results show that the participants had a good user experience with the four tested websites. All the 9 hedonic and 14 pragmatic metrics for the websites had positive ratings. The results show that even though the participants were satisfied with the pragmatic and hedonic aspects of all the websites, they were more satisfied with the pragmatic aspects of the websites compared to the hedonic aspects. The pragmatic metrics had the highest ratings, while the hedonic metrics had the lowest ratings. Specifically, the ease to learn metric, which is pragmatic, was the highest average metric for all the websites (3.98), while understandability (4), familiarity (4.06), consistency (4.04), and ease to learn (3.96), which are all pragmatic, were also the highest metrics for Shopee, Lazada, Amazon and Alibaba, respectively. Alternatively, the beautifulness metric, which is hedonic, was the lowest average metric for all the websites (3.37), while beautifulness (3.18), excitement (3.3), beautifulness (3.52) and motivation (3.16), which are all hedonic, were the lowest metrics for Shopee, Lazada, Amazon and Alibaba, respectively.

Furthermore, Table II shows that the participants had the best user experience while interacting with Amazon website, compared to other websites. Its pragmatic and hedonic metrics were rated the highest compared to other websites except for two pragmatic metrics (simplicity and familiarity). The Shopee website had the highest rating for the simplicity metric, while the Lazada website had the highest rating for the familiarity metric. The average rating for Amazon's hedonic and pragmatic metrics was the highest compared to the other three websites: 3.87. Alternatively, Table II shows that the participants' user experience with Alibaba was poor compared with the other websites; the average ratings for its hedonic and pragmatic attributes was the lowest compared with the other three websites: 3.57.

TABLE II. THE LIKERT SCORES FOR THE 9 HEDONIC AND 14 PRAGMATIC METRICS FOR THE FOUR WEBSITES

No.	Attributes	W1*	W2*	W3*	W4*	Avg.*
Hedonic Attributes						
1	Creative	3.66	3.54	3.68	3.36	3.56
2	Stylishness	3.2	3.6	3.64	3.2	3.41
3	Interest	3.58	3.6	3.74	3.46	3.60
4	Pleasantness	3.7	3.58	3.82	3.38	3.62
5	Attractiveness	3.44	3.52	3.68	3.34	3.50
6	Beautifulness	3.18	3.5	3.52	3.26	3.37
7	Excitement	3.3	3.3	3.74	3.38	3.43
8	Motivation	3.4	3.38	3.64	3.16	3.40
9	Enjoyability	3.56	3.5	3.8	3.56	3.61
Pragmatic Attributes						
1	Clarity	3.5	3.76	3.9	3.7	3.72
2	Practicality	3.72	3.58	3.96	3.74	3.75
3	Predictability	3.86	3.68	3.98	3.46	3.75
4	Simplicity	3.98	3.68	3.94	3.76	3.84
5	Efficiency	3.62	3.72	3.92	3.78	3.76
6	Organization	3.4	3.44	3.94	3.74	3.63
7	Understandability	4	3.8	4.14	3.8	3.94
8	Ease to learn	3.9	3.96	4.08	3.96	3.98
9	Expectation	3.62	3.62	3.88	3.5	3.66
10	Friendliness	3.68	3.6	4.14	3.8	3.81
11	Familiarity	3.72	4.06	3.86	3.62	3.82
12	Responsiveness	3.66	3.76	4.1	3.8	3.83
13	Flexibility	3.6	3.66	3.88	3.7	3.71
14	Consistency	3.8	3.9	4.04	3.64	3.85
Average		**3.61**	**3.64**	**3.87**	**3.57**	
W1: Shopee; W2: Lazada; W3*: Amazon; W4*: Alibaba; Avg.*: Average						

The qualitative results obtained from the analysis of the three open-ended questions in the questionnaire identified 24 user experience (UX) issues, three hedonic and 21 pragmatics, on the websites that affected the experience of the participants while interacting with them, as shown in Table III. The three hedonic issues are related to:

- Unattractive design: this issue was identified on all the websites;
- Annoying advertisements: this issue was identified uniquely on the local websites (Shopee, Lazada).
- Does not meet user expectation: this issue was identified on one local website (Lazada) and one international website (Alibaba).

TABLE III. THE USER EXPERIENCE ISSUES IN TERMS OF HEDONIC AND PRAGMATIC, IDENTIFIED FROM THE ANALYSIS OF THE QUALITATIVE RESULTS

No.	User Experience Issue	W1*	W2*	W3*	W4*
Hedonic Issues					
1	Unattractive design	✓	✓	✓	✓
2	Annoying advertisements	✓	✓	×	×
3	Does not meet users' expectation	×	✓	×	✓
Pragmatic Issues					
1	Not easy to use	✓	✓	✓	✓
2	Not easy to understand	✓	✓	✓	✓
3	Not user-friendly	✓	✓	✓	✓
4	Not easy to access	×	×	×	✓
5	Not easy to navigate	×	✓	✓	✓
6	Not straightforward design	✓	✓	✓	✓
7	Do not have similarity	×	✓	✓	✓
8	Do not have familiarity	×	×	✓	✓
9	Poor performance	✓	✓	✓	✓
10	Disorganized	✓	✓	✓	✓
11	Does not have variations (limited choices and options)	✓	✓	×	×
12	Inaccurate internal search function and filter	✓	✓	×	×
13	Poor item quality	✓	✓	×	✓
14	High pricings	×	✓	×	✓
15	Unsatisfying promotional offers (vouchers, promotions, discounts)	×	×	✓	✓
16	Poor shipping and delivery	✓	×	✓	✓
17	Inefficient payment process	✓	✓	×	×
18	Poor customer service	✓	✓	✓	×
19	Insufficient product information and review	✓	×	×	✓
20	Lacks of security and trustworthiness	✓	×	×	×
21	Inconvenient refund process	✓	×	×	×
***W1: Shopee; W2*: Lazada; W3*: Amazon; W4*: Alibaba**					

Regarding the pragmatic issues, Table III shows that:

- A total of six pragmatic issues were identified commonly on all the websites (Shopee, Lazada, Amazon, Alibaba), which are related to: Not easy to use; not easy to understand; not user-friendly; not straightforward design; poor performance; and disorganized.
- A total of three pragmatic issues were identified uniquely on the international websites (Amazon, Alibaba); these are related to: Do not having familiarity; unsatisfying promotional offers (vouchers, promotions, discounts); and inefficient payment process.
- A total of two pragmatic issues were identified uniquely on the local websites (Shopee, Lazada); these are related to: Does not have variations (limited choices and options); and inaccurate search and filter.

Table III also shows that, even though all the websites had hedonic and pragmatic issues which affected the experience of the participants while interacting with them, Amazon had the least number of hedonic and pragmatic issues compared to the other three websites. Specifically, a total of 13 issues (one hedonic and 12 pragmatic issues) were identified on it. However, the other three websites had the same number of issues (17), as follows:

- Shopee had a total of 17 issues (two hedonic and 15 pragmatic issues) that were identified on it.
- Lazada had a total of 17 issues (three hedonic and 14 pragmatic issues) that were identified on it.
- Alibaba had a total of 17 issues (two hedonic and 15 pragmatic issues) that were identified on it.

V. DISCUSSION

This research addressed the gap identified in the literature by uniquely investigating, identifying, and comparing detailed user experience (UX) issues related to both pragmatic and hedonic features on local and international e-commerce websites. While the study had a novel aim—developing UX guidelines based on a comparative analysis—many findings align with earlier research, supporting the relevance of established UX principles.

The quantitative results showed that participants had positive experiences with the four tested websites, with all 9 hedonic and 14 pragmatic metrics receiving positive ratings. However, the qualitative data revealed 24 UX issues (3 hedonic and 21 pragmatic) affecting participants' experiences.

Unique issues on local websites (Shopee and Lazada) included one hedonic issue—annoying advertisements—and three pragmatic issues: limited product variations, inaccurate internal search and filters, and inefficient payment processes. While these issues were not widely reported in previous studies, two were considered key UX features: availability of product variations [19] and effective search functions [1].

Unique issues on international websites (Amazon and Alibaba) included two pragmatic issues: lack of familiarity and unavailability of satisfying promotional offers (vouchers, promotions, discounts). Interestingly, these features were present on local websites and positively influenced user experience, highlighting differences between local and international platforms.

Common issues across all websites included one hedonic and six pragmatic problems. The hedonic issue was unattractive

design, consistent with earlier research identifying visual appeal as a critical factor in UX [26, 31]. The six common pragmatic issues—difficult to use, hard to understand, not user-friendly, non-straightforward design, poor performance, and disorganization—were also supported by prior studies emphasizing usability, logical structure, and fast website performance [1, 18, 19, 23, 25, 26, 30, 31].

Other pragmatic issues, which were neither unique nor common, included a lack of similarity on Shopee, poor item quality on all except Amazon, high pricing on Lazada, poor shipping and delivery on Lazada, poor customer service on Alibaba, insufficient product information and reviews on Shopee and Alibaba, a lack of security and trustworthiness, and an inconvenient refund process on Shopee. Some of these issues, such as insufficient product information and unclear delivery dates, were identified in earlier research [1, 30, 31], while others, like poor shipping and customer service, were newly identified in this study.

The merits of this research include its combined focus on pragmatic and hedonic UX attributes, the mixed-methods approach capturing both quantitative and qualitative insights, and the development of actionable UX guidelines applicable to local and international e-commerce websites. The study also demonstrates the effectiveness of qualitative methods in uncovering issues that quantitative measures alone may miss.

The demerits (limitations) include the focus on only four e-commerce websites, which may limit generalizability, and convenience sampling, which may not fully represent diverse user demographics. The data collection methods—questionnaires and open-ended questions—may not capture as in-depth insights as interviews or focus groups. Finally, the UX guidelines are specific to e-commerce websites and may not directly apply to other types of digital platforms or mobile applications.

Overall, this research provides a balanced evaluation, showing both consistencies and novel findings compared to earlier studies, highlighting strengths and limitations, and offering practical guidance for improving UX on local and international e-commerce platforms.

VI. Proposed User Experience (UX) Criteria

This section presents the proposed user experience (UX) guidelines, uniquely proposed in this research, to address the gap identified in the literature regarding the lack of user experience guidelines. These included key pragmatic and hedonic metrics to evaluate specifically the user experience on e-commerce websites. The guidelines were mainly developed from the results obtained from an analysis of the qualitative data, which identified 24 user experience (UX) issues on local and international key e-commerce websites (see Table III), and the quantitative results obtained from an analysis of the 23 questions relating to the 23 metrics of the user experience of the tested websites (see Table II).

Table IV in Appendix presents the proposed guidelines. These consist of 27 categories (G1-G27), which were mapped to 17 areas based on their content. These categories were divided into two main groups to evaluate: the pragmatic and hedonic quality of e-commerce websites, respectively:

- Pragmatic quality: includes 20 categories, which were organized into 12 areas to evaluate the functional quality of e-commerce websites.
- Hedonic quality: includes the remaining seven categories, which were organized into five areas to evaluate the hedonic quality of such sites.

Table IV in Appendix also presents the explanation and reference for each of the suggested categories, whether based on the results of this research only or also supported by earlier research results. The 20 suggested categories to evaluate the pragmatic quality of e-commerce websites include 12 categories which were supported by the results from earlier research and 8 unique categories which were uniquely suggested by this research. The 12 categories shed light on the important functional or utility aspects in an e-commerce website, which should be addressed to obtain a positive user experience, which relates to 12 areas on the website: design, structure, navigation, responsiveness, efficiency, advertisements, internal search, content, payment and refund, shipping and delivery, customer service, security, and trustworthiness.

1) Design: Three categories related to the design of the website were suggested to obtain a positive user experience in an e-commerce website, which include having a user-friendly design, a straightforward design, and a consistent design, as explained in G1, G2, and G3, respectively, in Table IV (Appendix). These important aspects were also suggested by earlier research, as shown in Table IV (Appendix).

2) Structure: Two categories related to the structure of the website were suggested to achieve a positive user experience in an e-commerce website, which include logical organization of the website's content and having similarity with other websites so that users will be familiar with the structure of the website, as explained in G4 and G5, respectively, in Table IV (Appendix). G4, which is related to having logical structure, was also suggested by earlier research, however, G5 which is related to having similarity and familiarity was uniquely suggested by this research.

3) Navigation: One category related to having easy navigation was suggested to obtain a positive user experience in e-commerce websites, as explained in G6. This was also suggested by earlier research.

4) Responsiveness: One category was suggested uniquely by this research related to having good performance in terms of being responsive to support users while using the website, as explained in G7.

5) Efficiency: One category related to having an efficient website to support users to complete their tasks quickly was suggested by this research, as well as by earlier research, as explained in G8, to obtain a positive user experience in e-commerce websites.

6) Advertisements: One category related to avoiding advertisements was uniquely suggested by this research to achieve user experience in an e-commerce website, as explained in G9, as they confuse users.

7) Internal search: The effective internal search category was suggested by this research and earlier research, also to obtain a positive user experience in e-commerce websites as it helps users to obtain their target products easily. The explanation is provided in G10 together with the references of earlier research.

8) Content: Five categories were suggested related to the content of e-commerce websites, which could contribute to achieving a positive user experience on e-commerce websites; three of them were uniquely suggested by this research. The five categories related to: having product variations (suggested also by earlier research as shown on G11), having good product quality (uniquely suggested by this research as shown in G12), having helpful information and reviews for each product (uniquely suggested by this research as shown in G13), and having reasonable priced products (uniquely suggested by this research as shown in G14), and finally providing satisfying promotional offers (uniquely suggested by this research as shown in G15).

9) Payment and refund: Two categories were suggested related to payment and refund, which, if addressed, can achieve a positive user experience in e-commerce websites. These relate to having an easy payment process (this was identified uniquely in this research as explained in G16), and the website should allow refunds to be made conveniently, which was also identified by earlier research as explained in G17.

10) Shipping and delivery: This includes one category related to providing good shipping and delivery services, which help to send the products to the users, and it was also suggested by earlier research. The explanation and references are shown in G18.

11) Customer service: One category was suggested uniquely by this research and related to having good customer service to support users while using the website. the explanation and references are shown in G19.

12) Security and trustworthy: This includes one category related to having secure and trustworthy transactions to encourage users to buy from it. It was also suggested by earlier research. The explanation and references are shown in G20.

Alternatively, the seven suggested categories to evaluate the hedonic quality of e-commerce were supported by the results from earlier research, and they shed light on the important aspects that influence the emotions and feelings of the users when interacting with the website, and therefore addressing them will help to obtain a positive user experience on e-commerce websites. The seven hedonic categories are related to five areas: attractiveness, creativity and enjoyment, pleasant and excitement, motivation, and expectation.

1) Attractiveness: This is related to having features that will attract users to interact and navigate throughout the website, as shown in G21.

2) Creativity and enjoyment: This area includes two categories, shown in G22 and G23, and are related to having creative features and enjoyable features.

3) Pleasant and excitement: This area includes two categories, the website should be pleasant and excite users, as shown in G24 and G25, so that it will evoke users' positive feelings and interest while interacting with it.

4) Motivation: This includes one category which are related to having the features that will motivate the users to interact with the website and complete their tasks, as shown in G26.

5) Expectation: This includes one category, as shown in G27, which relates to addressing users' expectations and needs by providing all the needed functionality.

It is important to emphasize that earlier research, which identified specific heuristics or criteria to evaluate user experience of e-commerce websites, did not consider users' preferences regarding key features or metrics that should be considered to obtain positive user experiences on e-commerce websites [24,25,26,30,31], and they did not consider hedonic metrics in the heuristics [24,25,26]. Additionally, other criteria or tools, which were developed by earlier research to evaluate the user experience, were general and not specific to e-commerce websites [12,27,33,36,37].

VII. Conclusion

This research developed user experience (UX) guidelines for e-commerce websites to foster positive user experiences. The guidelines consist of 27 categories, including 20 pragmatic and 7 hedonic features, derived from a comparative evaluation of two local (Shopee, Lazada) and two international (Amazon, Alibaba) e-commerce websites. A mixed-methods approach was employed, combining quantitative data from the User Experience Questionnaire and qualitative data from open-ended questions, to identify and compare UX issues affecting users across these platforms. Common UX problems included unattractive design and pragmatic issues such as poor usability, unclear structure, and disorganization, while unique issues were observed for local and international websites. These findings informed the development of actionable UX guidelines to improve e-commerce user experiences.

Despite its contributions, this research has limitations. The guidelines are specific to e-commerce websites and may not directly apply to other types of websites or mobile applications. Only four platforms were examined, so UX issues on other websites may differ, limiting generalizability. Convenience sampling may not reflect balanced age groups or international diversity, affecting the applicability of the findings. Additionally, the use of questionnaires and open-ended questions may have restricted the depth of qualitative insights compared to interviews or focus groups.

Based on these limitations, several future research directions are suggested. Future studies could extend the guidelines to mobile e-commerce applications and additional platforms to enhance generalizability. Ensuring more diverse participant demographics could provide a more global perspective. Employing richer qualitative methods, such as interviews or focus groups, could capture deeper insights into users' experiences. Further research could also explore AI-driven personalization for adaptive UX and conduct longitudinal studies to evaluate the impact of implementing the guidelines

over time. These directions will help to refine and extend the practical value of UX guidelines for both local and international e-commerce platforms.

REFERENCES

[1] A.N. Babatunde, O.C. Abikoye, and O.E. Falaju, "Usability evaluation of users' experience on some existing e-commerce platforms," Libr. Philos. Pract., pp. 1–17, 2019.

[2] N. Wilson and R. Christella, "An empirical research of factors affecting customer satisfaction: A case of the Indonesian e-commerce industry," DeReMa J. Manag., vol. 14, no. 1, pp. 21–44, 2019.

[3] Y.U. Chandra and L. Angela, "Key success factors for a better user experience in e-commerce website," in 2021 Int. Conf. Inf. Manag. Technol. (ICIMTech), pp. 512–516, 2021.

[4] A.Z.M. Noor, N.M Zainuddin, R. Ibrahim, Y. Yahya, and M.S.A. Aziz, "Evaluating the user experience of a Muslimah fashion e-commerce website using heuristic evaluation method," Open Int. J. Informat., vol. 8, no. 2, pp. 1–17, 2020.

[5] IMARC Group, "Malaysia e-commerce market size, share, trends and forecast by business model, mode of payment, service type, product type, and states, 2025–2033," 2024. [Online]. Available: https://www.imarcgroup.com/malaysia-e-commerce-market.

[6] MDEC – Malaysia Digital Economy Corporation, "National E-Commerce Strategic Roadmap (NESR)," 2024. [Online]. Available: https://mdec.my/nesr.

[7] Incorp, "E-commerce in Malaysia: trends and phenomenal growth 2024," 2024. [Online]. Available: https://malaysia.incorp.asia/blogs/future-of-e-commerce-in-malaysia/.

[8] T. Wahyuningrum, C. Kartiko, and A.C. Wardhana, "Exploring e-commerce usability by heuristic evaluation as a component of system usability scale," in 2020 Int. Conf. Adv. Data Sci., E-Learning Inf. Syst. (ICADEIS), pp. 1–5, 2020.

[9] H. Cheng, "How does interaction design affect user experience through online shopping interfaces?," in IOP Conf. Ser.: Mater. Sci. Eng., vol. 573, no. 1, 012076, 2019.

[10] L. Punchoojit and N. Hongwarittorrn, "Usability studies on mobile user interface design patterns: a systematic literature review," Adv. Hum.-Comput. Interact., pp. 1–22, 2017.

[11] P. Cybulski and T. Horbiński, "User experience in using graphical user interfaces of web maps," ISPRS Int. J. Geo-Inf., vol. 9, no. 7, 412, 2020.

[12] M. Hassenzahl, "The thing and I: understanding the relationship between user and product," in Funology: From Usability to Enjoyment, M. Blythe, C. Overbeeke, A. Monk, & P.S.N. Wright, Eds., Norwell, MA: Kluwer Acad. Publ., pp. 31–42, 2005.

[13] M. Hassenzahl, E.L.C. Law, and E.T. Hvannberg, "User experience – towards a unified view," in Proc. UX WS NordiCHI'06, pp. 1–3, 2006.

[14] V. Bernataviciute and R.A. Balogh, "Sustainable web design in the e-commerce sector: evaluation and proposed improvement of existing guidelines," Dissertation, Jönköping Univ., 2022.

[15] G.R. Hellianto, A. Suzianti, and Komarudin, "User experience modeling on consumer-to-consumer (C2C) e-commerce website," in IOP Conf. Ser.: Mater. Sci. Eng., vol. 505, no. 1, 012080, 2019.

[16] M. Hassenzahl, "User experience (UX): towards an experiential perspective on product quality," in Proc. 20th Conf. l'Interaction Homme-Machine, pp. 1–15, 2008.

[17] M. Hassenzahl, M. Schöbel, and T. Trautmann, "How motivational orientation influences the evaluation and choice of hedonic and pragmatic interactive products: the role of regulatory focus," Interact. Comput., vol. 20, no. 4/5, pp. 473–479, 2008.

[18] R.A. Lestari, E. Muslim, and B.N. Moch, "User interface evaluation of official store for FMCG products in e-commerce website using user experience approach," in IOP Conf. Ser.: Mater. Sci. Eng., vol. 505, no. 1, 012079, 2019.

[19] M.A. Puspasari, T. Sari, F.S. Pratama, and M.F. Fadillah, "User experience evaluation on use of cosmetic B2C e-commerce sites," J. Eng. Manag. Ind. Syst., vol. 7, no. 2, pp. 69–76, 2019.

[20] M. Ekşioğlu, S. Varol, and Y. Duman, "An investigation of user-experience design of e-commerce websites," in Proc. World Congr. Electr. Eng. Comput. Syst. Sci. (EECSS2015), 316-1, 2015.

[21] C. Bozzi and C. Mont'Alvão, "The user experience (UX) on female apparel e-commerce websites in Brazil," Work, vol. 66, no. 4, pp. 945–962, 2020.

[22] T. Mominzada, M.Z.B. Abd Rozan, and N.A. Aziz, "Consequences of user experience in a gamified e-commerce platform," Int. J. Electron. Commer. Stud., vol. 13, no. 1, pp. 113–136, 2021.

[23] T.D. Vila, E.A. González, N.A. Vila, and J.A.F. Brea, "Indicators of website features in the user experience of e-tourism search and metasearch engines," J. Theor. Appl. Electron. Commer. Res., vol. 16, no. 1, pp. 18–36, 2021.

[24] L. Bonastre and T. Granollers, "A set of heuristics for user experience evaluation in e-commerce websites," in ACHI 2014: 7th Int. Conf. Adv. Comput.-Hum. Interact., pp. 27–34, 2014.

[25] C. Bascur, C. Rusu, and D. Quiñones, "ECUXH: A set of user experience heuristics for e-commerce," in Int. Conf. Hum.-Comput. Interact., Cham, Switzerland: Springer Int. Publ., pp. 407–420, 2021.

[26] Y. Sudiana, U. Chandra, and L. Angela, "Key success factors for a better user experience in e-commerce website," in 2021 Int. Conf. Inf. Manag. Technol. (ICIMTech), Jakarta, Indonesia: IEEE, pp. 512–516, 2021.

[27] A. Hinderks, M. Schrepp, and J. Thomaschewski, "A benchmark for the short version of the user experience questionnaire," in Proc. 14th Int. Conf. Web Inf. Syst. Technol., pp. 373–377, 2018.

[28] S. Ritonummi and O. Niininen, "User experience of an e-commerce website: A case study," in Contemp. Issues Digit. Market., pp. 61–71, 2021.

[29] N.R. Febriandika, A.N. Millatina, Luthfiyatillah, and S. Herianingrum, "Customer e-loyalty of Muslim millennials in Indonesia: integrated model of trust, user experience, and branding in e-commerce webstore," in Proc. 2020 11th Int. Conf. E-Educ., E-Bus., E-Manag., E-Learn., Osaka, Japan, pp. 369–376, 2020.

[30] L. Hasan, "Major and minor issues affecting the user experience on e-commerce websites," Int. J. Adv. Appl. Sci., vol. 10, no. 10, pp. 208–221, 2023.

[31] L. Hasan, "Common and unique user experience problems on e-commerce websites," in Multi Conf. Comput. Sci. Inf. Syst. (MCCSIS), 2023.

[32] B. Moriset, "e-Business and e-Commerce," in A. Kobayashi, Ed., Int. Encycl. Hum. Geogr., Oxford: Elsevier, 2019.

[33] M. Schrepp, J. Thomaschewski, and A. Hinderks, "Construction of a benchmark for the user experience questionnaire (UEQ)," Int. J. Interact. Multimedia Artif. Intell., vol. 4, no. 4, pp. 40–44, 2017.

[34] S.E. Scholtz, "Sacrifice is a step beyond convenience: a review of convenience sampling in psychological research in Africa," SA J. Ind. Psychol./SA Tydskr. Bedryfsielkunde, vol. 47, no. 0, a1837, 2021.

[35] S. Merriam, Qualitative Research and Case Study Applications in Education, Jossey-Bass Publ., 1998.

[36] N. Yusof, N.L. Hashim, and A. Hussain, "A conceptual user experience evaluation model on online systems," Int. J. Adv. Comput. Sci. Appl., vol. 13, no. 1, pp. 428–438, 2022.

[37] A.S. Al-Hunaiyyan, R. Alhajri, B. Alghannam, and A. Al-Shaher, "Student information system: investigating user experience (UX)," Int. J. Adv. Comput. Sci. Appl., vol. 12, no. 2, pp. 80–87, 2021.

APPENDIX

TABLE IV. THE PROPOSED USER EXPERIENCE (UX) GUIDELINES

No	Area	Category	Explanation	References
Categories to evaluate the pragmatic quality of any e-commerce				
G1	Design	The website should have a user-friendly design	A website should have an overall user-friendly or easy to use design. This will allow users easily to navigate through the website and complete their tasks efficiently and effectively; it will also make it flexible and convenient to navigate.	This research; [23,25,26]
G2		The website should have a straightforward design	A website should have a straightforward design; this mainly relates to the site having a clear, easy to learn and understand design so that users can complete their tasks without hesitation by choosing wrong features or options, and without the need to think much to achieve their goal.	This research; [15,23-27,30,31,33,37]
G3		The website should have consistent design	The website should have consistent design in terms of the colours used, the location of menus, the layout and feedback.	This research; [23-25,30,31]
G4	Structure	The website's content should be organised or structured logically	The website's content should be organised or structured logically and clearly. For example, similar products should be grouped together.	This research; [18,19,23,24,30,31]
G5		The website should have similarity and familiarity	A website should have similarities with other websites that a user frequently uses; this will make the website look familiar to the user. This therefore helps to make the website easier to use and understand as if the user is doing nothing out of the ordinary.	This research
G6	Navigation	The website should be easy to navigate	It should be easy to navigate around the website and the site should have features and functions that are easy to access. This will make the work of the users very convenient as the website will be very flexible which will help in allowing the users to achieve their goal faster.	This research; [23,24]
G7	Responsiveness	The website should have good performance in terms of responsiveness	A website should have good performance; it should be responsive and provide responses in a consistent manner which help to prevent the user from getting frustrated while using the website.	This research
G8	Efficiency	The website should be efficient	A website should allow the users to complete their tasks quickly.	This research; [1,15,23,25-27,30,31,33,36,37]
G9	Advertisements	The website should avoid having advertisements	A website should avoid having advertisements as they tend to confuse the users. Most users are sceptical regarding advertisements that are posted online due to the high probability (and fear) of being scammed.	This research
G10	Internal search	The website should have an accurate internal search and filter	The website should have an accurate internal search and filter(s) to help users to search easily for the product they desire to buy.	This research; [1]
G11	Content	The website should have product variations	The website should have various products with many choices and options as users like to have choice while shopping; this allows them to assess if one product is better than another.	This research; [19]
G12		The website should have good product quality	The website should have products with a certain level of quality so that the users will not be discouraged from purchasing from the application.	This research
G13		The website should provide helpful information and reviews for each product on it	The website should provide helpful reviews and information for each product on it so that users can easily understand the product, and allow them to easily compare products and choose the products that best suit their needs.	This research; [1,30,31]
G14		The products on the website should be reasonably priced	The products on the website should be reasonably priced to encourage users to buy from the website.	This research
G15		The website should provide satisfying promotional offers (i.e. vouchers, coins, rewards, promotions, discounts)	The website should provide satisfying promotional offers, such as: vouchers, coins, rewards, promotions or discounts. These offers will allow the users to save money or to get their money's worth as they do their shopping. They also help make the users more willing to make any purchases.	This research
G16	Payment and refund	The website should have an easy payment process	The website should have easy, convenient, and smooth payment process for the users	This research
G17		The website should allow refunds to be made conveniently	The website should allow refunds to be made with convenience; this gives a business some room to amend for any problems or mistakes that may have occurred in the business process. Proper compensation to users helps in increasing the reputation of the business and helps in correcting any bad user experience.	This research; [1]
G18	Shipping and delivery	The website should provide good shipping and delivery	The website should provide good shipping and delivery services that help to send the products to the users.	This research; [1,30,31]
G19	Customer service	The website should have good customer service	The website should have a good customer service as a business without good customer service will make users unable to make proper inquiries if they encounter any problems while using the website. This causes the users to feel frustrated which negatively influences user experience.	This research

G20	Security and trustworthy	The website should have secure and trustworthy transactions	The website should have secure and trustworthy transactions to encourage users to buy from it; these aspects are significant to a website's success.	This research; [1,23]
Categories to evaluate the hedonic quality of any e-commerce				
G21	Attractiveness	The website should be attractively designed	The design of the website's pages should attract the users. This will encourage them to navigate throughout the website.	This research; [26,30,31,33]
G22	Creativity and enjoyment	The website should be creatively thereby designed	The design of the website should have creative features.	This research; [27,30,31,33,37]
G23		The website should be enjoyable	The website should be enjoyable; this will encourage users to interact with it.	This research; [30,31]
G24	Pleasant and excitement	The website should be pleasant	The website should be pleasant; this will evoke users' positive feelings while interacting with it.	This research; [30,31,33]
G25		The website should excite users	The website should excite users, thereby evoking their interest in interacting with the website.	This research; [24,27,30,31,33,37]
G26	Motivation	The website should motivate users	The website should motivate the users to interact with the website and complete their tasks.	This research; [12,27,30,31,33,37]
G27	Expectation	The website should meet users' expectations	The website should address users' needs by providing all the needed functionality; it should behave as users expect.	This research; [30,31,33,37]