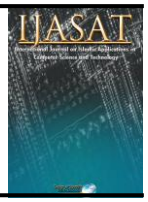

System Architecture for E-auctions that Conforms to Sharia Principles

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ABSTRACT

Online auction or e-auction is one of the most successful forms of electronic commerce in which millions of products are sold daily via a dynamic price competition. Unlike customary trading methods, e-auctions are conducted in a virtual environment where participants are remotely contacted, no hand-to-hand delivery, and higher fraud and deceit risks are present. From Muslims' perspectives the main question that arises pertaining to e-auctions is the extent of compatibility of this new form of auction with sharia principles. This concern is valid since studies revealed the presence of illegitimate sharia features in the conventional e-auction methodology and raised the demand to fully harmonize its system architecture so that it embodies the Islamic principles. In order to meet sharia requirements, this paper proposes identity verification to avoid anonymous identity, product verification in terms of ownership and permissibility, lawful payment methods, compatible auction and bid charging, and following rightful procedures. Implementing e-auction systems based on the proposed architecture can be considered sharia compatible. This allows and reassures Muslims to participate in e-auctions.

***Keywords*: Sharia e-auction, Islamic lawful e- auction, E-auction from Islamic perspectives.**

1. INTRODUCTION

Since ancient times auction has been a popular trading mechanism for the exchange of goods, commodities, and services. With the advent of internet and the World Wide Web (WWW) technology, massive attention turned to electronic commerce in which business transactions are conducted remotely and electronically taking the advantage of reaching a large number of potential customers and suppliers with low cost and minimal time. Trading through e-auction is one of the most successful e-commerce applications which gained tremendous popularity in the past decades with millions of items auctioned every day and hundreds of auction sites emerging worldwide (Haruvy & Leszczyc 2010). E-auction provide numerous advantages such reaching a large group of bidders, giving more flexibility on bidding, easiness of finding items and suitable needed auctions, and cutting cost since there is no geographical auction house. By contrast, e-auction has the disadvantages of higher fraud risk and harder item(s) inspection (Lucking-Reiley 2000). Usually, e-auction involves four stockholder entities including seller, bidder(s), auctioneer, and the sold item(s).

This resounding success of e-auction faces an important question especially for Muslim about the extent of compatibility the new form of auction has in terms of Sharia principles. According to (Zainul et al. 2004) Islam urges for two preliminary principles of permissibility

and harmlessness when doing their daily business either electronically or in conventional way. Permissibility meaning fully compliant with Islamic norms and harmlessness emphasize that no harmful implications for others or the public. Although trading through auctions either off-line or online is permissible, that is Halal since the prophet Muhammed (SAW) and the Muslims after him have been practicing it, but some studies reveal that some e-auction features might be exposed to prohibited contracts such as najash (prices inflation), riba(interest), maisir (gambling) or gharar (uncertainty). See for instance the studies in Al-Munajjid (2007), Abd Rahman (2009), and Jamalludin (2011). These findings point to the need to develop a sharia compliant e-auction that guarantees and eliminates the prohibited features together with ensuring fully lawful auctioning procedures form the beginning to the end.

Accordingly, this study comes to fill in this obvious gap and proposes the desired system architecture. This paper is organized in four main sections. In the second section, a review of the literature will focus on the Islamic Jurists point of view and discuss briefly the prohibited features found in current e-auction systems. Section three, the methodology section comprises of two sections, which are the sharia requirements and the system architecture, respectively. The former discusses in details the requirement for sharia compliant system architecture and the later describes the proposed architecture from the technical point of view. The final section of this paper discusses the implications of this work.

2. LITERATURE REVIEW

Auction is an old trading mechanism that has emerged since the ancient times specifically during ancient Babylon and Roman times where auction used to sell war plunder or in conducting marriages (Shibik 1983). Ancient Arabs in the pre-Islamic era also mentioned the practice of auctions in trading slaves especially in the annual slave markets known as “Aswak Nekhasah” (Ali 2002). In the Islamic era, auctions are considered as one of the popular lawful trading mechanisms and particularly the Prophet Muhammed (SAW) practiced it to sell a cup and a rug owned by one of his companions (At-Tirmidzi, No. 1139). In general, there is a semi-consensus that trading through auction is lawful in Islam because of the dominant evidences from Quran and Sunah i.e. Hadith. Evidence from Quran are relay on verses that state the validity of selling goods such as the verse No. 275 from Surah Al Baqarah when Allah (swt) said “Allah has permitted trade and forbidden usury” (Ali 1946). Evidences from Sunnah, derives two Hadiths narrated by Al-Bukhari and Muslim and al-Tirmidhi respectively. In the first one prophet Muhammed (saw) auctioning a salve owned by one of his companions and said “Who will buy this slave from me?” then one of prophet‘s companions bid an amount and the prophet (SAW) accepts (Al-Bukhari No.2034 , Muslim No. 997). In the second one prophet Muhammed (SAW) auctions a rug and a cup saying "Who will buy this rug and cup?"A man said, “I’ll take them for a dirham,” and the Prophet (SAW) said, “Who will offer more than a dirham? Repeated twice” Another man gave him two dirhams, and bought the goods (At- Tirmidzi No.1139).

However, in contrast to the dominant jurists view, Al-sulayman (2005) stated two other views in which the first consider auction as less desirable i.e. Makrooh in all cases and the other consider auction less desirable in selling legacies only. Due to strong evidences the

author liked the dominant view. In the same direction, the International Fiqh Council publish their decision about auction contract either offline or online in which they stated its validity under the conditions that the underling transactions including administration, management, and control must be compliant with Sharia (Al-saloos 2002).

Contrary to expectations, e-auction has appeared before the wide spread of the World Wide Web in early 1990s. It is about 1991 when the first e-auction and e-market place has been launched for pig trading in Singapore (Neo 1992). Later on, news groups and emails have been leveraged to announce auctions and receiving bids in a very simple form of e-auction (Lucking-Reiley 2000). The late 1990s saw the explosive growth of e-auctions which supports diversity of features, business models, auctioning mechanisms, and products (Chui & Zwick 1999). The largest e-auction site e-bay.com showcases one of the most successful stories on the electronic market. Starting from $86 million revenue in 1998, ebay grows proportionally reaching $9.1 billion nowadays (eBay 2011). Usually, e-auctions are classified according to its business model; that is whether it is business to business (B2B), business to consumer (B2C), and consumer to consumer (C2C). Studies revealed that B2C is the most dominant model. E-auctions can also be classified according to the supported bidding features whether they are to single, double, open, sealed, ascending, and descending.

With the widespread of technology and the ensuing mutation in business models, Muslims worldwide are apprehensive about these changes and questioned the compatibility of this new way of doing commerce with sharia principles (Zainul et al. 2004,Ghazali 2011). Although Islam is known to promote a comprehensive way of life and a veracious system that transcends the barriers of time and place, Muslims must not embrace any new technology without first understanding the ramifications of using such technology in terms of sharia compatibility. In general, Islam advocates its followers to obey rules of permissibility and harmlessness in doing their business and trades regardless of the way business are conducted either electronically or in a conventional way (Zainul et al. 2004). However, many doubts has been raised about the electronic business transaction especially from Sharia jurists perspective with a number of essential questions such as absence of hand to hand delivery, uncertainty (Gharar), Najash, and short selling.

Unfortunately, throughout literature there are few studies found in which discussing e-auction from the Islamic Jurists point of view. Abd Rahman (2009) briefly discussed the auctioning mechanisms in eBay (eBay.com) and swoopo (www.swoopo.co.uk). Because of gambling features contained in swoopo, the author stated that auctioning is prohibited through this site. Auctioning jewelry on ebay is also considered to be prohibited due to the absence of hand to hand delivery. Compatible e-payment method is big challenging because of usury in commission and dynamic transaction rates. However, Al-Munajjid(2010b) differentiated between credit and debit cards in which the former illegal while the later legal. When exploring eBay and bidz (www.bidz.com), Al-Munajjid (2010a, 2010b) reached to consistent result with regards to trading jewelry and e-payment as Abd Rahman (2009). However, those studies investigated sites in a broad sense and did not conduct analysis in depth to discover the underlying prohibited activities as had been done by Jamalludin et al. (2011).

Using four round of Delphi technique with a panel of experts from University Kebangsaan Malaysia (UKM), Jamalludin et al. (2011) identified eight e-auctions' functions

that are to some extent inconsistent with Islamic sharia principles. Forms of prohibited procedures such as Najash(prices Inflation), Gharar (uncertainity), Riba (Interest), and Maisir (gambling) has been identified. In particular, eight prohibited features including anonymous identity, uncertain description, Riba in payment, inaccurate fees and charging system for auction and bids, fraud in low reservation price and, third party services in which all are found inconsistent with sharia acts. Although the study succeeded in shaping borders of the sharia compliant e-auction in which identifying the inconsistent features, but it lacked to suggest solutions or alternatives in order to overcome such conflicts.

Aiming to effectively leverage the technology in the western societies halalfinder.com has been launched in March 2012 for auctioning halal products only. At the first glance the site expected to be fully Sharia compliant but when exploring the site deeply, it seems almost closer to conventional sites with no major differences. In particular, there is no emphasize given to validate transaction from Islamic point of view and even no control over fraud as stated in their terms of service. However, the site proves the benefit of this study to the Muslims society worldwide.

3. METHODOLOGY

The literature review revealed that there are many requirements that must be fulfilled in order for e-auction systems to be Islamic compatible. Therefore, before introducing the proposed system architecture a brief discussion of each of sharia requirements is going to be introduced in the next section then the system architecture will be going to be introduced.

3.1 Sharia Requirement in E-Auction:

Through literature, a number of issues in which clearly violate sharia rules have been introduced. In order to design sharia compliant e-auction system architecture all those issues supposed to be resolved and any inconsistency with sharia rules must be eliminated. Table 1 lists all those issues and summarizes the sharia requirement on each of them. In abroad sense, sharia requirements are directly related to auction participant seller or bid, the auctioned product, or to the auction procedure.

Firstly, auction participant are required to be eligible in terms of age, consciousness, and free will. As estimation seventeen to eighteen years old is consistent age. However, the main important thing e-auction raises is the use of anonymous or fake identity. Sharia requires the use of true identity in doing business to avoid uncertainty i.e Gharar; therefore strong identity verification must be carried out. Secondly, the auctioned product must be permissible, owned by the seller and accurately described. Product permissibility is necessary to avoid trading impermissible goods such as pork or wine therefore, a verification of Halal product must take place. Moreover, Sharia prohibit selling un-owned products which might be stolen or do not exist. Therefore, seller has to declare his ownership proof. In addition, the product ought to be described clearly and accurately in a way that eliminates ambiguity.

Table 1: Sharia Requirement in E-auction

No.	Issue	Sharia Requirement
1	Identity	- Eligibility in terms of age and free will. - True Names. - Accurate Information.
2	Product	- Adequately described. - Permissible i.e. Halal. - Owned by seller.
3	Auction Fees	- Comply Ijarah rules: fixed amount, pre-agreed, & precisely defined. - Paid by seller only. - Refunded if auction fails.
4	Bidding fees	- Comply Ijarah rules: fixed amount, pre-agreed, & precisely defined. - Defined for all bidders equally. - Refunded to all losers. - Subtracted from winning price.
5	Payment Method	- Fixed annual rates. - Free or fixed amount per transaction. - Rates comply Ijarah rules.
6	Bid withdraw	Not allowed.
7	Closing rule	- Auction end in timing threshold. - End time not allowed to be expanded.
8	Determining winner	- Wining attributes clearly stated. - Auction protocol set by seller - Seller consent necessary (must be satisfied with price).
8	Delivery	- Independent contract from auction contract. - Charge must clearly be set. - Guarantee product return
9	Selling Contract	Established after the seller determines winning bid.

The reset of issues mostly are related to auction procedures in which some sharia violation noticed. Firstly, service charges for auction, bid, or delivery all must comply sharia rules. The auction fee is not precisely defined in most conventional e-auction systems and interest i.e. Riba in many cases is easily noticed. For instance, auction fee in some sites is defined as percentage of the winning price. In Islam any service should be defined under the concept of Ijarah where fees must previously be defined and agreed upon by both parties. Bid fee is allowed to be taken but only for guarantee purpose and not be taken as auction revenue. Therefore, sharia urges to refund the bid fees to all bids that lose auction and subtracted from the wining price. In case when the winner do not pay the due price then e seller has the rights to confiscate the amount. Payment is another important issue since most e-payment methods are currently not in compliant with Sharia especially debt and credit cards because of many forms of interest taken. However, there are other payment methods that almost compatible with sharia rules such as the use of Islamic debt cards, direct bank transfer or bank cheques.

With regard to auction protocol, it seems that there is no restriction to bid ascending or descending, sealed or open. All that does not matter. However, bidder must commit to the bidding amount. This implies that bid withdraw is unacceptable unless a satisfactory reason is declared. In order to avoid the prohibited uncertainty i.e. Gharar, seller has to declare accurate auction losing rules. As in most conventional e-auctions the closing rule is predefined threshold timing where auction must be closing at and then the seller shall announce the winning bid. Due to some security challenges such as sniping and bid shielding, seller sometimes allow for time expansion which is considered from Islamic perspective

somehow a cause of uncertainty therefore the best solution auction time must not be allowed to be expanded.

Another important requirement is that the wining determination rule must be clearly be stated in advance to avoid bidder uncertainty. For instance in ascending bid auction the highest price might not be the only attribute considered to win the auction but a degree of trust or bidder location. Furthermore, sharia requires seller's consent to accept the highest bid or another acceptable bid from his perspective. Such consideration clearly comes in contradiction to conventional e-auction systems which automatically consider the highest bidder is the winner despite seller satisfaction.

3.2 System Architecture:

In order to maintain the sharia requirement aforementioned in section 3.1, this study proposes the e-auction system architecture depicted in the Figure 1 below. The system is designed in a three-tier model in which frond end directly interacts with the auction participants, middle-end caries out the business logic and operational functions, and the back-end is the database management system. The system stakeholders in this study are two main entities including the seller and bidders together with three external entities including the product verification institute, the payment party, and delivery service courier.

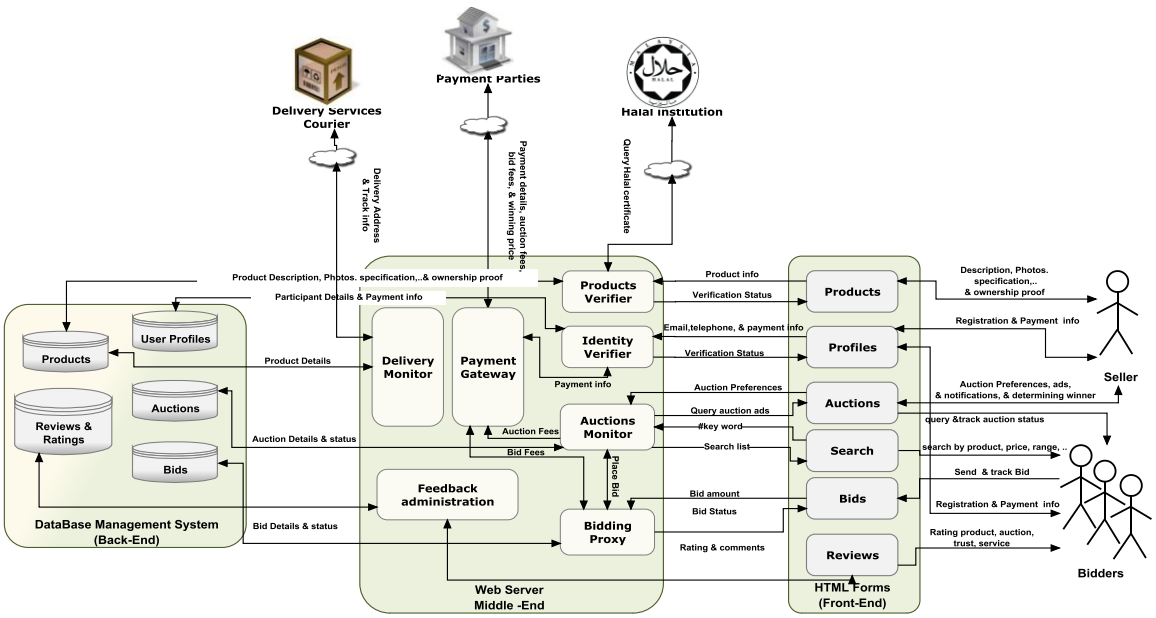

Figure 1: The proposed e-auction system architecture

Basically, the front end ought to use HTML forms because of its simplicity and popularity where five models are supposed to be implemented as interface for the seller and bidder in particular: profile, product, auction, bid, and reviews. The profile model maintains the registration stage in which sellers and bidders interact with to submit their identity details and record themselves as registered members. The Sharia requirements in this stage is to supply true and accurate details such as full name, sufficient age i.e. exceeds seventeen years old, valid email, and telephone for verification purpose, proper mailing address and payment method. Product model is responsible for providing sufficient product specification to exhibit product details in an attractive manner using a combination of text, photo, and video. Auction

interface looks differently to sellers and bidders. Sellers can submit auction preferences easily, notifications, and auction management solely maintained. In addition, seller prepares and trigger auction ad, notified by new bids, list bid history, close auction, and determine winner. Bidders can trace auction status, current price, bid history, and closing time. Bid form is simple just to enables potential bidder to submit his bid. Moreover, a contact to payment gateway, is established in case bid charge applies. Search and review interfaces seemly same as in conventional e-auction sites in which bidders easily find a specific auction or sending their feedback on auction product or seller.

Middle end contains seven models including identity and product verifiers, auction monitor, proxy bidder, payment gateway, delivery monitor, and feedback administration. All those models carry out tasks that require interactive processing and connect front-end to back end and also to external resources. Therefore, those models are considered the most important in the proposed architecture.

- **Identity Verifier**: during the registration process, both participants must be verified either that they are satisfying sharia requirements or not. There are three types of identity verification techniques that can be applied in implementing this model. Firstly Email and telephone verification must take place to ensure email validity and telephone as well. Next of that, payment details and billing address can be used to verify identity especially when the submitted registration details become identical to the payment info. In addition, refundable random money withdraws are going to certify participant identity.
- **Product Verifier**: just to assure product permissibility and sufficient description. Permissibility verification can be done through three levels using a trusted third party service, automated black/white lists, and feedback systems. Halal institutions service, can be invoked remotely to get halal certificate. For known products a typical brand search can identify product validity. Product description verification is supposed to obligates for satiable specification length, compulsory photos, and some other compulsory attributes such as product name, brand, size, color and other attributes that may vary from category to another.
- **Auction Monitor**: This model is responsible for running auctions in the same way auctioneer did in the classic auction scenario. The model receives auction preferences from the seller and stores them in the back-end data store, receives search queries and prepares advertising list, triggers auction, received bids, closes auction at the end, and helps in deterring winner. Auction monitor must preserve sharia requirement in which it ensures seller and bidder identity, issues the product verifier to certify product ownership and product permissibility, imposes and refund auction and bid fees that are compatible with sharia, disallow bid withdraw and time expansion. The model is ought to help auction participants to reach consent and determines the winner accurately and creates the formal contract between seller and the winning bidder. Furthermore and as usual, the model shall help in performing the payment safely and providing sufficient information about the delivery status and tracking.
- **Bidding Proxy**: The main task of this model is to manage auction bids, place them to the specified auction, and record the result in the back-end bids store. In case bidder invoke automatic bidding, the proxy bidder has to be implemented using a chosen score function

in which it bids periodically in behave of bidder and place bid each time bid loses. In addition, this model is responsible to carry out bid fees payment using the payment gateway model; also to notify the bidder each the bid status is changed. In case the bid placed fails to win the auction, the model is responsible to refund back the money by asking the auction model to refund back charges as sharia requires doing.

- **Payment Gateway**: payment is an important stage of any auction process especially in verifying auction participant, paying auction fees for seller, paying bidding charges for bidder, paying the winner price, and lastly refunded back the lose bid charges. The main thing here is that the chosen payment method should have fully to confirm to sharia acts. It is auction house responsibility only to recognize the methods that comply to sharia, such as Islamic debt cards or Islamic bank account.
- **Delivery Monitor**: Because e-systems do business virtually, there has to be an external system that is responsible for carrying the product from seller to winner. The delivery courier is out to set charges according to Islamic laws and the contract must be independent of auction contract. The model shall track the delivery status to the winner mailing address and inform the changes to seller and bidder interfaces. All the changes are recorded in the back-end store.
- **Feedback administration**: As trust is playing significance rule in bidder's decision, this model maintains a comprehensive rating and review system for product, auction, and user. In addition, a commentary and messaging system is going to ease the exchange of ideas among auction participants and help to encourage participants in providing meaningful service.

4. CONCLUSION & FUTURE WORK

This paper has discussed e-auctions from an Islamic point of view and proposes a system architecture that embodies the sharia requirements. A number of conflicts between conventional e-auction systems and the Islamic principles have been identified which implies to the fact that use of such systems are at least partially prohibited. Sharia requirements are varied between participant constraint, product permissibility, inadequate charging system, illegal payment methods, un-refunded charges, and some procedural restriction in terms of timing, contract establishment, and winner determination. The proposed architecture suggests a new model to verify users' identities, product permissibility, lawful payment methods, compatible auction and bid charging, and following rightful procedures. In future, the proposed architecture is in need to be validated from the sharia point of view and the technical professionals. Obviously, a prototype implementation and testing that proves system suitability will be a natural extension for this research.

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