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Distribution of Inheritance under Islamic Law: An Appraisal of Online Inheritance Calculators

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Abstract

With the proliferation of the internet, new modes of access and dissemination have been invented. This paradigmatic shift is not only providing a stimulus for science and technology, but traditional fields of knowledge, such as religious studies and allied disciplines, are also among its beneficiaries. Once it was an uphill task to find a scholar well versed in Islamic inheritance law and ask for advice on the distribution of a deceased's estate. Various online inheritance calculators have made it convenient, and to some extent, eliminated the inevitability of the consultation with scholars of inheritance. In this background, the paper analyzes some accessible online inheritance calculators and explores their strengths and weaknesses. For evaluative purposes, two benchmarks are devised: one is 'accuracy score' and another 'efficiency grade.' The outcome of the assessment is mixed. Despite the accessibility of online calculators, one should not repose outright confidence without being aware of their merits and demerits. Some calculators have evolved a smooth and efficient system to solve a large number of propositions of inheritance, while others lack proficiency and accuracy.

Keywords: Islamic inheritance law, online inheritance calculator, distribution of estate, technology based calculation of shares

Introduction

Availability of the internet has greatly influenced the modes of communication and brought a revolution to the dissemination of information and knowledge. Religion and its allied fields are not reluctant to embrace new technology and they are trying to maximize their impact by switching to latest scientific techniques. This paper deals with one such dimension and analyzes some online inheritance calculators developed under Islamic law for the distribution of a deceased's estate.

According to Coulson, Islamic inheritance law is a "solid technical achievement" and Muslim jurists were justified in taking pride in devising with mathematical precision and sophistication a system for the distribution of an estate.[1] During the 19th century, Almaric Rumsey proclaimed that Islamic inheritance law was "the most curious and interesting

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[1]N. J. Coulson, *Succession in Muslim Family* (Cambridge University Press, 1971), 3.

system of devolution which the world has yet seen."[2] Another European author in the first half of the 20th century noted that inheritance law evolved by Muslim jurists "in the utmost detail and with the greatest ingenuity a system of sound logic if of some intricacy."[3] The scholars are largely in agreement that Islamic inheritance law is a science founded on logic and developed through mathematical sophistication despite some occasional complexities.

Islamic inheritance law is an epitome of mathematical precision and sophistication that is expected to be translated through computer based technology. Hence, one observes noticeable technological advancement in this direction. Though there are a number of websites proclaiming to have evolved a system for the distribution of inheritance in addition to various downloadable applications, but there is a dearth of scholarship analytically evaluating such technologically available inheritance calculators. Some scholars have propounded as to how computer based technology could be brought to service for Islamic inheritance law. A system for the calculation of shares is proposed based on CLIPS language in one paper.[4] In another, AraFamOnto, an Arabic ontology-based inheritance calculation system was put forward to minimize human role in gathering for accurate family data.[5] In another article written in the Malay language, the authors have created a web based application for distribution of shares.[6] Such scholarship figures out that the role of computer based technology is encouraging in the calculation of shares under Islamic inheritance law. The present paper evaluates to what extent the accessible online inheritance calculators have attained the sophistication and accuracy for solving various propositions.

2. Selection of Online Inheritance Calculators

The author resorted to Google for identification of accessible online inheritance calculators, and selected six out of those which appeared on the first page of the search

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[2]*Al-Sirajayyah or the Mahommedan Law of Inheritance* (Translated by Sir William Jones (1792) and Edited by Almaric Rumsey) (Calcutta: Thacker, Spink & Co. 2nd Edition, 1890), vii.

[3]C. H. Withers Payne, *The Mahomedan Law of Inheritance According to the School of Shafii* (Singapore: Printers Limited, 1932), i-ii.

[4]Alaa N. Akkila, and Samy S. Abu Naser, "Proposed Expert System for Calculating Inheritance in Islam," *Worldwide Journal of Multidisciplinary Research and Development* 2, no. 9 (2015): 38-48.

[5]Samia Zouaoui, and Khaled Rezeg, "Islamic Inheritance System Based on Arabic Ontology (AraFamOnto)," *Journal of King Saud University- Computer and Information Sciences*, available at https://www.sciencedirect.com/science/article/pii/S1319157818309959 (Last Accessed on 07/08/2020).

[6]Ilka Zufria, and M. Hasan Azhari, "Web-Based Applications in Calculation of Family Heritage," (Science of Faroidh), available at http://jurnal.uinsu.ac.id/index.php/query/article/view/659/469 (Last accessed 07/08/2020); See also Naseema Shaik, Aziza Hadi Asiri, Hajer Mohammed Hussein, Razan Hamdan Ali Alshehri, and Zohoor Saeed Al-Ahamri, "Inheritance Calculator," *International Journal of Computer Science Trends and Technology (IJCST)* 7, no. 6 (Nov-Dec 2019): 1-5.

engine. In addition to online inheritance calculators, one may find numerous applications, commonly known as 'apps' in different apps' stores, dealing with the calculation of shares under Islamic inheritance law. However, the present paper has confined its analytical ambit to online inheritance calculators. There are two reasons for this approach: the first is to avoid any confusion of mixing two different streams of communication, and the second is that such confinement would allow an ample space for wide-ranging analysis for at least one dimension of information revolution in Islamic law of inheritance.

The following is the list of selected online inheritance calculators along with their abbreviated caption used in the paper:

1. http://www.inheritancecalculator.net/(Calculator 1)
2. http://inheritance.ilmsummit.org/projects/inheritance/home.aspx(Calculator 2)
3. http://www.lubnaa.com/money/InheritCalc.php(Calculator 3)
4. http://www.inheritance-calculator.com/(Calculator 4)
5. https://kurandersleri.net/miras/en/Miras_Erkek_en.html(Calculator 5)
6. http://www.miraas-in-islam.com/english/Default.aspx(Calculator 6)

All the above mentioned calculators are apparently developed by individuals or non-government organizations. None of the above has territorially delimited its scope and they offer services without geographical boundaries. None of the selected calculators deals with the *Shia* school of law. The calculators appeared on the first page of the search engine as top preferences belonged either to *Sunni* schools of law or professed to be applied to all Muslims. Owing to some radical differences between *Sunni* and *Shia* schemes of inheritance,[7] the developers of online inheritance calculators have avoided mixing both streams in one system. This particular aspect is evident in the shortlisted online inheritance calculators.

3. Islamic Inheritance Law

Islamic inheritance law revolves around three categories of legal heirs and three core rules for the distribution of an estate. Three categories of legal heirs are sharers, residuaries and distant kindred.[8] Sharers are entitled to a fixed portion of an estate. Residuaries take

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[7]Lucy Carroll, "The Ithna Ashari Law of Intestate Succession: An Introduction to *Shia* Law Applicable to South Asia," *Modern Asian Studies* 19, no. 1 (1985): 85-124; Shahbaz Ahmad Cheema, "Sunni and Shia Laws of Inheritance: A Comparative Analysis," *Pakistan Journal of Islamic Research* 10 (2012): 60-82.

[8]D. F. Mulla, *Principles of Mahomedan Law* (Edited by M. A. Manan) (Lahore: PLD Publishers, 1995), 84; Tanzil-ur-Rahman, *A Code of Muslim Personal Law* (Vol. 2) (Karachi: Islamic Publishers, 1980), 474 (*Dhawi al Furud*, *Asbat* and *Dhawi al-Arham*); Asaf A. A. Fyzee, *Outlines of Muhammadan Law* (Edited by Tahir Mahmood), (Oxford University Press, 5th ed, 2009), 320 (Qur'ānic heirs, agnatic heirs and uterine heirs); Hamid Khan, *The Islamic Law of Inheritance* (Karachi: Oxford University Press, 2007), 70-73; Syed Ameer Ali, *The Personal Law of the Mahommedans* (London: W. H. Allen and Co. 1880): Faiz Badruddin Tyabji, *Muhammadan Law: The Personal Law of Muslims* (Bombay: N. M. Tripathy & Co. 3rd Edition, 1940); Al-Haj Mahomed

what is left out of an estate after disbursement of specified shares to sharers. Sharers are 13 in number: four out of them are males, while the rest are females.[9] Residuaries are of three kinds: residuaries in their own right, residuaries in another's right and residuaries together with another.[10] In the overwhelming number of situations, these two categories consume the entire estate, and in their absence, except spouses, distant kindred is entitled to inheritance.[11] Distant kindred are those relatives of a deceased who are neither sharers nor residuaries. They are mainly linked to a deceased with an intervening female relationship, e.g., mother's brother and sister, daughter's children.

For accurate distribution of an estate and managing preferences among various tiers of legal heirs, Islamic law has formulated three core principles/rules. They are exclusion (*hajb*),[12] return (*radd*)[13] and increase (*awl*).[14] The first deals with partial or complete exclusion of some legal heirs in presence of other more closely related heirs.[15] The second pertains to the reversion or return of the residue of an estate to sharers, in absence of residuaries, in accordance with their prescribed shares.[16] The third principle is applied when the shares of the eligible legal heirs exceed the supposed shares of an estate, and consequently, the quantum of the shares is decreased proportionately to satisfy the shares of the legal heirs in numerical terms.[17] All *Sunni* schools are not unanimous on every aspect of this brief description of Islamic law of inheritance. For instance, Maliki School does not

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Ullah Ibn S Jung, *The Muslim Law of Inheritance* (Allahabad: S. Sultan Law Publishers, 1934) 36; Neil B. E. Baillie, *The Mohummudan Law of Inheritance According to Aboo Haneefa and His Followers* (Calcutta: Thacker & Co., 1832); Coulson, *Succession*; *Al-Sirajayyah*.

[9]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance: Practices in Pakistan* (Islamabad: Shariah Academy, 2017), 46; Khan, *The Islamic Law of Inheritance*, 78: Al-*Sirajayyah*, 14-15.

[10]Mulla, *Principles of Mahomedan Law*, 102-104; Al-*Sirajayyah*, 23; Sabuni, *Al-Mawarith*, 67-68 (*Asabah bi-Nafsihi, Asabah bi-Ghairihi* and *Asabah ma'a Ghairihi*); Cheema, *Islamic Law of Inheritance*, 61; Rahman, *Muslim Personal Law*, 519; Fyzee, *Muhammadan Law*, 332 (agnates in their own, agnates in the right of another, and agnates with another).

[11]Fyzee, *Muhammadan Law*, 323; Khan, *The Islamic Law of Inheritance*, 94. Mulla, *Principles of Mahomedan Law*, 120.

[12]*Al-Sirajayyah*, 27-28; Cheema, *Islamic Law of Inheritance*, 71-82; Fyzee, *Muhammadan Law*, 336-337.

[13]Mulla, *Principles of Mahomedan Law*, 115; Fyzee, Muhammadan Law, 332; Khan, *The Islamic Law of Inheritance*, 92-94; Cheema, *Islamic Law of Inheritance*, 112-124.

[14]Mulla, *Principles of Mahomedan Law*, 98; Fyzee, *Muhammadan Law*, 331; Cheema, *Islamic Law of Inheritance*, 99-112; Khan, *The Islamic Law of Inheritance*, 91-92.

[15]Ibn Rushd, *The Distinguished Jurists' Primer: A Translation of Bidayat Al Mujtahid*, trans., Imran Ahsan Khan Nyazee, Vol. 2 (UK, Garnet Publishing, 1996), 425-426; Muhammad Abdul Rauf, *Al-Mirath: Inheritance According to the Sharī'ah Law of Islam* (USA: Al-Saadawi Publications, 2000), 16-20.

[16]Tahir Mahmood Kiani (Translator & Editor), *The Mukhtasar Al-Qudūri: A Manual of Islamic Law According to the Hanafi School* (London: Ta-Ha Publications, 2010).

[17]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 99-112.

award share to distant kindred in absence of sharers and residuaries,[18] nor it applies the rule of *radd*,[19] and opts to deposit the estate or whatever is left to *Bait ul Maal* (public treasury). We would underscore some other differences later in the paper.

4. Benchmarks for Evaluation of Online Inheritance Calculators

For systemically evaluating the online inheritance calculators, the paper first proposes twenty propositions of inheritance. Thereafter, in light of these propositions, an analysis is conducted of the answers offered by the selected online calculators. In the formulation of the propositions, an effort has been made to pick those which reflect the wide spectrum of *Sunni* law of inheritance. Each proposition is allocated five marks and those calculators which would correctly solve all propositions, irrespective of the difference of opinion among various *Sunni* schools, would earn hundred marks on the 'accuracy score.'

In addition to the accuracy score, another concept of 'efficiency grade' is coined for the assessment of the calculators. Efficiency is not merely a mathematical type of appraisal like the 'accuracy score.' It covers the entire methodology for solving a proposition. It takes into account the explanations and rationales extended by the calculators for the distribution of an estate. Whether the methodology adopted by the producer/developer of the calculator is intelligible to common people for whom it was created? How far reliance on a calculator would relieve a lay person from seeking advice/guidance of a scholar on the distribution of one's estate? From the perspective of efficiency, the paper grades the online inheritance calculators in three levels starting from minimum to maximum: the most basic is elementary; the second is moderate and the third and the most sophisticated is advanced. However, if a calculator does not describe the justifications for its solutions or the rationale offered is not in line with the settled opinions of various *Sunni* schools, the efficiency grade cannot be determined.

5. Propositions of Inheritance for Assessment of Online Inheritance Calculators

This section describes the selected propositions and solves them summarily. An inheritance proposition may be solved in more than one manner. It may be concluded in fractions or percentages or it may simply be worked out according to the real value of an estate. Such methodological variations have not been taken into account for the ascertainment of the accuracy score and efficiency grade because preference of one methodology does not imply any qualitative repercussions for another possible mode of solution.

The majority of the selected propositions are chosen from the books referred to for those who want to acquaint themselves with complete a methodology for their solution. The references in this section also briefly explain the difference of opinion among *Sunni*

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[18]Rahman, *Muslim Personal Law*, 536; Coulson, *Succession*, 91.

[19]N. J. Coulson, *Succession*, 49; Rahman, *Muslim Personal Law*, 530.

schools. For the sake of brevity in solving the propositions, I have abbreviated few important terminologies such as (R) for residuary, and (X) for excluded.

1. Husband (1/4), Father (1/6), Mother (1/6) and Sons (R).
   Husband: 3/12, Father: 2/12, Mother: 2/12 and Sons: 5/12.[20]
2. Wife (1/4), Uterine Brother (1/6) and Full Bother (R).
   Wife: 3/12, Uterine Brother: 2/12 and Full Brother: 7/12.[21]
3. Father (1/6), Mother (1/6), Wife (1/8) and Daughter (1/2).
   Father: 5/24 (4/24 as sharer & 1/24 as residuary), Mother: 4/24, Wife: 3/24 and Daughter: 12/24.
4. Father (R), Daughter (1/2) and Son's Daughter (1/6).
   Father: 2/6, Daughter: 3/6 and Son's Daughter: 1/6.[22]
5. Husband (1/2), Uterine Brothers (1/3) and Full Sisters (2/3).
   Husband: 3/6, Uterine Brothers: 2/6 and Full Sisters: 4/6 = 9/6

After application of *awl*:

   Husband: 3/9, Uterine Brothers: 2/9 and Full Sisters: 4/9.[23]
6. Wife (1/4), Mother (1/2), Full Sister (1/2), Consanguine Sister (1/6), Uterine Sister (1/6). Wife: 3/12, Mother: 2/12, Full Sister: 6/12, Consanguine Sister: 2/12 and Uterine Sister: 2/12 = 15/12

After application of *awl*:

   Wife: 3/15, Mother: 2/15, Full Sister: 6/15, Consanguine Sister: 2/15 and Uterine Sister: 2/15.[24]
7. Father (1/6), Mother (1/6), Wife (1/8), Daughter (1/2), and Son's Daughter (1/6).
   Father: 4/24, Mother: 4/24, Wife: 3/24, Daughter: 12/24, and Son's Daughter: 4/24 = 27/24

After application of *awl*:

   Father: 4/27, Mother: 4/27, Wife: 3/27, Daughter: 12/27, Son's Daughter: 4/27.[25]
8. Father (1/6), Son (R), Grandfather (X), Full Brother (X) and Uterine Sister (X).
   Father: 1/6 and Son: 5/6.
9. Wife (1/8), Daughter (1/2), Full Sister (R), Full Uncle's Son, i.e., Paternal Cousin (X).
   Wife: 1/8, Daughter: 4/8 and Full Sister: 3/8.

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[20]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 157.
[21]Ibid., 163.
[22]Ibid., 164.
[23]Ibid., 106.
[24]Ibid., 108-109.
[25]Ibid., 110-111.

10. Daughter (1/2), Son's Daughter (1/6), Mother (1/6), Consanguine Sister (R) and Full Uncle (X).
    Daughter: 3/6, Son's Daughter: 1/6, Mother: 1/6 and Consanguine Sister: 1/6.[26]
11. Grandmother (1/6), Daughter (1/2), Son's Daughter (1/6).
    Grandmother: 1/6, Daughter: 3/6 and Son's Daughter: 1/6 = 5/6

After application of *radd*:

Grandmother: 1/5, Daughter: 3/5 and Son's Daughter: 1/5.[27]

12. Husband (1/4) and Two Daughters (2/3).
    Husband: 3/12 and Two Daughters: 8/12 = 11/12

After application of *radd*:

Husband: 6/24 and each Daughter: 9/24.
Or
Husband: 1/4 and Two Daughters: 3/4
Husband: 2/8 and each Daughter: 3/8.[28]

13. Husband (1/2) and Maternal Uncle (1/2) [Maternal Uncle inherits the remaining estate as distant kindred].
14. Daughter's Son and Full Sister's Son.

Daughter's Son takes entire estate excluding Full Sister's Son under Hanafi School.[29]

Or

According to Hanbali School, they represent their linking relationship with the deceased and inherit their share: Daughter's Son as Daughter (1/2) and Full Sister's Son as Full Sister (1/2).[30]

15. Wife (1/4), Father (R) and Mother (1/3).
    Wife: 1/4, Father: 2/4 and Mother: 1/4.[31]
16. Husband (1/2), Father (R), and Mother (1/3).
    Husband: 3/6, Father: 2/6 and Mother: 1/6.[32]
17. Husband (1/2), Mother (1/3) and Grandfather (R).

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[26]Sabuni, *Al-Mawarith*, 76-77.

[27]Ibid., 126.

[28]Sabuni, *Al-Mawarith*, 127. Maliki school does not apply the rule of *radd* and suggests that the remainder would be deposited in *Bait ul Maal* (public treasury). See Coulson, *Succession*, 49.

[29]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 129-131.

[30]Ibid., 128-129.

[31]Sabuni, *Al-Mawarith*, 57-58; *Mouasa Fiqhiyia*, Vol. 3, 132; Coulson, *Succession*, 45-46. It is one of the propositions known as *Umariyyatan*.

[32]Sabuni, *Al-Mawarith*, 57-58; *Mouasa Fiqhiyia*, Vol. 3, 132; Coulson, Succession, 45-46. It is one of the propositions known as *Umariyyatan*.

Husband: 3/6, Mother: 2/6 and Grandfather: 1/6.[33]

18. Husband (1/2), Mother (1/6), Two Uterine Brothers (1/3) and Two Full Brothers (R). Husband: 3/6, Mother: 1/6, Two Uterine Brothers: 2/6 = 6/6 and Two Full Brothers: X.[34]

19. Mother (1/3), Full Sister (X) and Grandfather (R).
Mother: 1/3 and Grandfather: 2/3.[35]

20. Husband (1/2), Mother (1/3), Full Sister (X) and Grandfather (1/6). Husband: 3/6, Mother: 2/6 and Grandfather: 1/6.[36]

The selected propositions are reflective of various aspects of Islamic inheritance law. The first four propositions deal with sharers and residuaries. The next three (i.e. nos. 5, 6 and 7) embody the rule of *awl* and the proposition nos. 8, 9 and 10 illustrate the principle of *hajb* (exclusion). The proposition nos. 11 & 12 pertain to the application of *radd*, while the proposition nos. 13 & 14 to distant kindred. Thereafter, the proposition nos. 15 to 20 represent some exceptional cases in which Muslim scholars have differed with each other, e.g., *Umariyyatan* (nos. 15 & 16), *Himariyya* (no. 18), *Al-Akdariyya* (no. 20).

5.1. Calculator 1

This online inheritance calculator is prepared by 'Shariahstandards.org' that is a "community of Muslims who work together to define and publish open global standards for Islamic Law."[37] The community provides a disclaimer that it does not take the responsibility for the accuracy or inaccuracy of the published standards and leave it to those individuals and organizations who have originally prepared them.[38] In addition to the online inheritance calculator, it has published online systems for determination of prayer times and zakat calculator.

The system for calculating inheritance online is the most rudimentary not only from its appearance but also from its functioning. There are only seven legal heirs mentioned

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[33]*Mouasa Fiqhiyia*, Vol. 3, 132. The solution is in accordance with majority of scholars except Imam Abu Yusuf who is of the opinion that grandfather would also be treated like father, and the mother would have one third from the remainder after giving the spouse his/her share.

[34]N. J. Coulson, *Succession*, 73-76. The above proposition is solved according to Hanafi and Hanbali schools of law. On the contrary, Maliki and Shafi schools argue, following 2nd Caliph Umar's (*RA*) later decision, that the share of one third of uterine brothers would be distributed among uterine and full brothers equally. This proposition is termed as *Himariyya*.

[35]N. J. Coulson, *Succession*, 80. The solution above mentioned is in line with the Hanafi school. On the contrary, the majority of other Sunni schools suggest that grandfather would not exclude full sister and they both share the residue. The grandfather would have double share than that of the full sister. See Coulson, Succession, 84.

[36]Sabuni, *Al-Mawarith*, 111. This solution is in line with Hanafi and Hanbali schools. However, other schools, following Zaid bin Thabit, resolve it differently. This proposition is famously termed as *Al-Akdariyya*. See Coulson, *Succession*, 88-89; Sabuni, *Al-Mawarith*, 111-112.

[37]https://shariahstandards.org/about-us (Accessed on 4/7/2020).

[38]Ibid.

specifically in the system. They are further divided into two classes as primary heirs and other heirs. According to the website, father, mother, sons and daughters are primary heirs, whereas spouse, brothers and sisters are other heirs. If any proposition of inheritance involves any other legal heir than those mentioned in the online system, it would fail. Further, among brothers and sisters, there is no distinction of full/real, consanguine and uterine. Hence, the competency of this online system is limited to solve propositions of inheritance exclusively dealing with specified seven legal heirs. The reply to an inheritance proposition is offered graphically in a circle by giving different shades of colors to the shares allocated to various legal heirs. The website also provides shares of various legal heirs in percentages and fractions.

Keeping in view the capacity of the calculator, it could only answer in some of the propositions of inheritance listed in the previous section. It has replied accurately to the proposition no. 1. While responding to the proposition no. 3, instead of allocating the residue of one share (1/24) to the father as residuary, it has decreased total number of shares from 24 to 23 and applied the rule of *radd* to all legal heirs including wife. Again in the proposition no. 12, the calculator has incorrectly applied the rule of *radd* to husband, and thereby decreased the legitimate share of the daughters. With regard to the proposition nos. 15 and16 which are known as *Umariyyatan*,[39] the calculator has granted the parents their prescribed shares and has not calculated their shares from the remainder of the estate after allocating the share to the surviving spouse. This manner of solution is in opposition to the overwhelming majority of scholars. Even if these last two answers are treated as correct, the accuracy score of this calculator is 15 out of 100. Furthermore, the calculator does not provide rationale for the distribution of estates, and hence, it does not earn elementary level on the efficiency grade.

5.2. Calculator 2

This is one of the refined calculators available online. It has accurately replied to 18 out of 20 propositions, and consequently, its accuracy score is 90 out of 100. Moreover, its efficiency grade is of moderate level because it has justified in reasonably well manner its methodology of distribution of an estate. If someone possesses an elementary level of familiarity with Islamic law of inheritance, he may find himself absolved from the necessity of consulting with a scholar to appreciate the manner of distribution evolved by this calculator. However, for the sake of avoiding any confusion in the distribution of an estate, the developer of the calculator recommends that consultation with a scholar is always advisable and the solution proposed by the calculator should not be taken as a 'fatwa'.[40]

Calculator 2 is hosted by a website that does not introduce who has developed it.[41] There are many sections on the website containing valuable information relating to

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[39]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 52-55.
[40]http://inheritance.ilmsummit.org/projects/inheritance/faq.aspx (Accessed on 7/7/2020).
[41]http://inheritance.ilmsummit.org/projects/inheritance/home.aspx (Accessed on 7/7/2020).

testamentary and intestate succession of a Muslim's estate. In addition to crafting some test questions and their answers, the developer of the calculator has briefly enumerated important rules of inheritance to which he frequently refers to while explaining the rationale for solutions. There are 29 legal heirs specified on the calculator including all sharers under *Sunni* law and various levels of residuaries going up to grandfather and coming down to grandchildren. A chart is appended on a separate slide on the website to display the link of these 29 legal heirs with the deceased.[42] In the section of articles, the developer has catalogued some relevant material including videos on inheritance and will under Islamic law.

The producer mentions those books which were consulted by him for developing the calculator and says that he excluded "uncommon cases like …, absence of standard heirs."[43] 'Standard heirs,' according to the developer of the calculator, are sharers and residuaries. This is the reason that the calculator could not solve the proposition nos. 13 and 14 pertaining to distant kindred.

In the proposition nos. 4, 10, and 11, the calculator mistakenly replaces son's daughter as daughter while explaining the rationale for her share. Further, in solving the propositions pertaining to the rule of *radd*, it alludes to residuaries (i.e. rule no 14 on the website's section of 'Rules'). The rule of *radd* is applied in those situations where residuaries are non-existent.[44] Hence, the reference to residuaries is erroneous and misleading. Two propositions relating to *Umariyyatan*, i.e. 15 & 16, are solved by the calculator in accordance with the majority opinion. The proposition no. 18 is concluded in conformity with the view of Zaid bin Thabit (*RA*) followed by Maliki and Shafi schools.[45] The calculator's response for the proposition no. 19 is in line with the opinion of fourth caliph Ali.[46] However, this view is not followed by *Sunni* schools who generally favor the opinion of Zaid bin Thabit (*RA*).[47] The last proposition is solved by the calculator in line with majority opinion based on Zaid bin Thabit's (*RA*) point of view.[48] Considering the manner of resolution in the last three propositions, one may point out a lack of consistency in the adoption of different streams of opinion by the calculator. Despite such incoherence, I have treated these propositions as perfectly solved for ascertainment of the accuracy score, because they prefer one of the settled opinions under Islamic law.

5.3. Calculator 3

This calculator is hosted on a website 'lubnaa.com'. The website does not introduce itself nor carries any 'about us' section to make others familiar to its proprietor/s. It contains

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[42]http://inheritance.ilmsummit.org/projects/inheritance/chart.aspx (Accessed on 18/7/2020).

[43]http://inheritance.ilmsummit.org/projects/inheritance/faq.aspx (Accessed on 7/7/2020).

[44]Al-Haj Mahomed Ullah Ibn Jung, *The Muslim Law of Inheritance*, 36.

[45]Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 80-82.

[46]N. J. Coulson, *Succession*, 80.

[47]Ibid., 84.

[48]Ibid., 88-89.

numerous sections about diversified topics such as religion, politics, science, interfaith, charities, Islamic centers, books and movies. With respect to its online inheritance calculator, it conspicuously makes a disclaimer that "[t]he inheritance calculator can be used for study or research purpose only and is not legally binding in any manner."[49] This disclaimer is very aptly made because the website possesses a great potential to confuse and confound. For instance, after mentioning the gender of the deceased as male, I inquired about the share of the deceased's husband as sole legal heir, and surprisingly, the reply was that he was entitled to 100% of the estate.

The calculator has enlisted ten legal heirs, and they are father, mother, husband, wife, son, daughter, paternal brother and sister, and maternal brother and sister. It implies that the system does not possess the proficiency to address those propositions of inheritance which involve other than the specified heirs, e.g., grandfather, son's son, son's daughter etc. Furthermore, the terminologies of paternal and maternal brother/sister espouse perplexity. After exerting some effort, I discovered that maternal brother/sister was employed for uterine brother/sister. However, there is no such distinction between full and consanguine brother/sister in the calculator. The terminology of paternal brother/sister may encompass the both -full/real and consanguine- or it might have been intended to imply consanguine brother/sister exclusively. Hence, the system evolved by the calculator is deficient as well as confusing. Anyhow, for ascertainment of the accuracy score of this calculator, I am assuming that paternal brother/sister has been used as a substitute phrase for full/real brother/sister.

Out of twenty selected propositions of inheritance, the calculator has flawlessly solved the proposition nos. 1, 2, 3 and 5. With respect to the proposition nos. 3 and 5, it has reasonably explained the rationale. For instance, in the proposition no. 3, the remainder of one share is given to the father considering him the closest male residuary. Regarding the proposition no. 5, it has described that excess shares of the eligible sharers cause proportionate reduction to their respective shares, and that is the essence of the rule of *awl*. Two propositions pertaining to *Umariyyatan*, i.e. 15 and 16, are solved according to the prescribed shares of respective sharers, disregarding the opinion of majority scholars to the contrary. Anyhow, if these two are added to the above-mentioned four correctly solved propositions, the total number will become six. It means that the accuracy score of the calculator is 30 out of 100.

The proposition nos. 12 and 18, in spite of exclusively dealing with the specified legal heirs, are incorrectly solved. In the proposition no. 12, the calculator has applied the rule of *radd* in favor of the husband along with the daughters. Consequently, the daughters' share has been reduced and the husband's due has been unlawfully enriched. In the proposition no. 18, the calculator confuses about the identity of maternal brothers as uterine brothers and excludes them by the full brothers. This is contrary to what it has done earlier in the proposition nos. 2 and 5. In the last mentioned two propositions, the calculator

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[49]http://www.lubnaa.com/money/InheritCalc.php (Accessed on 4/7/2020).

authoritatively treats maternal brother as uterine brother and calculates his share accordingly.

The calculator distributes shares in percentages and fractions. Sometimes, it explains the rationale for the distribution of estates though such statements are not very elaborative and are mentioned as one liner under each proposition. The calculator requires some patience and attentiveness to appreciate correct solution in case of plurality of same legal heir. For instance, in the proposition no. 1, the calculator mentions that there is more than one son, but it calculates the share of one son only in its answer and assumes that lay inquirer would apply the same share to other son/s. If the lay inquirer does not notice it, this would end up in erroneous distribution of the estate. Considering all the above, the author accords the calculator elementary ranking on the efficiency grade.

5.4. Calculator 4

There are many sections on the website hosting this calculator: some of them briefly describe the rules of inheritance and the manner of using the calculator. However, the information provided in various sections is sometimes repetitive and overlapping. This calculator is developed by Muhammad Waqas who is an advocate in Rawalpindi, Pakistan.[50] He appears to be the most accessible developer of any inheritance calculators discussed and evaluated in this paper. In addition to the provision of his email and the creation of a contact section on the website,[51] he has provided his postal address and cell number.[52]

The developer says that his calculator is beneficial not only for general masses, but also for lawyers, judges and *mufti*s.[53] On the one hand, the developer asserts that his calculator has been tested by many and its solutions are 100% correct,[54] and on the other, he states that he has implemented 30% of his envisioned project.[55] Further in the section of 'Disclaimer,' the developer warns that the calculator is for learning and information purposes only and one may rely on it at one's own risk and responsibility.[56]

The calculator claims to provide solutions of inheritance propositions in light of various *Sunni* schools including Hanafi, Maliki, Shafi and Hanbali. It also asserts proficiency to solve propositions without reference to any school and in accordance with the opinions of Abu Yusuf and Imam Muhammad -two distinguished disciples of Imam

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[50]http://www.inheritance-calculator.com/advocate-muhammad-waqas.php (Accessed on 13/7/2020).

[51]http://www.inheritance-calculator.com/contact.php (Accessed on 13/7/2020).

[52]http://www.inheritance-calculator.com/faq-islamic-inheritance-calculator.php (Accessed on 13/7/2020).

[53]Ibid.

[54]Ibid.

[55]http://www.inheritance-calculator.com/introduction-islamic-inheritance-calculator.php (Accessed on 13/7/2020).

[56]http://www.inheritance-calculator.com/inheritance-disclaimer.php (Accessed on 13/7/2020).

Abu Hanifa. So far as the first 10 propositions are concerned, they are solved perfectly. For solving these propositions, we find no difference of opinion among various *Sunni* schools.

Maliki school does not recognize the application of *radd* to enrich legal heirs beyond their prescribed share and prefers depositing the residue to *Bait ul Maal* (public treasury).[57] According to Maliki School, "public treasury is a residuary heir."[58] So, the possibility for application of *radd* is negated conclusively by equating public treasury with male agnatic heir. The proposition nos. 11 and 12 are solved correctly by the calculator under Maliki School. Scholars belonging to Shafi school espouse divergent opinions on the application of *radd*.[59] The one is in conformity with Hanafi and Hanbali schools that the excess in absence of any residuary would revert to the sharers in accordance with their prescribed share except spouse, while the other opinion maintains that in case of proper management of public treasury, the residue should be deposited in it.[60] But if this is not so, the rule of *radd* would be applicable. The developer has preferred the first opinion in developing his calculator and accordingly solved the above mentioned propositions under Shafi school.

Maliki school does not recognize the category of distant kindred,[61] and hence, in such situations where they inherit under other *Sunni* schools, Maliki school prefers to deposit the property in public treasury for benefit of all Muslims. Following this approach, the calculator does not award anything to distant kindred in the proposition nos. 13 & 14 under Maliki school. The calculator does not solve the proposition no. 14 accurately under Hanbali school. The solution offered under Hanbali school by the calculator is similar to the one under Hanafi school irrespective of the fact they both have distinct methodologies for determination of shares of distant kindred.[62]

In the propositions pertaining to *Umariyyatan*, the calculator follows the majority approach of dividing the shares of parents from the remainder of an estate (i.e., 1/3rd to mother and 2/3rd to father from the remainder) after allocating the surviving spouse his/her prescribed share. Abu Yusuf follows the same methodology of *Umariyyatan* in case of substitution of father by grandfather, contrary to all other *Sunni* schools.[63] Interestingly, the calculator has maintained this distinctive opinion of Abu Yusuf in the proposition no. 17 and solved it accordingly.

In case of *Himariyya* (i.e. no. 18), the calculator accurately represents two strands of opinion held by various *Sunni* schools. According to Hanafi and Hanbali schools, the full

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[57]Neil B. E. Baillie, *The Moohummudan Law of Inheritance*, 111.

[58]N. J. Coulson, *Succession*, 49.

[59]Payne, *The Mahomedan Law of Inheritance*, 22.

[60]N. J. Coulson, *Succession*, 49-50; Neil B. E. Baillie, *The Moohummudan Law of Inheritance*, 111.

[61]N. J. Coulson, *Succession*, 91; Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 126.

[62]N. J. Coulson, *Succession*, 92-107; Shahbaz Ahmad Cheema, *Islamic Law of Inheritance*, 127-133.

[63]*Mouasa Fiqhiya*, Vol. 3, 132.

brothers do not get any share since nothing is left as residue after allocating the prescribed shares to the sharers. On the other, Maliki and Shafi schools are of the opinion that the prescribed share of the uterine brothers would be equally distributed among both categories of brothers irrespective of their otherwise distinctive relationship with the deceased in this situation. In the proposition no. 19, the calculator largely reflects the difference of opinion among various *Sunni* schools. In solving the proposition no. 20 under Hanafi school, correct solution is offered, while the calculator does not count accurately when inquired under Maliki and Shafi schools.

Despite occasional inaccuracies highlighted in the previous paragraphs, the calculator is one of the best and efficient online inheritance calculators. In light of the criterion devised for awarding the accuracy score, the calculator has earned 100 out of 100. Occasional inaccuracies in calculation under various schools do not deprive it to get the maximum score. Additionally, the calculator aims to provide justifications and rationales for distribution of estates in a detailed manner with reference to the Qur'ān, *Sunnah* of Prophet Muhammad (*SAW*) and books of authority. The main book relied on by the calculator is *Al Sirajiyyah* which is standard Hanafi text on inheritance law.[64] However, the calculator refers to it even in cases supposedly solved under other schools than Hanafi school that seems perplexing. Anyhow, considering the elaborate manner in which the developer has made endeavors to substantiate his solutions entitles the calculator to be granted the advanced level on the efficiency grade.

5.5. Calculator 5

The fifth online inheritance calculator is devised by Dr. Halis Aydemir[65] and hosted at https://kurandersleri.net/miras/en/Miras_Erkek_en.html. This calculator appears to be limited in its scope and application. There are only seven legal heirs specified on the website who are son, daughter, father, mother, brother, sister and spouse. Thus, the calculator offers promise to solve propositions involving the above legal heirs exclusively. The creator of the calculator does not consider any other person as eligible legal heir on the pattern of classically recognized three categories of heirs.

Moreover, the calculator does not differentiate between various kinds of brothers and sisters. Hence, its joint reference to brothers and sisters may confuse as to whom exactly is intended. I, for determining the accuracy score of the calculator, assume that the phrases brothers and sisters imply full/real siblings only.

The producer of the calculator has provided a brief analysis of the verses of inheritance. According to him, whenever some portion of an estate is left behind after awarding the

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[64]*Al Sirajiyyah*, V-VI.

[65]For introduction of the developer of the online calculator and his educational background, see https://openlibrary.org/authors/OL6884914A/Assoc._Prof._Dr._Halis_Aydemir (Accessed on 5/7/2020).

legal heirs their due that would be given to '[other] near of kin, orphans and needy persons' in light of verse 8 of Al-Nisa.[66]

The calculator has devised an innovative manner to distribute an estate that is not in conformity with any of the traditional *Sunni* schools. Nevertheless, the developer of the system has attempted to justify his methodology by referring to the verses of the Qur'ān pertaining to inheritance. For the purpose of comprehending his methodology, an analysis of some illustrations is presented below.

In the proposition no. 1, the calculator awards the entire estate to sons and deprives other legal heirs, i.e. father, mother and husband. For allocating the entire estate to the sons, he refers to the initial part of verse 11 of Al-Nisa.[67] However, he does not take into account other sections of the same verse recommending for the parents' specified share.

In the proposition no. 3, the calculator allocates 50% of the estate to the daughter whose prescribed share is 1/2. After this allocation, other legal heirs [father (1/6), mother (1/6) and wife (1/8)] are given their prescribed shares out of the remainder, i.e. 50%. In this manner, other legal heirs, who were originally entitled to have their prescribed share out of 100 under the classical schools, are disadvantaged to be given their shares out of 50 reducing their due substantially. Furthermore, some portion of the estate is even left behind and that portion, according to the developer of the calculator, could be distributed under verse 8 of Al-Nisa to other kin, orphans and needy persons.

In the proposition no. 12, the calculator awards 2/3rd of the estate to two daughters, and then the husband is given his prescribed share, i.e. 1/4, out of the remaining 1/3 estate. In this manner, 25% (3/4 of 1/3) of the estate is not consumed by sharers and left for other near kin, orphans and needy persons who may not be legal heir.

In the cases of *Umariyyatan*, the remainder is given to the father by the calculator. It is interesting to observe that in the proposition no. 15, the father is given the remainder after award of his prescribed share, i.e., 1/6. However, in the proposition no. 16, the father is exclusively given the remainder without first awarding him his prescribed share. Such dichotomy/duality in corresponding propositions appears to be puzzling. Surprisingly, it is a chance that only the proposition no. 16 finds an accurate solution irrespective of its contradiction to the majority point of view on the issue.

Consequently, the calculator earns 5 out of 100 on the accuracy score. So far as the efficiency grade is concerned, it could not be determined taking into account the methodology as well as explanation of rationale for such modus operandi because they are structured divergently and come from altogether different perspective than other *Sunni* schools.

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[66]https://kurandersleri.net/miras/en/Miras_Ayetler_en.html (Accessed on 5/7/2020).

[67]"Allah is recommending you concerning your children: To the male like the share of two females."

5.6. Calculator 6

This calculator is developed by Abdul Nasir[68] who has derived his knowledge of Islamic inheritance law from Bashir Ahmed Bagvi and Maulana Abdul Baseer. The developer claims to have tested his calculator for its accuracy on 2644 propositions incorporated in *Kitab e Mirās* of Bashir Ahmed Bagvi.[69] The webpage hosting the calculator reproduces the Qur'ānic verses relating to inheritance[70] and also explains some fundamental rules of inheritance on its home page[71] and in the section of frequently asked questions (FAQ).[72] This information is instructive, but not comprehensive.

The calculator enlists 286[73] legal heirs including numerous remote residuaries and distant kindred. Some of the specified legal heirs, particularly in the category of residuaries, are too remote and involve numerous upward and then downward trajectories that it turns out to be a risky task to figure out their link with the deceased. For example, the legal heir specified at serial no. 143 involves seven upward generations and ten downward generations. Distant kindred is enumerated from serial no. 151 to 300 in the calculator. Therefore, the calculator is expected to solve propositions involving extremely remote residuaries and distant kindred.

The answers by the calculator are expressed in figures and not in fraction. One may calculate the answers in the percentage if one puts the value of an estate as hundred. The calculator also offers services to compute the portion reserved for will, funeral expenses and debts in addition to the distribution of an estate under inheritance law.

The calculator does not explain the rationale for solutions proffered by it except reproduction of the same sentences with all answers irrespective of whether such sentences have any bearing in that particular situation. This is one of the most glaring shortcomings of the calculator and requires to be addressed carefully, and consequently, the system is in need of up-gradation methodologically. This lapse sometimes compels an inquirer to seek guidance from a scholar even after using the calculator. Taking this into account, the calculator is granted an elementary level on the efficiency grade.

The calculator has compartmentalized the legal heirs in three categories. The first category includes 18 heirs who are closely related relatives such as parents, children, spouses, siblings and grandparents. The second deals with an extended list of residuaries, and the third pertains to distant kindred. 18 legal heirs mentioned in the first category are always reproduced in the solutions by the calculator irrespective of whether they actually

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[68]islamic.inheritance@gmail.com (Email of the developer as provided on the website).
[69]http://www.miraas-in-islam.com/english/about.aspx (Accessed on 12/7/2020).
[70]http://www.miraas-in-islam.com/english/inQuraan.aspx (Accessed on 12/7/2020).
[71]http://www.miraas-in-islam.com/english/index.aspx (Accessed on 12/7/2020).
[72]http://www.miraas-in-islam.com/english/Massail.aspx (Accessed on 12/7/2020).
[73]The developer claims to have enumerated 300 legal heirs. See http://www.miraas-in-islam.com/english/about.aspx (Accessed on 12/7/2020).

exist in any proposition. Their reproduction in all solutions is not only needless but also troublesome. On the contrary, in its answers to the proposition nos. 9 & 10, the calculator omits reproducing even residuaries (i.e., full uncle's son and full uncle) who are not entitled to any share in those situations. The developer notes at the bottom of the solution's page that some relatives are not shown in the answers because they do not get any share in the estate, but this does not prevent ambivalence. On the one hand, those in the first category always find space in the solutions irrespective of their non-entitlement in a given situation, but on the other, those in the second and third categories would be mentioned in those situations exclusively where they are entitled to inherit.

The calculator follows the Hanafi school of law as manifested from its solutions of the proposition nos. 14 (distant kindred), 19 and 20 (grandfather and siblings). The proposition no. 18 is incorrectly solved by giving some share (i.e., 1.421 out of 100) to the full brothers. Under the Hanafi school, nothing is left to be granted to the full brothers after disbursing the prescribed shares of the sharers. The propositions of *Umariyyatan* (i.e., no. 15 & 16) are solved in accordance with the majority opinion. In light of the solutions offered by the calculator to the selected propositions, its accuracy score is 95 out of 100.

6. Conclusion

Online inheritance calculators under Islamic law are increasing day by day. This surge calls for a systematic evaluation of such calculators' precision and sophistication. Despite its limited scope, the paper is the first attempt in this direction. It has first shortlisted six accessible online inheritance calculators from Google. For the purpose of assessment, it has devised two fold formulae comprising of the accuracy score and the efficiency grade. The paper then formulated twenty propositions of inheritance demonstrative of wide spectrum of *Sunni* schools of law and provided their solutions. This was followed by an evaluative analysis of each selected calculator one by one. After conducting the analysis, each calculator is awarded an accuracy score out of 100 and allocated a grade keeping in view its efficiency level. The respective accuracy score and efficiency grade of the selected calculators are as under:

Table 1. Accuracy score of inheritance calculators

	Selected Calculators	Accuracy Score	Efficiency Grade
1.	Calculator 1	15	N/A
2.	Calculator 2	90	Moderate
3.	Calculator 3	30	Elementary
4.	Calculator 4	100	Advanced
5.	Calculator 5	05	N/A
6.	Calculator 6	95	Elementary

The differences among various schools under Islamic inheritance law on some important issues engender difficulty for developing a comprehensive online calculator dealing with all schools in one smooth and efficient platform. The selected online

calculators have overcome it, to some degree, by confining their scope to *Sunni* law of inheritance. In light of the differences among various *Sunni* schools, the calculators have either limited their methodology to one particular school or attempted to have made a convergence of their own convenience. That convergence is not pleasant all the times. Distinctively, calculator 4 has fared comparatively well in this regard and created autonomous systems (or slides) for various shades of opinions under different *Sunni* schools.

Three calculators placed at serial nos. 2, 4 and 6 have performed very well at least on the accuracy score. This emphasizes that the methodology adopted for the calculation of shares of legal heirs by Muslim scholars can be synchronized with computational technology offered by online software systems. So far as the efficiency grade of the calculators is concerned, except two calculators at serial nos. 2 and 4, the rest have not been capable enough to leave an encouraging impression. This sort of sophistication that alleviates the necessity of consultation with a scholar on the distribution of shares under inheritance law requires more skill and care than necessitated for performing optimally on the accuracy score. However, the attainment of significant efficiency by the two calculators establishes that the development of an extremely proficient and methodical online inheritance calculator is possible.

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Online Inheritance Calculators

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http://inheritance.ilmsummit.org/projects/inheritance/home.aspx(Calculator 2)
http://www.lubnaa.com/money/InheritCalc.php(Calculator 3)
http://www.inheritance-calculator.com/(Calculator 4)
https://kurandersleri.net/miras/en/Miras_Erkek_en.html(Calculator 5)
http://www.miraas-in-islam.com/english/Default.aspx(Calculator 6)