

Mapping E-Auction Sharia Compliant Requirements to User Interface Design

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Abstract—Successful online auction platform depends on many factors. These factors amongst others include competent business models which can survive the world's economic challenges, useful features to attract buyers and sellers, as well as intuitive and easy to learn interface to enhance user experience. The infamous eBay for example is considered the most successful e-auction platform which caters for various products, while artnet is reviewed as an e-auction dedicated to art with the highest revenue. eBay has the largest user base of all the online auction sites. Though it has some steep fees, it also has an easy-to-use interface that makes listing items simple. Although these e-auction platforms are attractive in so many ways, many Muslim consumers are increasingly aware of Islam as a way of life, and their responsibility to seek not just for halal products but also to use services which guarantee legitimacy of the transactions and conformant to Islamic business rules. This study presents Mazad, a Sharia compliant e-auction platform that offers processes and procedures that meet Sharia requirements, promotes benevolent behavior, as well as Islamic business ethics. In order to encourage Muslim and non-Muslim users alike to learn about specific e-auction features which are not available in conventional online auctions, this work emphasizes on the mapping of the sharia requirements of e-auctions and their implementation in Mazad by highlighting its user interface design. The user centered design principles as well as the “What You See Is What You Get” concept is used in designing Mazad, the sharia compliant e-auction platform.

Keywords— e-Auction; sharia compliant; WYSIWYG; user centered design; intuitive.

I. INTRODUCTION

Software development is already becoming a lucrative and highly competitive industry. *Indeed*, a job search site reported that full stack developers are amongst the most in-demand by employers in 2019 in terms of open job postings [1]. The survey also reported Paul Wallenberg the head of technology recruiting services at LaSalle Network informed that some companies prefer developers who can work on all levels of the application stack. Developers also need to understand their users' requirements well to translate the requirements to application features from front-end to back-end correctly to ensure their applications receive a better reaction once released or deployed into an App Store [2].

Nowadays Muslims are increasingly aware that Islam is a way of life hence they are obligated to use halal and sharia compliant products and services not only concerning food consumption but also in other aspect of life such as banking, trade, health, communications, learning, entertainment and life. Therefore, it is necessary to refine the conventional e-

auction designs which encompass the auction processes, procedures, protocols and user interface from start to end in order to embed the requirements of Sharia and to avoid any violation. It is accepted that reference modelling is a well-known approach in the development of information systems that share certain characteristics or application-specific details [3]. Hence, we have proposed a reference model verified by experts with the intention to assist software developers in laying down the basic infrastructure needed for designing and implementing sharia compliant e-auction systems [4]. Based on this reference model, we built an e-auction prototype system which was designed by mapping the e-auction sharia compliant requirements to its unique features and interface design is intuitive and interactive. This paper examines the auction marketplaces from the pre-Islamic times to the present day, highlights the features of Islamic auctions, presents the requirements for Sharia compliant e-auctions and their mapping to Mazad's features which can be viewed via its user interface.

II. MATERIALS AND METHOD

A. Auction Marketplace at a Glance

An auction is a process of buying and selling goods or services by offering them up for bid. The linguistic, the word auction comes from the Latin verb ‘*auctio*’ (from ‘*augere*’) which means ‘to increase’ and surprisingly the equivalent Arabic term for auction *al-mazayadah* comes from the root word *za-ya-da* which also means ‘increase’ [5]–[7]. Like negotiation, auction use a dynamic pricing mechanism in order to determine price offered by potential buyers. During the reign of the Roman empire, auction was prominent for trading slaves [8]. The prophet Muhammad (SAW) himself practiced auction to sell a cup and a rug owned by one of his companions [9]. The fact that auction is endorsed by the prophet Muhammad (SAW) makes it special because he was recognized as skillful and honest businessman. To date, traditional auction houses have been replaced by online auction advancing it to reach many potential customers and suppliers with lesser cost and time [10]. eBay the largest online e-auction recently reported a revenue of 10.856 billion U.S. dollars for the twelve months ending June 30, 2019 [11].

B. E-auction Issues from Sharia Perspective

Most jurist schools allow auctioning either online and offline but affirm that it must comply with the sale contract requirements [12]–[15]. In the study done by [16], it described the process of auction is like the process of *bay al-muzayadah*, which is a recognized contract under Sharia. The study further explained that *bay al-muzayadah* is defined as the intermediation between seller and buyer, or between lessor and lessee, in order to determine the amount of the price of the commodity or services that is intended to be acquired based on mutual acceptances of the counter values by the par ties.

Today's innovations in auction transactions conducted over the Internet via mobile devices have introduced new processes, procedures and methods that do not exist in traditional auctions [4]. These raised some doubts from the sharia perspective especially concerning the legitimacy of the transactions. An in-depth study of some of the conventional online auction systems and methods reveals some of the disadvantages that directly lead to some of the prohibited practices such as usury (*riba*), gambling (*maiser*), uncertainty (*gharar*) and price inflation (*najash*). For example, the unclear process of determining service charges, non-refundable auction fees and bidding fees, fraud, ambiguity and collusion between bidder and seller to increase price are contradictory to Islamic teachings. In addition, online auction transactions also raise issues about the absence of auction physical meeting place, lack of endorsement of ownership of goods for sale, doubts of seller and bidder identities, and so on [17]–[19]. Islam also prohibits transactions that contain any element of tyranny and requires that it apply justice to every transaction [20]. The concept of justice and finding the best is more important in online auctions because buyers and sellers are not physically present in one event. Therefore, it is important for any online auction to implement the features of the Islamic auction as stated. An example of such applications is the

Mazad system (which comes from *al-Mazayadah* word) developed by [21].

C. User Centered Design

Designing and implementing an intelligent and user friendly HCI for any kind of software or hardware application is always a challenging task for the designers and developers because it is very difficult to understand the psychology of the user, nature of the work and what best suits the environment [22]. In designing *Mazad's* user interface, User-Centered Design (UCD) is used, specifically the generative method (e.g., brainstorming) to develop an understanding of user needs. User-centered design principles encompass understanding the business, maximizing graphic effectiveness, thinking like a user, using models and prototypes, focusing on usability, inviting feedback, and documenting everything [23]. The focus would be on representing the buyer/bidder's and seller's auction interface. We designed a transparent and intuitive interface in order to create an interface that is easy to learn and use, enhance user productivity, make it easy to obtain help or correct errors, minimize input data problems, provide feedback, create an attractive layout and design, and use familiar terms and images as described by [24]. The concept of “What You See Is What You Get” (WYSIWYG) is also utilized in creating concept and content maps to enhance learning [25], as well as in selecting the GUI components in every page so that users can learn about sharia compliant features which are not available in conventional e-auctions.

Like previous work done by [34], we used the cognitive walkthrough method to identify the tasks that users need to accomplish to participate in the auction marketplace. For the role as a seller, we identify the tasks (processes) using the cognitive walkthrough method beginning from registering as a seller until delivery by including the specific sharia requirements as features in the seller's GUI. The same method is applied to identify tasks (processes) for the role of a bidder. The next section will discuss each of the sharia requirements for e-auctions and features implemented in our proposed e-auction system.

D. Sharia Compliant Requirement in Mazad

There are three unique features implemented in our proposed *Mazad* system: 1) sharia compliant processes and procedures, 2) bid strategies that incorporate the concept of benevolence and leniency, and 3) Islamic business ethics. All these features are described in the following subsections.

1) Sharia Compliant Process and Procedures

Table 1 shows the mapping of process and procedures related to sharia requirements for e-auction to *Mazad's* features are reflected in the user interface design.

2) Bid Strategies Based on Altruistic Behavior

Al-Shatibi reemphasized the principle of Quranic supremacy as the ultimate source for making rules among Muslims [26]. He argued that the individual's interests and common good (*maslahah*) constitute the prime purposes of Islamic law. Al-Shatibi further explained that the laws prescribed are for the maintenance of certain *maqasid* (objective) of the law namely *daruriyat*, *hajiyyat* and *tahsiniyat*.

TABLE I
MAPPING OF E-AUCTION SHARIA REQUIREMENTS TO MAZAD'S FEATURES

Process/Procedures	Shariah Requirement	Mazad's feature/user interface
Identity verification	Accuracy of personal information such as full name Eligibility in terms of age and maturity Free will to enter contract	User registration (Fig.2) Registered user verification (Fig. 3)
Auction fees	Comply with Ijarah rules: fixed amount, pre-agreed, & precisely defined during contract signing [27] Paid by seller only. Refunded if auction fails, but can also be considered as registration fee to be used for operational cost if the auction authority does not have any other source of income	Product listing (Fig. 4)
Product description	Adequate description Supporting document (can be supported with images, etc.) Existence (must be readily available) Permissible to consume Owned & under possession of the seller	Product listing (Fig. 4) Uploading image (Fig. 5) User declaration (Fig. 6)
Payment methods	Fixed annual rates Free or fixed rate amount per transaction Comply with Ijarah rules	Buyer determine preferred Islamic payment method (Fig. 7)
Bidding fees	If applied, must comply with Ijarah rules: fixed amount, pre-agreed, & precisely defined Defined for all bidders equally Refunded to all losers.	Bidding fee not applied to bidder
Bidding and bid withdrawal	Open cry protocol (disallow withdrawal of bids until another bid is received) Sealed-bid Protocol (disallow withdrawal)	Bid withdrawal (Fig. 10)
Determining winner and selling contract	Seller consent necessary (must be satisfied with price) Established after the seller determines the winning bid	Accepting winner (Fig. 11) Revise selling contract (Fig. 12)
Delivery	Charges must be clearly set Guarantee product returns	Shipping fee and return policy (Fig. 6) Delivery details (Fig. 13)

Maqasid daruriyat is the objectives that must be observed in the enactment of any Islamic law to protect human well-being via five main essentials of human beings: faith (*din*), life (*nafs*), intellectual ('*aql*), property (*maal*) and lineage (*nasl*) [28]. *Maqasid al-hajiyat*, in turn, is to eliminate the difficulties in human life. For example, the legality of future contract/sale (*bay al-salam*) certainly helps to avoid difficulties in human transactions. Whereas the *maqasid tahsiniyat* is to complement the two previous *maqasids* which emphasize on the aspect of perfection in normal practice and nobleness in morals. For example, the permissibility regarding the use of trading applications and online payments can certainly facilitate the daily affairs of today's society. The question is how to implement the *sharia maqasid* in the bidding strategy to show altruistic behavior?

Altruism is the principle and moral practice of concern for happiness of other human beings and/or animals, resulting in a quality of life both material and spiritual. In other word, it implies selflessness behavior. In 1851, Auguste Comte introduced the term 'altruism' to distinguish this form of unselfish motivation from acts which were selfishly motivated [29]. Table 2 shows the mapping of altruistic requirements to *Mazad's* features which are implemented in bid setting sub-features. A software agent was used to implement the proxy bidder. The *maqasid* is implied when determining the value of the product to the buyer (human bidder) via prioritization. If the buyer

specifies the product as a basic need (*daruriyat*) the bidding agent will behave selfishly. On the contrary, if the product is prioritized as *hajiyat* or *tahsiniyat* (to make life easy or a lavish item), bidding agent will bid altruistically. The buyer can set different level of altruistic towards seller alone, or towards other bidders as well. For example, bidders can show benevolent attitude toward sellers who are desperate to sell their goods by bidding at higher prices and lenience to other bidders by choosing not to outbid bidders who are really in need of acquiring a product.

TABLE II
MAPPING OF ALTRUISTIC REQUIREMENTS TO MAZAD'S FEATURES

Altruistic requirements	Mazad's feature/user interface
Proxy bidder	In setting bid preferences (enable/disable proxy bidding) (Fig. 10)
<i>Maqasid (daruriyat/ hajiyat/ tahsiniyat)</i>	Setting prioritization (bidder specify product as daruriyat (a basic need), hajiyat (makes life easier) or tahsiniyat (makes life perfect/lavish) (Fig. 14)
Benevolent and lenience	Setting altruistic parameter to seller and/or other bidders (Fig. 10)

3) Islamic Business Ethics

For the full implementation of sharia-based e-auctions, an important feature is to meet sharia requirements in the trust

model implemented. This cannot be achieved unless the trust matrix is modified to reflect Islamic business ethics [30]. Table 3 shows the mapping of Islamic code of ethics and business conduct used to metrics used to evaluate user's behavior in measuring the trustworthiness of a seller by the buyer. Five Likert scales are used: Very poor (-1), Poor (-0.5), Moderate (0.0), Good (0.5) and Very Good (1). These data collected is used to determine user's trust rating. The trust rating feature is shown in all seller's product listing to assist new buyers in choosing trusted seller. Similar method is also used to for rate buyers.

TABLE III
MAPPING OF BUSINESS ETHIC TO METRIC FOR TRUST RATING FEATURE

Islamic Business Ethical Code	Metric used for trust rating
Truthfulness	Product description (Fig. 16)
Transparency	User frankness (Fig. 16)
Commitment	Received product (Product quality and delivery time) and quick response (Fig. 16)
Cooperation	Cooperation in complying to agreed terms (Fig. 16)
Leniency	Shipping cost, Price affordability (Fig. 16)

III. RESULTS AND DISCUSSION

The designing process of the user interface was conducted iteratively in which several enhancements and revisions are carried out to come up with creative user interfaces. As the *Mazad* is a web application, several web tools were leveraged. Cascading Style Sheets (CSS) is used to format the HTML elements in each web page to give a unified style of the system pages. The readymade open source twitter bootstrap v 3.0 (www.getbootstrap.com) is used to speed the design process. Bootstrap library provides cross-browser compatibility and suited different kinds of smart devices. JavaScript gives interactive capabilities to the static web pages. The open source *JQuery* (jquery.com) library is used to ease the manipulation of the HTML codes. This section will display the corresponding user interfaces which have been mapped from the requirements discussed in Section II. The results of the implemented user interfaces will be discussed following the same order.

A. Auction Process and Procedure

Each process and procedure described as features in Table 1 will be illustrated in *Mazad* user interface. Fig. 1 depicts the main page of *Mazad* e-auction system. Users can sign in using the application id of Facebook, Twitter or Google.



Fig. 1 *Mazad's* main page

1) *User Verification*: Fig. 2 shows the user registration process starting with entering personal information and email and password, uploading profile picture, address and phone number, and at the final step the user has to make a declaration agreeing to the terms of use of the site and the Service Level Agreement that must adhere to sharia principles, as well as the age and maturity of the mind to make the transaction.

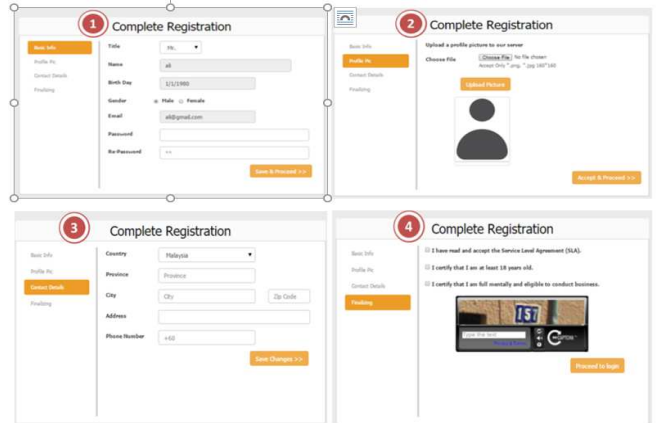


Fig. 2 User registration

To ensure that users are human rather than automatic programs, the CAPTCHA technique [31] is used to generate random combinations of letters and numbers for verifying human user. Next, the registered user will need to do three levels of verification, namely e-mail account, phone and payment verification as indicated by Fig. 3.

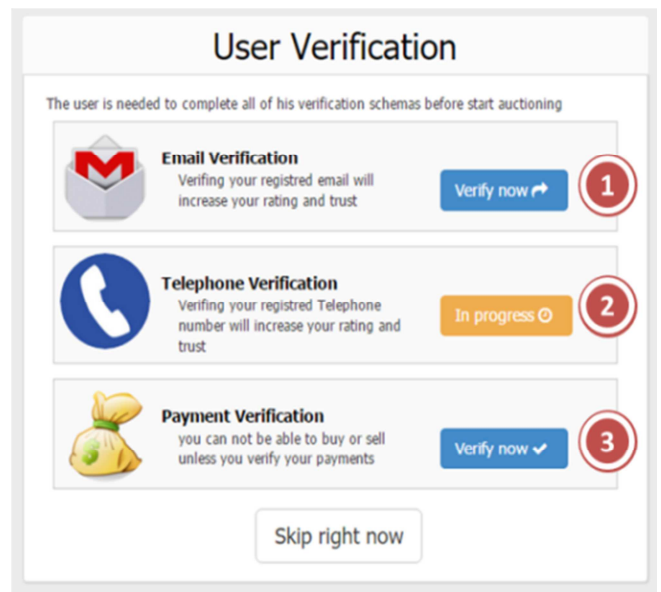


Fig. 3 Registered user verification

2) *Auction Fees*: In conventional e-auctions auction fees are considered commissions. eBay for example implements three types of auction fees [32]. *Mazad* implements a fixed fee based on product category. This single listing fee is paid only by the seller and is returned if the auction fails. However, it is up to the seller to set shipping fee or not. For example, the listing fee for mobile and computer categories is RM30, RM15 for sports equipment, RM5 for books and compact discs, RM100 for home appliances and traveling,

and so on. Fig. 4 shows the setting of auction fees when a seller chooses a product category during product listing.

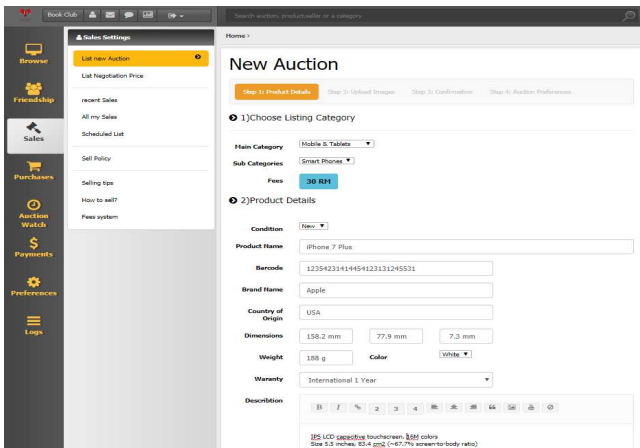


Fig.4 Determining auction fee during product listing

auction, select how long it should last, and the preferred type of payment method accepted by the seller.

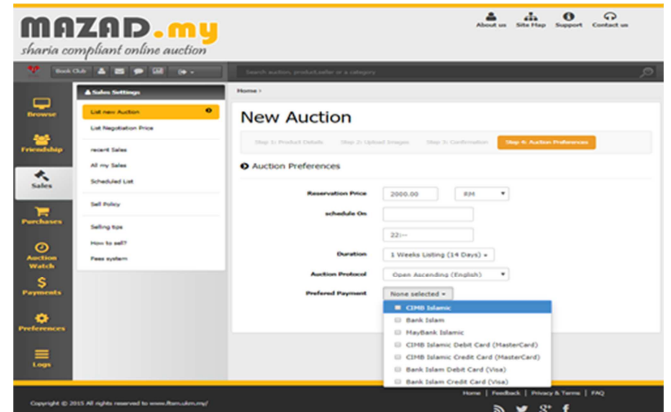


Fig. 7 Setting auction and Islamic payment method preferences

4) *Payment Method:* A user (buyer and seller) can add several Islamic payment methods to be selected for a specific transaction. Fig. 8 shows how this can be done. In the future Mazad can include Islamic payment gateway such as PayHalal [33].

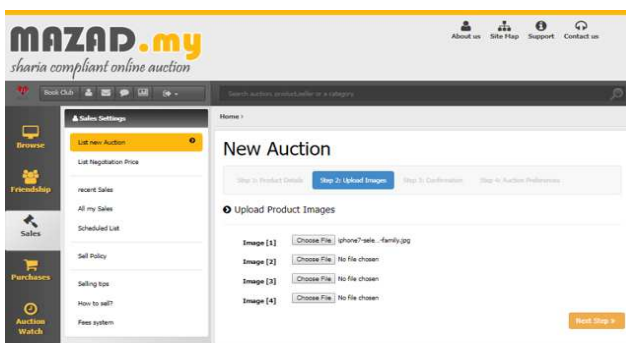


Fig. 5 Uploading image

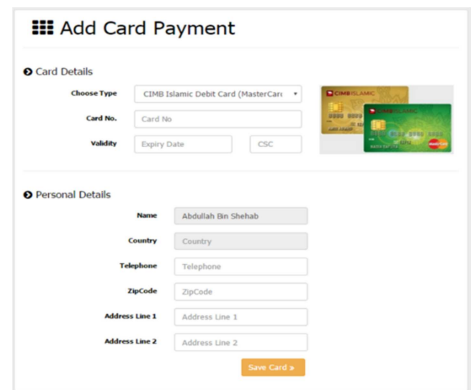


Fig. 8 Adding Islamic card payment method

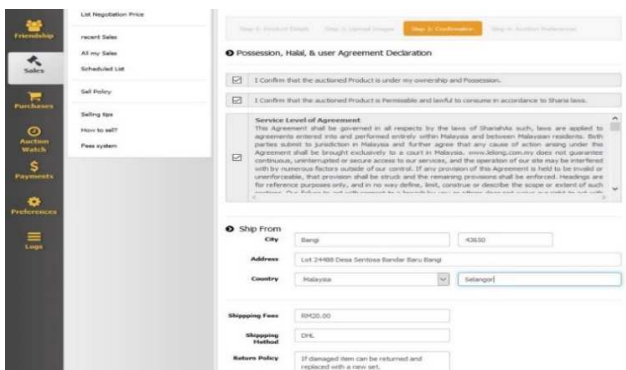


Fig.6 Declaration of product ownership, permissibility and SLA agreement

3) *Product Description:* Mazad uses advanced text formatting tool (WYSIWYG HTML text editor) to enable the best text formatting in product descriptions with video and image insertion to explain product details. Different templates are used for displaying product specifications by category based on the requirements for product description. There are 4 steps in creating new auction product listing, namely input product details, upload image or video, declaration of product ownership, halal status, and agreement to Service Level Agreement (SLA), and auction specifications. Each of the four steps are organized using the tab menu. All the steps are shown by Fig. 4, Fig. 5, Fig. 6 and Fig.7, respectively. Note that the seller can specify shipping fee and return policy in Fig. 6. In step 4 (Fig. 7) seller can set the reserved price, the date and time to start

5) *Bidding Fees:* Mazad does not charge fees to bid. Before bidding, the buyer usually searches for the product they want. Fig. 9 shows the interface used to find the product to bid. In the figure the main category is marked with number 1, while the sub-category is marked with number 2.



Fig. 9 Browsing for item to bid

In each category, the auction is listed with a summary of its specification (see number 4). Seller is marked with number 3. Seller's details and reputation can be seen on the auctioned product. In addition, the specified product auctions are identified in blue, green, and red. Blue means new auctions are in progress, green auctions are in progress, and red signifies that the auction is over. To take advantage of social network capabilities, features such as likes, follow, recommend (wish list) are also implemented (Refer to number 6). The blue menu tab can then be used to change the order of the listings either by newly added, closed, or most trusted seller.

6) *Bidding and Bid Withdrawal*: For each bid submitted, the buyer will set a bid amount that must be higher than the current price (for ascending open-cry auction). Fig.10 shows an adjustable proxy bidder configuration for launching a bidding software agent on behalf of the bidder.

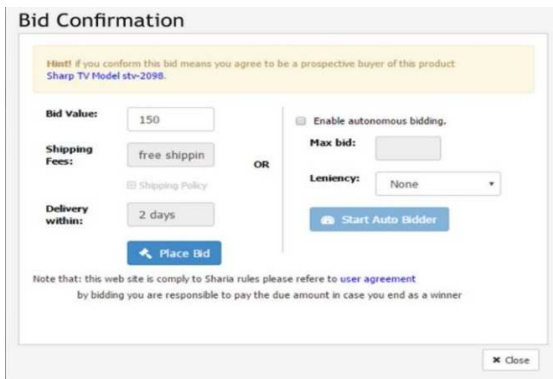


Fig. 10 Setting proxy bidder configuration

The buyer should only set the maximum bid amount and the agent will not bid beyond this value. Buyer can also assign the bidding agent to behave leniently or otherwise. Buyers are also reminded that they cannot withdraw bids and are responsible for paying the fee if declared as the winner.

7) *Determining winner and selling contract*: Since auctions depend on dynamic pricing, the interface should provide a way to check for auction price changes. By using the auction observer interface known as the bid-watcher, bidders and sellers can easily track changes in auction prices. The auction progress and bid history are shown in Fig. 11. The seller is satisfied with the current highest price he can select the bidder to be the winner and contact the bidder.

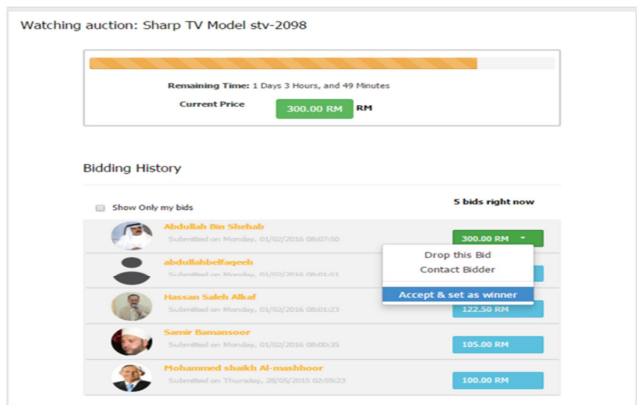


Fig. 11 Bid watcher

Fig. 12 shows a dialog that appears when the seller chooses to terminate the auction session. If the auction closes, then the bidder who offers the current highest price will be named the winner. The seller can declare the bid winner and review the sales contract by pressing the review contract button. Upon review, the contract will be sent to the bid winner.

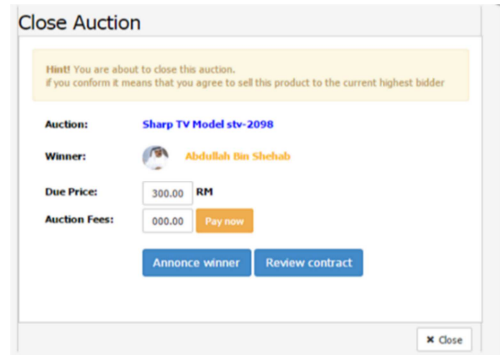


Fig. 12 Announce winner and review contract

8) *Delivery*: Fig.13 shows the entry of seller and buyer information to continue the product delivery process upon completion of the payment process.

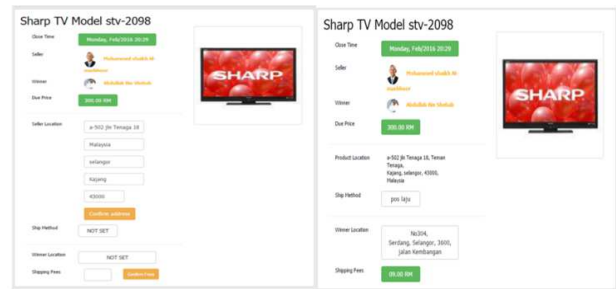


Fig.13 Input information for delivery

B. Altruistic Behavior

Mazad allows users to create social networks between sellers and bidders. When a user knows sellers and bidders in his circle, and their situation and needs, altruistic parameters can be set so that the bidding agent can be compassionate and reasonable when bidding. The bidder may select his or her level of need and assign an altruistic level to the seller or other bidder so that the bidding agent generates a bid value that reflects his or her desired behavior as shown in Fig. 14.

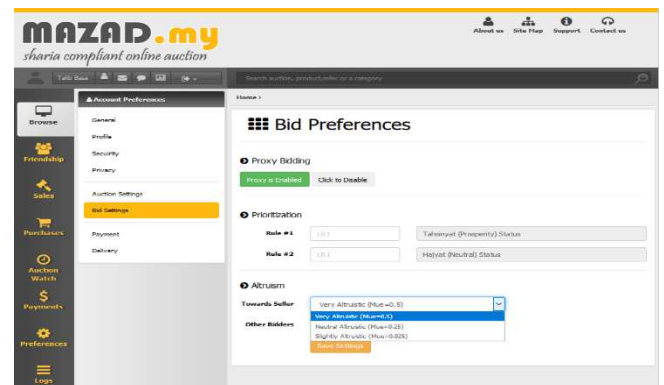


Fig. 14 Setting prioritization of product and altruistic behavior

C. Conforming to Islamic Business Ethics

Fig. 15 shows the features that allow bidders to filter the auction based on the time, auction mechanism and seller reputation which is calculated by considering of previous buyers' satisfaction when dealing with the seller. Fig. 16 shows detailed user's reputation and feedback history provided for each transaction.

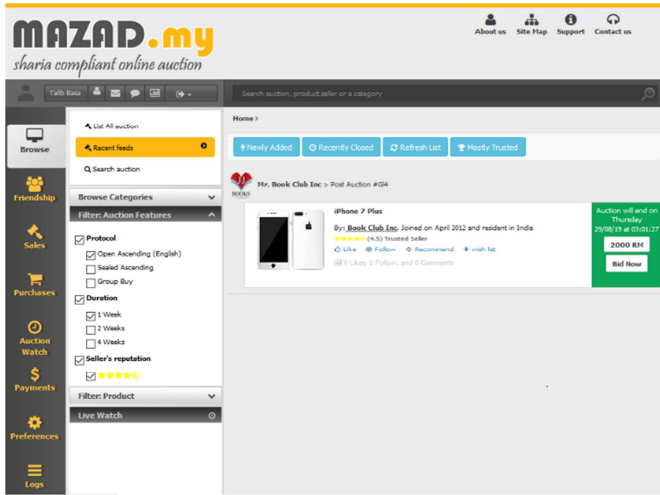


Fig.15 Filtering auction by user reputation

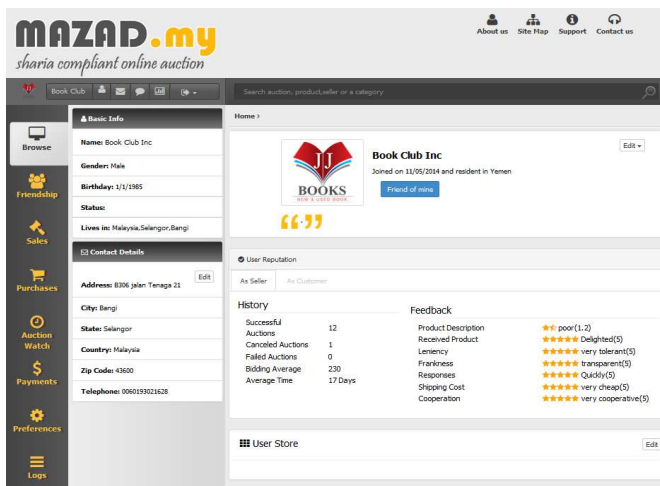


Fig.16 Detailed user reputation record

IV. CONCLUSION

The lack of real-world applications that adhere to the sharia-compliant features of the system especially the sharia-compliant e-auction system makes it difficult for users to visualize and appreciate the sharia compliant elements that should be emphasized. This paper describes the mapping process of the auction sharia compliant requirement to the user interface design using UCD technique. We also showed the interfaces of a sharia compliant e-auction prototype which was developed based on a reference model that has been reviewed by experts in the fields of sharia, business and information technology [4]. The interface design plays a major role in enabling Mazad to highlight the sharia-compliant features which are non-existent in the conventional auctions. This, in turn, serves as a medium to educate the general public about the sharia-compliant

requirements. Mazad also introduces the use of bidding software agents which apply altruistic bidding strategies to promote benevolent and Islamic values to soften the competition amongst bidders in an auction, as compared to the utilitarian decision model in conventional auctions. The research is expected to be a catalyst for researchers and business organizations to better understand the issue of sharia compliance in the context of online transactions, especially online auctions.

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REFERENCES

- [1] A. D. Rayome. (2018). The 10 most in demand tech jobs of 2019. published November 28, 2018 <https://www.techrepublic.com/article/the-10-most-in-demand-tech-jobs-of-2019/>
- [2] F. Sarro, M. Harman, Y. Jia, & Y. Zhang. (2018, August). Customer rating reactions can be predicted purely using app features. In 2018 IEEE 26th International Requirements Engineering Conference (RE), pp. 76-87. IEEE, 2018.
- [3] E. Souza, A. Moreira & F. Wanderley. (2018, January). Towards an Agile Reference Architecture Method for Information Systems. In Proceedings of the 51st Hawaii International Conference on System Sciences.
- [4] M. Al-aaidroos, N. Jailani, & M. Mukhtar. (2019). Expert validation on a reference model for e-auctions that conform to Islamic trading principles. Journal of King Saud University-Computer and Information Sciences. Volume 31, Issue 1, Pages 62-71
- [5] A. L. Academy, (2004). The intermediate lexicon dictionary (Almujam Alwaseet). Cairo: Arabic Language Academy.
- [6] C. Hultmark, C. Ramberg & C. Kuner. (2002). Internet marketplaces: the law of auctions and exchanges online. Oxford University Press on Demand.
- [7] J. A. Ibn Manzur. 2003. Lisan al-Arab. Matba'ah Dar al-Hadith: al-Qaherah
- [8] J. Ali. (2002). Almufasal Fi Tarikh Alarab Maqabl Al-Islam (The Details of the Arabs history in the pre-Islamic Era). Beirut: Dar Al-ficker.
- [9] M. I. Al-Tirmidhi (1998). Al-Jami 'al-Kabir. Ed. Bashshar 'Awwad Ma 'ruf. Dar al-Gharb al-Islami.
- [10] E. Lieber & C. Syverson. (2012). Online versus offline competition. The Oxford handbook of the digital economy, 189.
- [11] <https://www.macrotrends.net/stocks/charts/EBAY/ebay/revenue> retrieved on the 5th September 2019.
- [12] A. S. Baharuddin, F. Johari, & M. A. Mas'ad. (2018). Transaksi Kewangan Secara 'Online' Menurut Undang-Undang Keterangan Islam di Malaysia: Isu dan Cabaran. Journal of Fatwa Management and Research, 113-127.
- [13] N. M. Quqazi. 2004. Selling by auction provisions and its contemporary applications. Amman: Darulnafae.
- [14] Z. Zaidan. 2009. Albay bilmazad alalani (the sale with using auction). Dar alkitab alqanuni.
- [15] A.R. Zaharuddin. Fiqh kewangan Islam: Halal Dan Haram Dalam Sistem Jual Beli Islam. PTS Islamika SDN BHD. 2014.
- [16] M. El Haloui & R. Aboulaich. (2019). Leveraged buyout booms and busts: can Islamic finance help prevent and mitigate such market distortions?. Investment Management & Financial Innovations, 16(1), 299.
- [17] S. Jamalludin, N. Jailani, S. Ahmad, S. Abdullah, M. Mukhtar, M. A. Bakar & Z. Abdullah. (2011). A Syariah compliant e-auction framework. In Proceedings of the 2011 International Conference on Electrical Engineering and Informatics (pp. 1-6). IEEE.
- [18] N. A. M. Rashid, N. Jailani, R. Sulaiman & Z. Abdullah. (2014). Multi-agent security architecture for a Sharia compliant e-auction. Journal of Theoretical and Applied Information Technology, 70(2), 345-355.

- [19] A. Jilani & V. A. Ansari. (2017). Evaluation of Online Auction Mechanism as Per Islamic Norms of Transactions. *International Journal of Commerce, Business and Management (IJCBM)*, ISSN: 2319-2828 Vol. 6, No.2 Mar-April 2017, pp. 44-51.
- [20] A. M. Mas'ad. (2018). Analisa Syariah Terhadap Konsep dan Jualan Lelong Secara Bisik: Kajian Kes Pasar Bisik Kuala Muda Kedah. *Úlum Islamiyyah: The Malaysian Journal of Islamic Sciences* Vol. 24 (August).
- [21] M. Al-aaidroos. (2017). A Reference Model for Shariah Based e-Auction. PhD Thesis, Faculty of information Science and Technology, Universiti Kebangsaan Malaysia.
- [22] Z. Ahmed. (2011). Designing flexible GUI to increase the acceptance rate of product data management systems in industry. *arXiv preprint arXiv:1103.1134*.
- [23] B. Still & K. Crane. (2017). *Fundamentals of User-Centered Design : A Practical Approach*. CRC Press.
- [24] E. N. McKay. (2018). *Intuitive Design: Eight Steps to an Intuitive UI*. Black Watch Publishing. 1st edition.
- [25] M. Schwab, H. Strobelt, J. Tompkin, C. Fredericks, C. Huff, D. Higgins & H. Pfister. (2016). booc. io: An education system with hierarchical concept maps and dynamic non-linear learning plans. *IEEE transactions on visualization and computer graphics*, 23(1), 571-580.
- [26] F. A. H. M. Asni. (2017). Al-Syatibi Methodology Analysis In The Unification Of Usul Al-Fiqh Methods. *International Journal of Academic Research in Business and Social Sciences*, 7(7), 260-268.
- [27] M. A. J. Ahmad, L. Hussain & A. Abdullah. (2013). Takyif Fiqhi Terhadap Yuran Prestasi (Performance Fee) Daripada Lebihan (Surplus) Dana Risiko Peserta Takaful. *Muzakarah Cendekiawan Syariah Nusantara ke-7*. Ujah: Isu-Isu dan Aplikasi dalam Kewangan Islam. 29-30 Mei 2013, Singapura.
- [28] al-Ghazali, *Op. Cit.*, vol. 1, pp. 286-7.
- [29] A. Comte. 1875. *System of positive polity*. London: Longmans, Green (first published, 1851).
- [30] N. F. Kolan, N. Jailani, M.A. Bakar & R. Latih. (2018). Trust model based on Islamic business ethics and social network analysis. *International Journal on Advanced Science, Engineering and Information Technology*, 8(6), 2323-2331.
- [31] B. B. Zhu, J. Yan, G. Bao, M. Yang & N. Xu. (2014). CAPTCHA as graphical passwords—a new security primitive based on hard AI problems. *IEEE transactions on information forensics and security*, 9(6), 891-904.
- [32] M. Godin. (2017). eBay Seller Fees Explained – The Complete eBay Fee Calculator Guide. retrieved at <https://crazyliester.com/blog/ebay-seller-fees-calculator-guide/>.
- [33] PayHalal. 2019. <https://payhalal.my>.
- [34] N. A. Zaini, S. F. M. Noor & T. S. M. T. Wook. (2019). Evaluation of API Interface Design by Applying Cognitive Walkthrough. *Evaluation*, 10(2).