

exceeds. In [24] another alternative introduced in which utility stops maximizing afterwards and its marginal rates equal zero at that state. In our perception, the first treatment is more applicable especially when we know that it comes in line with Islamic jurists prioritizing preferences.

4) *Continuous Preferences*: One of the significant stages in utilitarian development history is when (Von Neumann & Morgenstern) successfully introducing utility axioms of completeness, transitivity, independence, and continuity [27]. Just to clarify each briefly, completeness assures that if there are any two alternatives then there must be a way to compare them either one is preferred or there is indifference relation. Transitivity preserves preference order on any set of alternatives. Interdependence proves that substitution between alternatives is preserved despite the nature of each. Continuity allows approximating preference relation of two alternatives in respect to their closer to other alternatives. Thus, continuing the process of approximation leads at the end to a place where decision maker indifference between alternatives [12]. However and in according to discussion, completeness, transitivity, and independence axioms seem convenient to Islamic provisions since there could not be found any conflict with Sharia norms but the only exception is the continuity axiom. The reason behind that is because continuity contradicts prioritizing the preferences in a discrete manner which seems more superb in accordance to Islamic jurists framework i.e. Asul Al-Fighi where duties, desirable, neutral, less-desirable, and impermissible has to be clearly defined.

The natural contradiction for continuous preference is the discrete and prioritizing preference in which more than the level of satisfaction defined in advance. As discussed in [28], Imam Al-ghazali introduces the term Purposes of Shariah i.e. Maqasid Al-Shariah to define levels of satiation that each Shariah provision must fulfill before proceeding to the next. Accordingly, Yousof Al-Qardhawi stated his decision in [28] about preferring rescue poor and suffering people to performing Makah pilgrimage i.e. Haj. That is because of the view that Haj could be delayed to another opportunity while rescue and saving are urgent which indicates that choices, therefore, has different levels to be satisfied in a prioritized manner. In regard to consumption decision, [26] define a three consumption level namely: Tharurat, Hajiyyat, and Tahsinat in which Muslims aims at the beginning to fulfil basic needs for himself and other related socials, then looks broader for conventional satisfaction and lastly for accessories. For example, basic food and water are Tharurat, fruit is Hajiyyat, but luxuries are Tahsinat. However, although such view comes in line with Islamic norms but the mathematical interpretation seems quite difficult and requires a persuasive prove.

In a variant direction, Asad Zaman [12] and recently Hassilah Saleh [16] incorporating the principle of lexicographic preference in the Islamic consumption theory. In [12], a distinction takes place to the level of poor or sufficiency consumption and the level of luxuries. In order to resolve the arguments raised on the satiation and continuity properties discussed above, two conventional utility functions utilized in which one concerned with the basic needs satisfaction and the other with the luxuries. This is

only a demonstration but more than two levels can be defined in a similar way. Therefore, a utility with three lexicographic levels can be defined as a proper treatment in which each corresponds to a specific level of consumption Tharurat, Hajiyyat, and Tahsinat as defined in [26]. Not so far, a similar approach used in to define a two dimensional utility that differentiate between worldly and Ukhwawi (spiritual satisfaction) commodities. The former is needed to achieve self-pleasure while the latter refer to spend of others. The worldly commodities defined in three levels as defined in [26]. While Ukhwawi commodities define another three levels correspond to Wajib (obligation), Mandoob (recommended), Mubaah (permissible). Then a utility function with three levels defined to determine the preference in between the bundle of commodities.

III. RESULTS AND DISCUSSION

So far, utilitarian decision making could not be considered fully compliant or fully contradicts Islamic provisions but partially suited and unsuited. Thus, a conclusion can be deduced in which there is a possibility to settle Sharia conflicts where a Sharia compliant decision making produced. In fact, the claim that certain method is Shariah harmonic is quite difficult challenge since a global consensus from Islamic organization required; nevertheless, the characteristics of Islamic model can be clearly identified from the aforementioned discussion. Before proceeding further, a look at the former discussion will be beneficial in order to summarize the landmarks as declared in Table 1. Islamic prospective seems to some extent accept the basic utility conception in which mathematically model human's attitude to some decisions. In the same direction confess the acquisitive nature of human instinct and appreciate that behavior under certain circumstances stated formerly. In the counterpart, utilitarian model compromised of four main deviations in which conflict to some Islamic provisions. Firstly, Islam urges for altruism while utilitarian struggle for egoism. Secondly, full desires satisfaction is arguable from Islamic point of view while the disciplined behaves more suburbs. Thirdly, non-satiation clashes with moderation and self-control and just principles. Lastly, continuous preferences insist for un-prioritization which contradicts jurist's framework i.e. Asul Al-Fighi rules. Discrete preference allows more than the level of satisfaction is more superb.

Consequently, a number of treatments on the utilitarian decision model have to take place in order to be Islamic based and adhering Sharia principles. The first treatment is to replace the egoistic behaves with altruistic ones which capable of interpreting both behave correctly instead of considering the selfish one. Secondly, a precise definition of satiation levels in which individuals target to fulfil in a prioritizing manner. That leads to the last aspect which is introducing the lexicographic preferences. The following Table 1 summarizes the comparison between the utilitarian model and the Shariah requirements.

TABLE I
THE UTILITARIAN MODEL FROM ISLAMIC PERSPECTIVE

COMMON DENOMINATORS	1. Utility Relation 2. Acquisitive Nature
DISPARITIES	1. Egoistic Behaves 2. Utility Maximization 3. Utility Non-Satiation 4. Continuous Preferences
SETTLEMENT	1. Altruistic Utility 2. Satiated Utility 3. Lexicographic Preferences

In the following section, two important treatments ought to take place in order to harmonize the utilitarian model which includes the incorporation of Altruistic Utility and the Lexicographic preferences.

1) *Altruistic Utility*: Surprisingly, not only Muslims raises their objection on egoistic utility assumption but some western economic scholars attracted by the altruistic utility in particular [29], [30]. Through these studies, the assumption of selfish agent vanished and replaced by adopting beneficiaries' utility within self-utility. Accordingly, each altruist utility compromised of two parts: the self-utility which constructed from self-pleasure and the aggregate summation of others utility which represent the degree of altruism towards the beneficiary. The altruistic utility is interdependent utility in which concerns given to those related to the decision maker and an impact going to obtained to the taken decisions. Clearly, now altruistic utility capable of absorbing tender behaves and benevolent acts because the change on beneficiaries' utility going to influence the donor utility and that become harmonic to Islamic provisions. Evidently, the Prophetic saying i.e. Hadith narrated by Anas supported that when the Prophet Muhammed (PBUH) said: "None of you [truly] believes until he loves for his brother what he loves for himself" (Al-Bukhari: Volume 1, Number 13) [23].

However, the perfection of Muslim's acts might not be easily achieved because of the influence of the physical essence of the body which is not perfect compared to the spiritual side [31]. Therefore, the natural expectation is that Muslim might deviate from the true teachings of Islam and then even well literate Muslims might behave in an egoistic manner. Moreover, there might be situations where an individual behaves partially altruistic and partially selfish or behave altruistic towards some people and selfish towards others. Consequently, altruistic perception factor can be leveraged in which determines how much the decision maker feels altruistic towards each of the society members. Now, let defining the altruistic utility function of as follow:

Assume there is a society of N members in which each utility comprised of two parts including the utility derived from their self-pleasure and the other member's altruistic perception such that.

$$U_{atit}^i(x) = U_{self}^i(x) + \sum_{j=1}^N \mu_{ij} * U_{atit}^j(x) \quad (2)$$

Where

$U_{self}^i(x)$: represents the self-utility consider it as any secular utility function

$U_{self}^j(x)$: represents the self-utility of the other members of the society

μ_{ij} : represents the altruistic coefficient which can be deduced from the following matrix

$$M = \begin{bmatrix} 1 & \mu_{12} & \mu_{13} & \dots & \mu_{1n} \\ \mu_{21} & 1 & \mu_{23} & \dots & \mu_{2n} \\ \mu_{31} & \mu_{32} & 1 & \dots & \mu_{3n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \mu_{n1} & \mu_{n2} & \mu_{n3} & \dots & 1 \end{bmatrix}$$

2) *Lexicographic Preferences and Satiated Utility*: As have been discussed earlier, preferences prioritization is more suburbs in Islam and accordingly there must be more than the level of prominence in which utility out to be maintained. To our perception, the treatment introduced by in which use the principle of satiated utility and lexicographic preference will contribute in settling objections of non-satiation and continuous preferences that rose against the conventional utility model. The term lexicographic utility has been introduced long time ago but never got attraction because of the dominant conventional utility conception. Fishburn in [32] has been attracted by the idea and extensively explore its axioms and properties. Instead of having a single continuous utility function, lexicographic preference maintaining different utilities in which lower level utilities must be satiated before proceeding to the next utility level. As a result, each used utility function shall comprise of satiation condition in which the utility could not exceed.

Mathematically, the general lexicographic ranking system can be seen as in the following equations:

$$\forall x, y \in A, \exists j, k \in \text{Integers and } j < k \quad (3)$$

$$x > y \Leftrightarrow U(x) >^L U(y) \Leftrightarrow$$

$$\exists j, k \in \text{Integers and } j < k \text{ such that}$$

$$\text{if } U_k(x) > U_k(y) \Rightarrow U_j(x) > U_j(y)$$

Equation (3) can be rewritten in details such that:

$$U(x) >^L U(y) \Leftrightarrow \quad (4)$$

$$\left\{ \begin{array}{l} [U_1(x) > U_1(y)] \\ \text{or} \\ [U_1(x) = U_1(y), U_2(x) > U_2(y)] \\ \text{or} \\ [U_1(x) = U_1(y), U_2(x) = U_2(y), U_3(x) > U_3(y)] \\ \text{or} \\ [\dots \dots] \\ \text{or} \\ [U_1(x) = U_1(y), U_2(x) = U_2(y), \dots, U_{n-1}(x) = U_{n-1}(y), U_n(x) > U_n(y)] \end{array} \right.$$

Noteworthy to know that, the lexicographic decision model upholds the axioms of completeness, transitivity, and reflexives [16]. Recalling now the Islamic prioritized preferences, it will be desirable to define three lexicographic

levels corresponded to Tharuryat (essentials), Hajyat (needs), and Tahsinat (accessories) where the highest priority to Tharuryat and then Hajyat and lastly Tahsinat. This means that alternatives belong to the lower levels must satisfy first before starting to the next level. This necessarily leads to define a satiated utility function which stops maximize it-self interminably.

Let us for this time denote the universal choice space with Z and define the following subsets.

$$Z = Z_1 \cup Z_2 \cup Z_3 \text{ such that } Z_1 \cap Z_2 \cap Z_3 = \emptyset$$

$$Z_1 = \{x: x \text{ is any choice belongs to Tharuryat}\}$$

$$Z_2 = \{x: x \text{ is any choice belongs to Hajyat}\}$$

$$Z_3 = \{x: x \text{ is any choice belongs to Tahsinat}\}$$

With help of equation (4) the following decision model can be defined:

$$U(x) >^L U(y) \Leftrightarrow \begin{cases} U_1(x) > U_1(y) \\ \text{or} \\ U_1(x) = U_1(y) \text{ and } U_2(x) > U_2(y) \\ \text{or} \\ U_1(x) = U_1(y) \text{ and } U_2(x) = U_2(y) \text{ and } U_3(x) > U_3(y) \end{cases}$$

Where:

$U_1(x), U_2(x), U_3(x)$: are the utility values received when choosing alternative belongs to Tharurat, Hajyat, and Tahsinat respectively.

$U_1(x), U_2(x), U_3(x)$: are satiated functions for some arbitrary levels $\bar{U}_1, \bar{U}_2, \text{ and } \bar{U}_3$.

$U_1(x), U_2(x), U_3(x)$: are asymmetric since if considered symmetric there will be no difference with the secular utility

Lastly, it is important to emphasize that neither of the functions defined above $U_1(x)$, $U_2(x)$, and $U_3(x)$ are individualistic but altruistic as defined in equation (2). However, the magnitude of the altruism coefficient μ_{tj} might not be the same on each of them since selfishness might be dominant in the case of necessity.

IV. CONCLUSIONS

Through this paper, a brief comparison between conventional utilitarian and Islamic decision process has been introduced. Utility conception found relevant from Islamic point of view together with a confession that Islam urges for acquisitive behaves. Contrary, Islamic provisions raises objections against egoistic encouragement, non-satiation, and un-prioritized preferences which are centric principles in the conventional utility model. By introducing the altruistic utility, satiated and lexicographic preferences the utilitarian model found that going to be more Islamic harmonic which paves the way for Islamic complaint decision making. In the future, it is hoped that the proposed treatments going to be implemented using computer simulation tools such as software agent in order to demonstrate Islamic legitimated decision models. Moreover,

it is hoped that future researchers will be able to utilize the proposed treatments to construct a variety of automated intelligent systems that upholds the Islamic teachings and stimulates Islamic ethics. For Instance, the model can be applied to implement decisions support systems, e-negotiators, automated trading agents like Shopbots or proxy bidders that stimulate for leniency and altruism.

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