Developing An Islamic Farayez System Applying Software Engineering

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ABSTRACT

Distribution of deceased person's wealth is a divine law in Islam. This distribution should be accurate; otherwise a gruesome punishment is waiting in hereafter. The combination of relatives of late person is diverse which makes the computation of distribution difficult. In order to ease the computation of shares of slain person, a software system can be designed for Islamic Farayez which is the premier concern of this article. The existing software systems cannot compute the distribution precisely always and furthermore have lack of proper explanation of the system. Having studied 'Islamic Shariah' for all possible combinations of relatives of dead person, a system has been modelled and developed which provides the knowledge of Islamic inheritance and distributes the wealth of deceased accurately through which user can be galvanized to follow. Here the Islamic Farayez has been analyzed and modelled using structured approach. After fixing different scenario of Islamic Farayez of a dead person, individual cases are analysed using three levels of Data Flow Diagram (DFD). Hence, DFD illustrated the organization of the functional components of the system; and as a consequence, based on this, the graphical form of algorithm or flow-chart of the overall Islamic Farayez system is developed. Finally, mathematical models are derived for all possible combination of relatives of late person and then developed the software for Islamic Farayez system. The reliability, accuracy, integrity and robustness of the proposed Islamic Farayez system are rigorously justified by comparing the proposed system generated results with manual results as well as other existing software generated results for various complex cases. It is recommended to use this proposed Islamic Farayez system as an expert assistant for distribution of deceased person's wealth among his/her eligible relatives.

Keywords: Islamic Farayez, Structured System Analysis and Design, Data Flow Diagram (DFD)

INTRODUCTION

When a Muslim passes away, there needs to be performed four tasks: payment of funeral expenses, payment of his/her debts, execution of his/her wills and allocation of remaining property amongst the heirs according to shariah. First three issues can be resolved easily but the toughest task is the last one (Abid 2017). Farayez is that section of the Islamic law that deals with the distribution of the estate (property) of a deceased person among his heirs according to Holy Quran and Hadith. In our society, heirs of a deceased person cannot get their rights due to improper distribution of his/her property. There are some reasons for this improper distribution. Firstly, people have very poor knowledge on farayez. As a result, they cannot distribute the property fairly. Secondly, venal people evade carrying out the proper distribution of a deceased property to his/her heirs. Thirdly, manual calculation of individual heir's property is cumbersome and time consuming. Therefore, heirs of a deceased may have a chance to get deprived which is strong violation of Islamic law. Consequently, whoever disobeys the law has indeed strayed into a plain error (Quran 33:36). This leads the Muslim not to gain eternal success. Thus, a professional software system can assist to the Muslim people for precise computation of the wealth of late person. This paper emphasizes to propose an efficient system model for Islamic Farayez employing Structured System Analysis and Design (SSAD) approach. This approach consists of fixing a scenario, determining components of the system and formulating the computational model for all possible cases of Islamic Farayez.Through DFD all required processes are identified which leads to increase the maintainability of the system. In addition, the computational model for farayez laws are translated into mathematical equations which have been rationalized by applying on real complex cases in this paper.

The remainder of the paper is structured into four sections. The related works are described in Section 2. Then, Section 3 explains the proposed system. Next, the method has been evaluated in Section 4. Finally, Section 5 concludes the whole paper.

RELATED WORKS

The Islamic Farayez system in this paper is based on Software engineering which is a systematic, disciplined and quantifiable approach that is concerned with all aspects of good software production, which is maintainable, dependable, secured, usable, reliable and acceptable by clients or user (Ian 2011). Few research works have been done on Islam using

software engineering. Shihab (2009) provides a benchmark for modeling software engineering principles based on Islamic ethical values. Professional association like ACM, IEEE, ABET, CSAC have established rules to help software engineers to understand and manage their ethical duty. Islam offers a set of moral principles and guidance which prove success in establishing ethically strong society in history. Muslim software engineers should follow Islamic ethics in developing software to get success in this world and in hereafter (Shihab 2009). Burhan et al. (2017)provides an idea about the utilization of Islamic teachings for upgrading the ethical principles of Muslim IT professionals specially software engineers. They offer an Islamic but global approach towards software engineering paradigms (Burhan et al. 2017). Muhammad (2012) developed an inheritance evaluative system based on Islamic law which can automatically calculate the share of deceased's heirs. But shares of some heirs like nephew,uncles are missed in this system (Asgha et al. 2004). Akkila et al. (2016) provided a rule based expert system which is trained for calculating inheritance of heirs according to Islamic shariaa. It can calculate property of some heirs only. Shares of sister,brother,uncle etc cannot be manipulated (Akkila et al. 2016). Imron et al. (2017) analyzed, designed and developed a prototype of method and tool by improving the Bin Packing Problem algorithm to manage inheritance in terms of money and invisible items, which provide the best result.There are some systems on Islamic Farayez. Some systems focus on the calculation process of different laws of inheritance according to Islamic Sharia. Some give importance on the laws of inheritance in their research. The most popular software are Lubnaa.com (Lubnaa 2017), IWIC (Islamic Wealth Inheritance Calculator) developed by Jalal Foundation (IWIC 2017) and Uttaradikar built by a Bangladeshi project named Access to Information (a2i) (Uttaradhikar.bangla 2016). But internal computational and system model on Islamic Farayez has not been shown anywhere which is the driving force of this research work.

PROPOSED SYSTEM

Any software system should be developed applying systemic approach, otherwise the system will not be professional. The development of a software involves defining the problem, having certain scope and vision, gathering requirements detailed requirements, making the design, implementing the system using programming technology, testing the developed system, delivering the product and maintaining it (Mashesh 2014). The systematic approach is used to develop the proposed Islamic Farayez System which basically consists of five typical stages: Requirement Analysis, Designing, Implementation, Testing and Maintenance. Based on the flow of theses stages during the development of software, several Software Development Life Cycle (SDLC) models have been proposed like waterfall model, Iterative model, V model, Spiral model and Agile model etc (Sahil Barjtya 2017). This article focuses on analysis, design and implementation stages

of waterfall model. Here analysis of a system refers to the answer of questions on who will use the system, what system will do, where and when it will be used, while system design implies of how it will operate in terms of hardware, software and network infrastructure (Alan et al. 2012). There are two techniques for system analysis and design: Structured System Analysis and Design (SSAD) and Object Oriented Analysis and Design (OOAD). SSAD is based on the identification of processes of system whereas the crucial part of OOAD approach is object identification. And the Farayez system of this paper has been designed applying SSAD, where the end-product of requirement analysis can be Data Flow Diagram (DFD) (Mahesh 2014). ADFD describes a flow of data in the system and the system is considered as a transformation function that transforms the given inputs to the expected outputs (Dinesh 2017). Firstly a scenario has been made for the system. Then having analyzed the scenario, three levels of DFDs have been exploited in order to show the processes of the whole system. Next all possible rules of Islamic Farayez computation modelshave been build. Finally the system has been implemented based on the DFD and built computational models.

A. Scenario of the System

The proposed system consists of two landmarks. The core functionality is to compute the inheritance of heirs of a deceased person. Other functionality is to display laws of inheritance, kinds of heirs and how much property an heir can get. Actor or user of this system is he who wants to get a brief knowledge on Islamic inheritance law and to compute a dead person's individual heir's property. How an actor can interact to deal the prescribed functionalities is illustrated through scenario in Figure 1.

B. System Analysis

System analysis is used to provide information of what software should do. This phase includes finding out the components and their communication inside the system and representing the system through DFD. In this paper, level 0, level 1 and level 2 DFD is used for analyzing Islamic farayez system. Figure 2 shows the Level 0 DFD which illustrates the overall view of the defined system. Level 1 DFD shown in Figure 3 decomposes the system into two modules: computation of shares and viewing information, which increase the maintainability of the system. First module takes total shares (TS) of deceased; amount of bequest shares (BS) and list of heirs (LH), computes individual heirs' shares and shows list of all possible heirs of a deceased person with distributed shares. Second module displays decrees given in Quran, laws given in hadith. The "Compute Shares" is further divided into five modules shown in Figure 4 dubbed Level 2 DFD. First module determines the list of eligible heirs (LEH) for shares and effective prescribed and residual shares (PRS). Then, the only deserved prescribed shares for eligible relatives are calculated by second module called "Compute Prescribed Shares". Next "Adjust the Shares" adjust the computed shares under total eligible prescribed

INITIAL ASSUMPTION:
An interested user can be prompted by the system for two functions. First one is to display Farayez related details information and another is to calculate a departed person's property for his/her successors.

NORMAL:
When an actor initializes to view information, he sees four options. The first two options are related to verses of Quran and genuine Hadith on Farayez. The 3rd and 4th options are for showing the list of all possible eligible relatives and their proportion of shares respectively. Having selected desired option, the system will show the corresponding information.
If the user needs to determine property of heirs, he selects the Islamic inheritance calculator. The system will take the amount of property of that person, number of heirs and type of heirs. Then the system computes and displays the individual inheritor's property and their portions.

WHAT CAN GO WRONG?
If the actor gives wrong input, for example more than four wives, one husband, one father, one mother etc the system will display wrong message.

SYSTEM STATE ON COMPLETION:
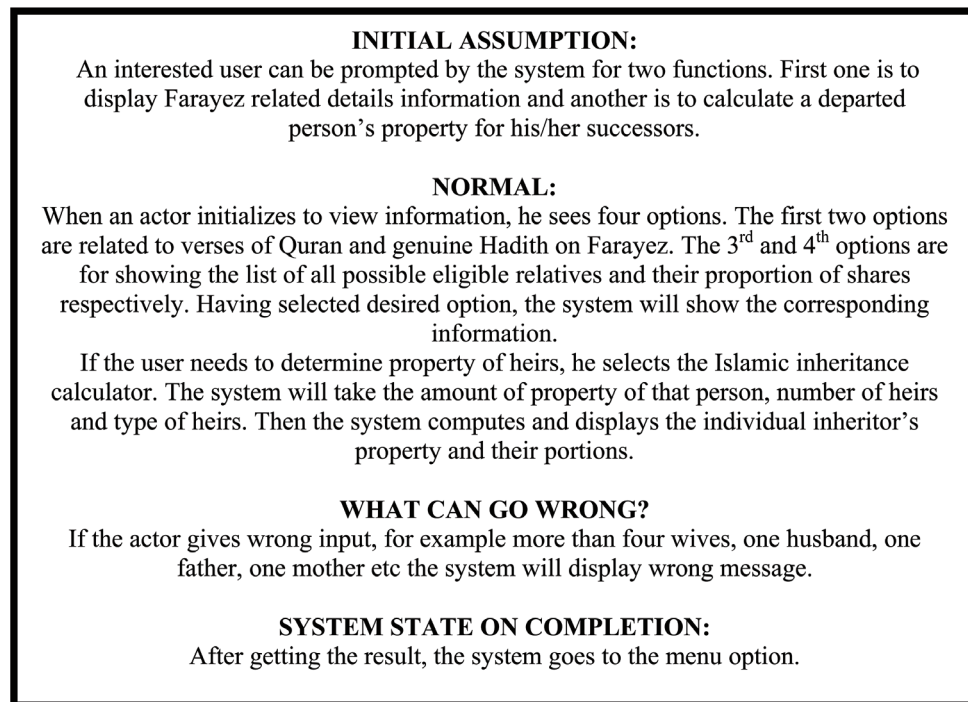After getting the result, the system goes to the menu option.

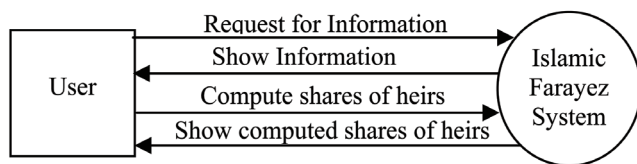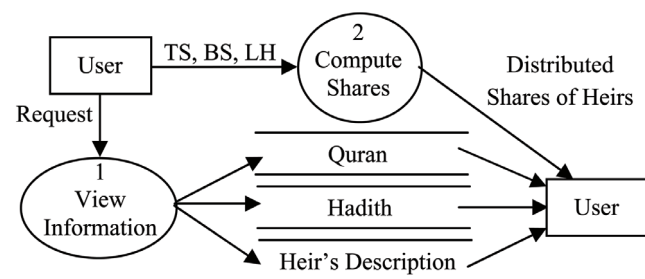FIGURE 1. Scenario of Islamic Farayez system

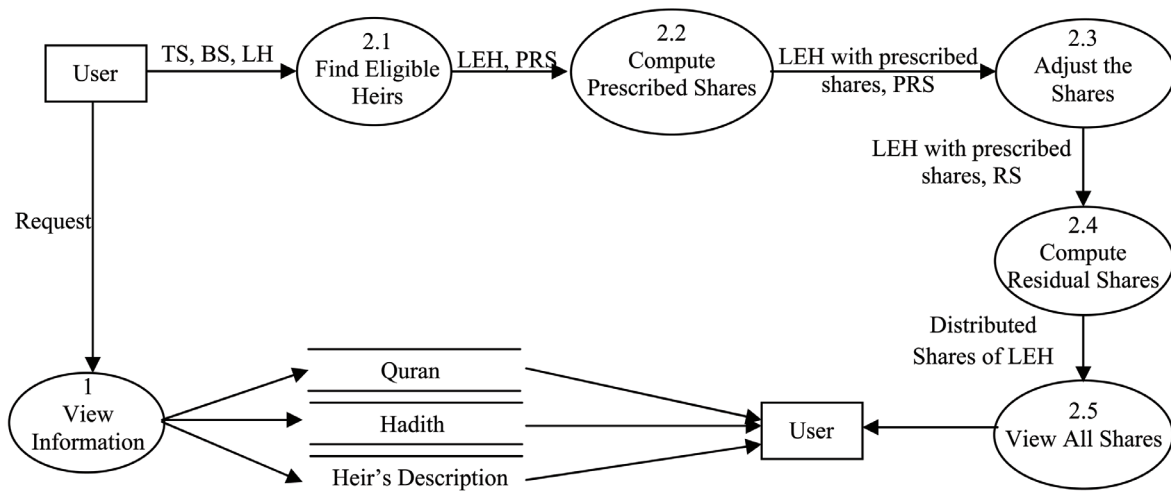FIGURE 2. Level 0 DFD

FIGURE 3. Level 1 DFD

FIGURE 4. Level 2 DFD

shares if necessary and compute the effective residual shares (RS). After that the residual shares for eligible relatives are computed. And finally all allotted shares are displayed to the users by the module named "View All Shares".

C. *System Modeling*

The computational model for distributing the total shares (TS) of deceased consists of four stages including determining the effective heir's shares, computing prescribed shares, adjusting the prescribed shares and computing residual shares sequentially. The shares of a person must be distributed as soon as the person has been died. The shares which are instructed by departed person to give someone are called bequest shares (BS) and the amount of these shares are not more than one third of the wealth (Bukhari-2742 and

Muslim-1628). Firstly all will shares are determined. Then after deducting all BS and debts from the TS, the rest of the property will be reckoned for prescribed and residual shares (PRS). From PRS, the shares are distributed to eligible relatives according to prescribed rules. The sum of all distributed prescribed shares (SDPS) may be more or less than PRS. If the SDPS is more than the (PRS), then the distributed shares must be adjusted by scaling down under PRS and residual shares are not allotted. Furthermore if the SDPS is less than the PRS and any eligible relative exist for residual shares (RS), the rest of the shares are distributed among those relatives. Otherwise, the allotted prescribed shares are adjusted by scaling up under PRS. The overall algorithm for distributing the wealth of deceased among eligible relatives is shown in flowchart illustrated in Figure 5.
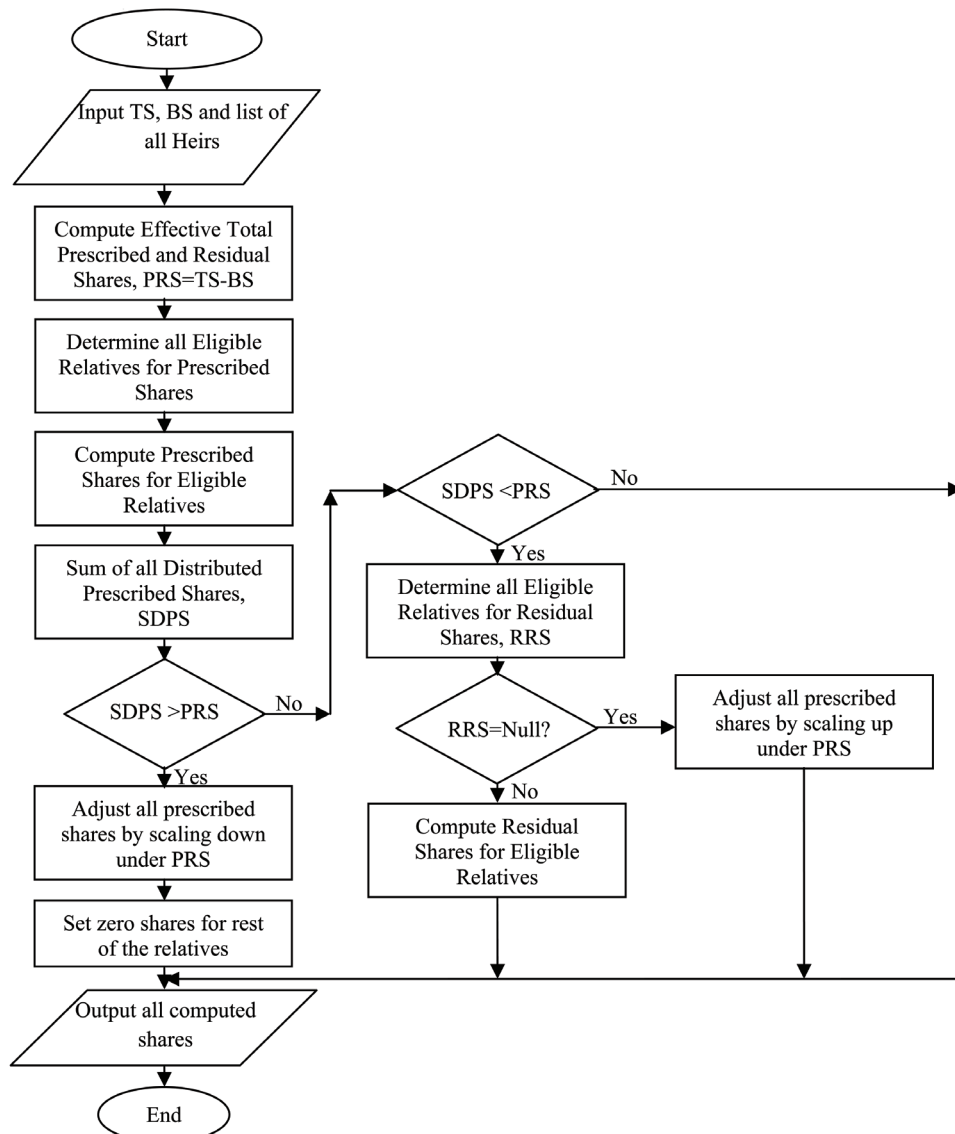

FIGURE 5. Flowchart for Computational Process of Islamic Farayez System

D. Models for Prescribed Shares

After giving the bequest shares, the rest of the shares are distributed to the eligible relatives regarding the holy Quran and Hadith and these shares are called prescribed shares. Nine possible eligible relatives for prescribed shares and their proportion of shares are shown in Table 1. The eligible relatives in inheritance for prescribed shares are determined using the flowchart in Figure 6. Out of them, husband, wives, father and mother of deceased are powerful as they must get the part of deceased's wealth without any condition. Other relatives deserve the conditional prescribed shares. For daughter, she will be considered for prescribed share if deceased has no son. Moreover, although deceased's paternal grandfather will be eligible for prescribed share unless the father of deceased is not alive, anyway maternal grandfather will not be counted. Furthermore, other conditional relatives are paternal and maternal grandmother. Maternal grandmother only depends on mother, while the implied condition of paternal grandmother is that both father and mother of deceased must not be alive.In addition, sister of deceased can also deserve prescribed share where the condition is brother, father, paternal grandfather, daughter, son, son's son and son's daughter are not alive. And last eligible relative is granddaughter (son's daughter). There are two cases for granddaughter, where the absence of son and grandson (son's son) is precondition, including zero or single daughter. That is, if the deceased has multiple sisters, in spite of not having son and grandson the granddaughter will not be considered for prescribed share. In order to model all prescribed shares for nine relatives in table I, two predicates named has(object) and has_no(object) have been considered. These two predicates are Boolean functions which return either 0 or 1 value as long as the existence of object in parameter and used to simplify the model avoiding the conditions.

Suppose the total prescribed and residual shares after deducting the debts and assets instructed in will of departed person is PRS. So the husband's prescribed share (HPS) of deceased is expressed as equation 1.

$$HPS = \frac{PRS}{4} + \left(\frac{PRS}{4} * has\_no\,(children) \right) \qquad (1)$$

According to Islam, any man may have at most four wives at a time. If the number of wives of dead person is NW, the equation in 2 is used to compute the wives' prescribed shares (WPS).

$$WPS = \frac{\dfrac{PRS}{8} + \left(\dfrac{PRS}{8} * has\_no\,(children) \right)}{NW} \qquad (2)$$

TABLE 1. Summary of Prescribed Shares' Portion [Surah An-Nisa]

Sl. No.	Relative	Case 1	Case 2	Case 3
1.	Husband	½ when deceased has no children	¼ when deceased has children	
2.	Wives	¼ when deceased has no children	1/8 when deceased has children	
3.	Daughters	½ when deceased has single daughter	2/3 when deceased has multiple daughters	
4.	Father		1/6 for any cases	
5.	Mother	1/3 when deceased has no children and siblings	1/6 when deceased has children or multiple siblings	
6.	Granddaughters (Son's Daughter)	½ when deceased has single granddaughters	2/3 when deceased has multiple granddaughters	1/6 when deceased has single daughter
7.	Grandfather (paternal)		1/6 for any cases	
8.	Grandmother (Both)		1/6 for Paternal or Maternal Grandmother	
9.	Sisters (Full)	½ when deceased has single sister	2/3 when deceased has multiple sisters	

If the departed person has ND number of daughters, the Daughter's prescribed shares (DPS) are computed using equations 3. Here DPS1 and DPS2 are the prescribed shares for single daughter and multiple daughters.

$$DPS = \left(\frac{DPS1 + DPS2}{ND} \right) * has\_no\,(son) \qquad (3)$$

Where

$$DPS1 = \frac{PRS}{2} * has\,(\sin gle\;daughter)$$

$$DPS2 = \frac{2 * PRS}{3} * has\,(multiple\;dughter)$$

The father's prescribed shares (FPS) of deceased are confirmed shares and determined applying equation 4.

$$FPS = \frac{PRS}{6} \qquad (4)$$

Other confirmed shares are mother's shares and the expression for computing the shares, MPS (Mother's Prescribed Shares), is shown in equation 5.

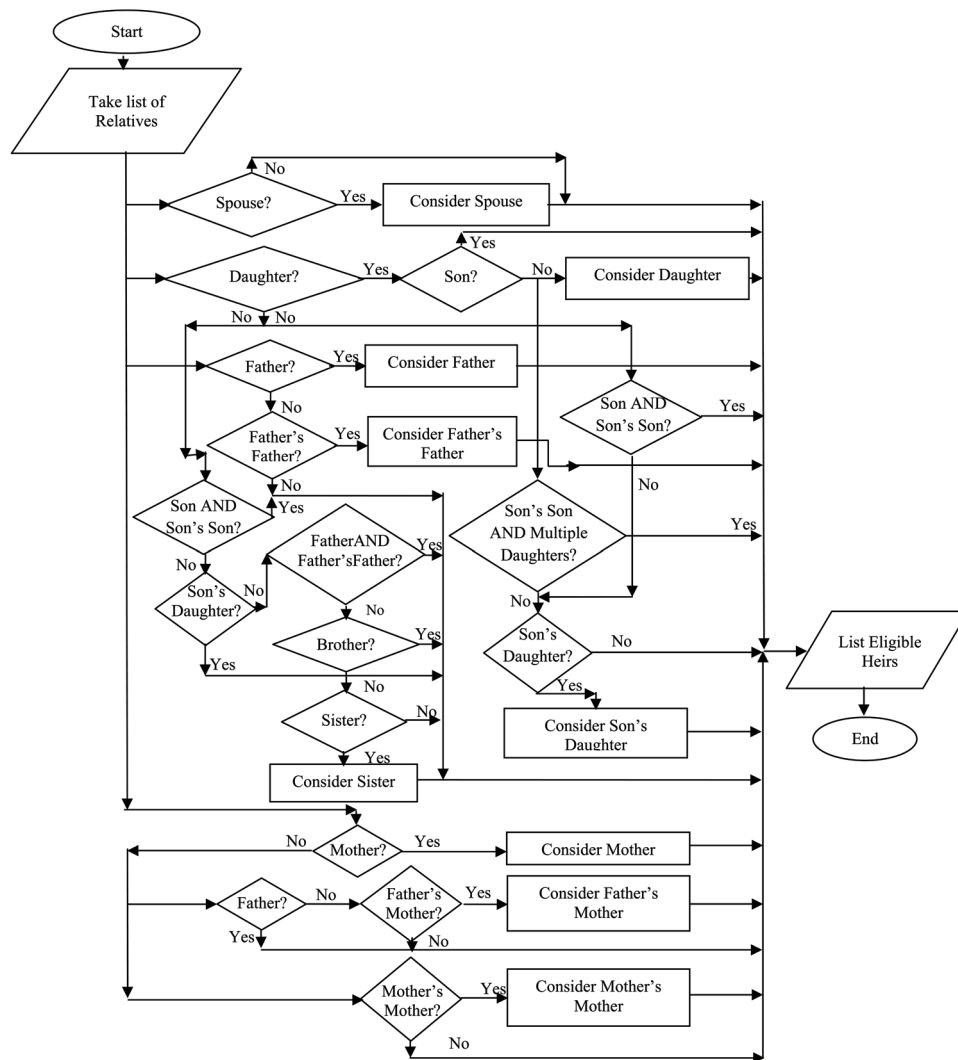$$MPS = \frac{PRS}{6} + \left(\frac{PRS}{6} * (L1\;\text{AND}\;L2) \right) \qquad (5)$$

FIGURE 6. Flowchart to determine eligible relatives for prescribed shares

Where

$L1 = has\_no\ (children)$
$L2 = has\_no\ (multiple\ siblings)$

Another potential eligible relative for prescribed shares is granddaughter, daughters of sons. If deceased has no multiple daughters, his/her sons and grandson (son's son) are not alive, the granddaughter will be considered for prescribed shares, GDPS (Granddaughter's Prescribed Shares), as equation 6, where GDPS1, GDPS2 and GDPS3 are prescribed shares for single granddaughter, multiple granddaughters and single daughter and NGD stands for Number of Grand Daughters.

$$GDPS = \left(\frac{DPS1 + DPS2 + GDPS3}{NGD} \right) * LGD \qquad (6)$$

Where

$$GDPS1 = \frac{PRS}{2} * has\ (sin\ gle\ grand\ daughter)$$

$$GDPS2 = \frac{2*PRS}{3} * has\ (multiple\ grand\ daughter)$$

$$GDPS3 = \frac{PRS}{6} * has\ (sin\ gle\ daughter)$$

$L3 = has\_no\ (son)$
$L4 = has\_no\ (son\ s'\ son)$
$L5 = has\_no\ (multiple\ daughters)$
$L6 = has\_no\ (daughter)$
$LGD = (L3\ \text{AND}\ L4)\ \text{AND}\ (L5\ \text{OR}\ L6)$

Paternal grandfather will get prescribed shares as long as father is not alive and the number of the shares named PGFPS (Paternal Grand Father's Prescribed Shares) is determined using the equation 7.

$$PGFPS = \frac{PRS}{6} * has\_no\ (father) \qquad (7)$$

Both paternal and maternal grandmothers can be considered for prescribed shares regarding some conditions. Maternal grandmother will get the wealth as long as mother is late. When both father and mother are died, paternal grandmother will be eligible for the shares. That is, father only can block the paternal grandmother, whereas mother

can obstruct both paternal and maternal grandmother. The Paternal Grandmother's Prescribed Shares (PGMPS) and Maternal Grandmother's Prescribed Shares (MGMPS) can be derived from the equation 8 and 9.

$$PGMPS = \frac{PRS}{12} * (L7 \text{ AND } L8) + \frac{PRS}{12} * L9 \qquad (8)$$

$$PGMPS = \frac{PRS}{12} * L8 + \frac{PRS}{12} * (L10 \text{ AND } L7) \qquad (9)$$

Where

$L7 = has \_ no (father)$
$L8 = has \_ no (mother)$
$L9 = has \_ no (mother's mother)$
$L10 = has \_ no (father)$

The last eligible relative for prescribed shares is sisters who will be qualified if none is alive among daughters, son, son's son, son's daughter, father, grandfather and brother. If the number of sisters is NS, SPS (Sister's Prescribed Shares) are computed using the equation 10, where SPS1 and SPS2 are prescribed shares for single sister and multiple sisters. The sister of deceased will be considered, if deceased has no paternal ancestors and no offspring (Al-Quran Surah An-Nisa/176).

$$SPS = \left(\frac{SPS1 + SPS2}{NS} \right) * L15 \qquad (10)$$

Where

$$SPS1 = \frac{PRS}{2} * has (\sin gle\ sister)$$

$$SPS2 = \frac{2 * PRS}{3} * has (multiple\ sister)$$

$L6 = has \_ no (daughter)$
$L3 = has \_ no (son)$
$L4 = has \_ no (son\ s'son)$
$L11 = has \_ no (sons'\ daughters)$
$L7 = has \_ no (father)$
$L12 = has \_ no (father's\ father)$
$L13 = has \_ no (brother)$
$L14 = L6 \text{ AND } L3 \text{ AND } L4 \text{ AND } L11$
$L15 = L14 \text{ AND } L12 \text{ AND } L13$

E. Adjustment of Prescribed Shares

Having distributed all prescribed shares of deceased to all successors, the Sum of all Distributed Prescribed Shares (SDPS) and the effective total prescribed and residual shares (PRS) either be equal or more or less. For this reason, all allotted shares might be adjusted and the adjustment factor is as equation 11. If SDPS is higher than PRS, all allotted prescribed shares should be scaled down under PRS by multiplying AF. On other hand, if the SDPS is less than PRS and no relative exist, then the distributed prescribed shares must be scaled up under PRS.

$$AF = \frac{PRS}{SDPS} \qquad (11)$$

F. Models of Residual Shares

The rest of the assets after giving the prescribed shares will be treated as total residual shares (RS), which is only applicable when SDPS is lower than PRS. The RS will be distributed to the relatives based on priorities. The computational flowchart to determine eligible relatives for residual shares is shown in Figure 7. Here the ratio of the estates for male and female candidates is 2:1 (Al-Quran Surah An-Nisa/11) if eligible relatives include both male and female. Otherwise all shares will be allotted to all relatives equally. Suppose the number of males and females candidates for RS are NMC and NFC. Then computational model for male residual shares (MRS) and female residual shares (FRS) are shown in equation 12 and 13 respectively. Generally, if the deceased has both brother and sister, sister must be treated for residual share. But there is a special case for sister. In spite of having no brother, sister can be considered for residual share when the deceased has either daughter or granddaughter or both (Muhammad Imran Muhammad, 2012). If SDPS is greater than or equal to PRS, shares are distributed to the rest of the inheritors.

$$MRS = 2 * \frac{RS}{(2 * NMC + NFC)} \qquad (12)$$

$$FRS = \frac{RS}{(2 * NMC + NFC)} \qquad (13)$$

RESULT AND DISCUSSION

None can change the laws of Farayez, as these are fixed by Allah. But the laws can be formulated to ease the computation of shares of deceased among his or her heirs which has been done in this study. In order to justify the proposed model, 10 possible different complex cases shown in Table 2 have been tried to determine.

For the sake of understanding, the identification of heirs for prescribed and residual shares under case 1 has been demonstrated in Figure 8 and Figure 9. Here bold lines indicate the flow of eligible candidates for shares while dash lines do not trigger the flow of flowchart. From Figure 8, it has been seen that the eligible heirs for prescribed shares are wife, father and mother. Suppose the total effective prescribed and residual share, PRS, of deceased is 100. The total prescribed shares for wife is computed applying equation 2 shown in figure 10. And the calculation of prescribed shares for father and mother is shown in figure 11. After giving the prescribed shares, the sum of distributed prescribed shares, SDPS is (12.5 + 16.67 + 16.67) or 45.84 which is less than PRS (100). So the residual shares will be considered and the effective amount of residual shares is RS, PRS − SDPS = 100-45.84 = 54.16. According to Figure 9, the eligible relatives for residual shares are sons and daughters. The amount of residual shares for son and daughterare determined using equation 12 and 13 illustrated in Figure 12.
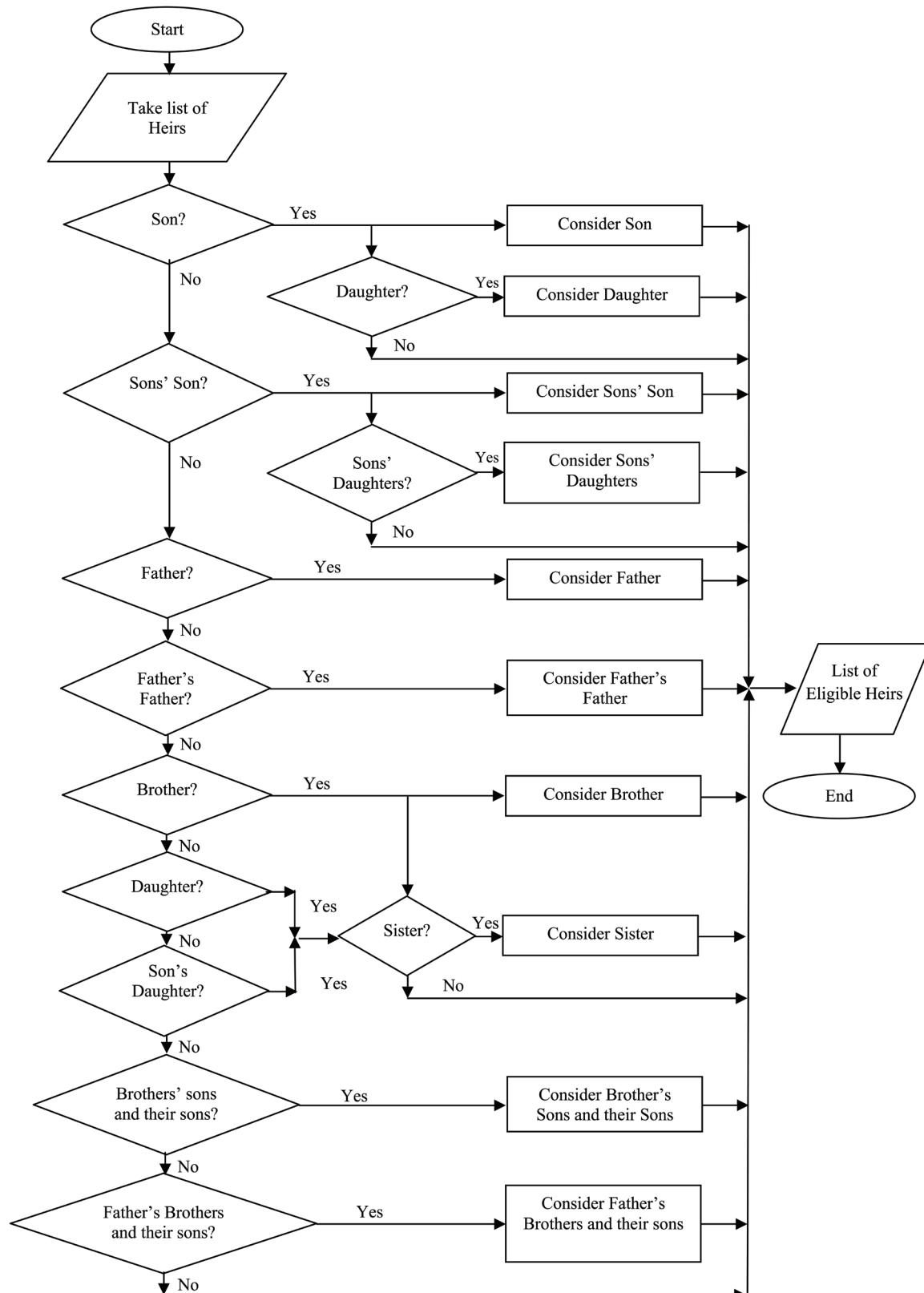
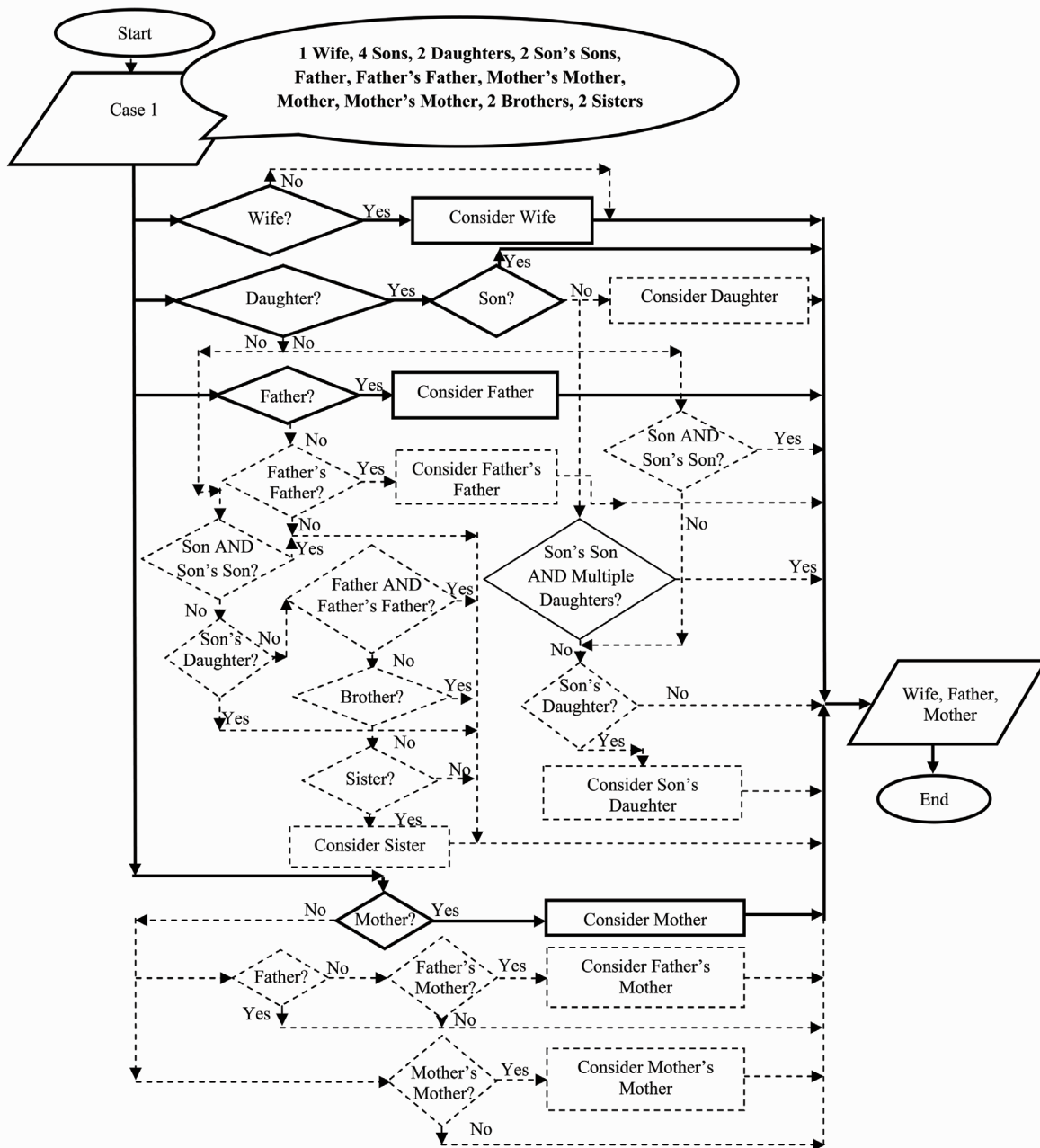FIGURE 7. Flowchart to determine the eligible relatives for residual shares

FIGURE 8. Flowchart for case 1 to determine eligible relatives for prescribed shares
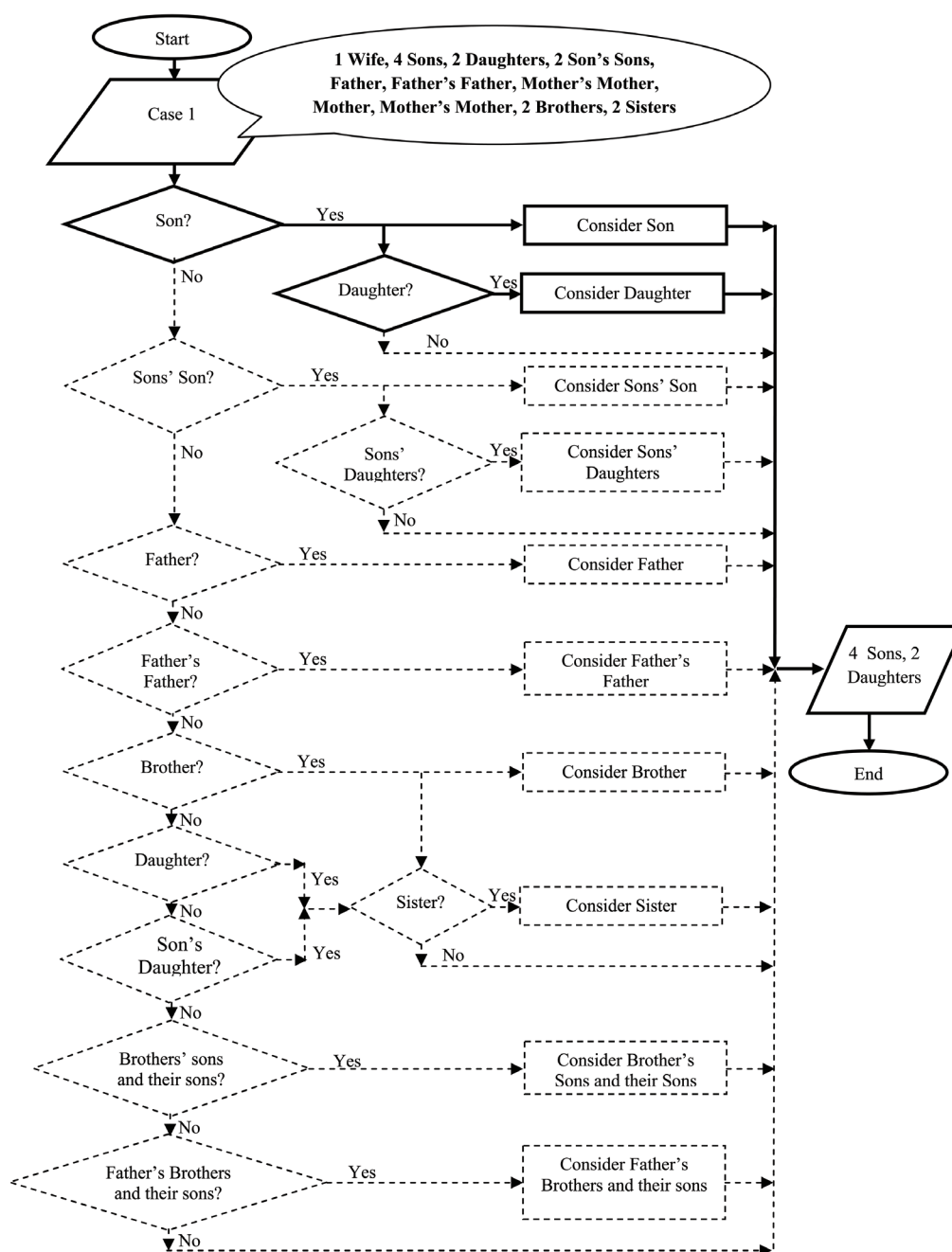
FIGURE 9. Flowchart case 1 to determine the eligible relatives for residual shares

For Wife

$$WPS = \frac{\frac{PRS}{8} + \left(\frac{PRS}{8} * has\_no(children)\right)}{NW} = \frac{\frac{100}{8} + \left(\frac{100}{8} * 0\right)}{1} = 12.5$$

Where PRS=100, has_no(children)=0, NW=1

FIGURE 10. Computation of wife's prescribed shares

For Father

$$FPS = \frac{PRS}{6} = \frac{100}{6} = 16.67$$

For Mother

$$L1 = has\_no(chidren) = 0$$

$$L2 = has\_no(multiple\ siblings) = 0$$

$$MPS = \frac{PRS}{6} + \left(\frac{PRS}{6} * (L1\ OR\ L2)\right) = \frac{100}{6} + \left(\frac{100}{6} * (0\ OR\ 0)\right) = \frac{100}{6} = 16.67$$

FIGURE 11. Computation of father's and mother's prescribed shares

For Sons

$$MRS = 2 * \frac{RS}{(2 * NMC + NFC)} = 2 * \frac{54.16}{(2 * 4 + 2)} = 10.83$$

For Daughters

$$FRS = \frac{RS}{(2 * NMC + NFC)} = \frac{54.16}{(2 * 4 + 2)} = 5.42$$

Where TRS=PRS-SDPS=100-(16.67+16.67+12.5)=54.16, NMC=4 and NFC=2

FIGURE 12. Computation of Residual Shares of Sons and daughters

The simulated results applying the proposed model for prescribed and residual shares compared to the manual result generated by expert for all 10 cases have been shown in table 2 out of 100 shares. Observing the table 2, it has been seen that for every case the simulated result using proposed model and actual result is completely identical which justify the correctness of the model. In addition, among those cases, the one interesting case 6 is for Kalala, a person who has left neither ascendants nor descendants. That is, this person leaves neither parent nor child. According to inheritance law, Kalala's brother blocks his or her sister from prescribed shares. That is if kalala's brother does not exist, but sister is alive, then his or her sisters will get prescribed shares as daughter's rules. Otherwise both brother and sister will be reckoned for residual shares and the shares will be distributed as the ratio of 2:1 like daughter and son case (Surah An-nisa, Al-Quran-11). The result for case 6 also justify that the proposed model is working for kalala properly. Thus it can be said that the modeling of the Farayez system has been done successfully. The proposed model must be implemented using structured language, since it the system is analyzed and designed using SSAD. In this paper, the proposed model has been built using C language and the home screen of the software is shown in figure 13.

TABLE 2. Experimental Result

| Case	Relatives	Prescribed Shares			Residual Shares		Simulated Result	Manual Result
		Eligibility	Amount Per Person (%)	Sum of Distributed Shares (%)	Eligibility	Amount Per Person (%)	Shares/Person (%)	Shares/Person (%)
1	1 Wife	Yes	12.5		No	0	12.5	12.5
	4 Sons	No	0		Yes	10.83	10.83	10.83
	2 Daughters	No	0		Yes	5.42	5.42	5.42
	2 Sons' Sons	No	0		No	0	0	0
	2 Son's Daughters	No	0		No	0	0	0
	Father	Yes	16.67	45.84	No	0	16.67	16.67
	Father's Father	No	0		No	0	0	0
	Father's Mother	No	0		No	0	0	0
	Mother	Yes	16.67		No	0	16.67	16.67
	Mother's Mother	No	0		No	0	0	0
	2 Brothers	No	0		No	0	0	0
	2 Sisters	No	0		No	0	0	0
2	2 Wives	Yes	6.25		No	0	6.25	6.25
	2 Sons' Sons	No	0		Yes	18.06	18.06	18.06
	2 Son's Daughters	No	0		Yes	9.03	9.03	9.03
	Father's Father	Yes	16.67	45.84	No	0	16.67	16.67
	Mother	Yes	16.67		No	0	16.67	16.67
	Father's Mother	No	0		No	0	0	0
	Mother's Mother	No	0		No	0	0	0
3	Husband	Yes	50		No	0	42.86	42.86
	Father's Mother	Yes	8.33		No	0	7.14	7.14
	Mother's Mother	Yes	8.33	116.66	No	0	7.14	7.14
	Sister	Yes	50		No	0	42.86	42.86
4	Husband	Yes	25		Yes	12.5	12.5	12.5
	1 Daughter	Yes	50	75	No	0	50	50
	2 Sisters	No	0		Yes	12.5	12.5	12.5
5	3 Daughters	Yes	22.22		No	0	22.22	22.22
	Father	Yes	16.67		No	0	16.67	16.67
	Father's Mother	No	0	100	No	0	0	0
	Mother's Mother	Yes	16.67		No	0	16.67	16.67
	2 Sisters	No	0		No	0	0	0
6	Wife	Yes	25	91.66	No	0	10	10
	2 Sisters	Yes	33.33		No	0	40	40
7	Mother's Mother	Yes	16.67		No	0	16.67	16.67
	1 Son's Daughter	Yes	50		No	0	50	50
	2 Brothers	No	0	66.67	Yes	11.12	11.12	11.12
	2 Sisters	No	0		Yes	5.56	5.56	5.56
8	Father's Mother	Yes	8.33		No	0	8.33	8.33
	Mother's Mother	Yes	8.33		No	0	8.33	8.33
	3 Son's Daughters	Yes	22.22	83.32	No	0	22.22	22.22
	3 Brother's Sons	No	0		Yes	5.56	5.56	5.56
9	Father	Yes	16.67		No	0	16.67	16.67
	Father's Mother	No	0		No	0	0	0
	Mother's Mother	Yes	16.67	100	No	0	16.67	16.67
	3 Son's Daughters	Yes	22.22		No	0	22.22	22.22
	3 Brother's Sons	No	0		No	0	0	0
10	Father	Yes	16.67		No	0	16.67	16.67
	Father's Mother	No	0		No	0	0	0
	Mother's Mother	Yes	16.67		No	0	16.67	16.67
	2 Son's Sons	No	0	33.34	Yes	19.04	19.04	19.04
	3 Son's Daughters	No	0		Yes	9.52	9.52	9.52
	2 Brothers	No	0		No	0	0	0
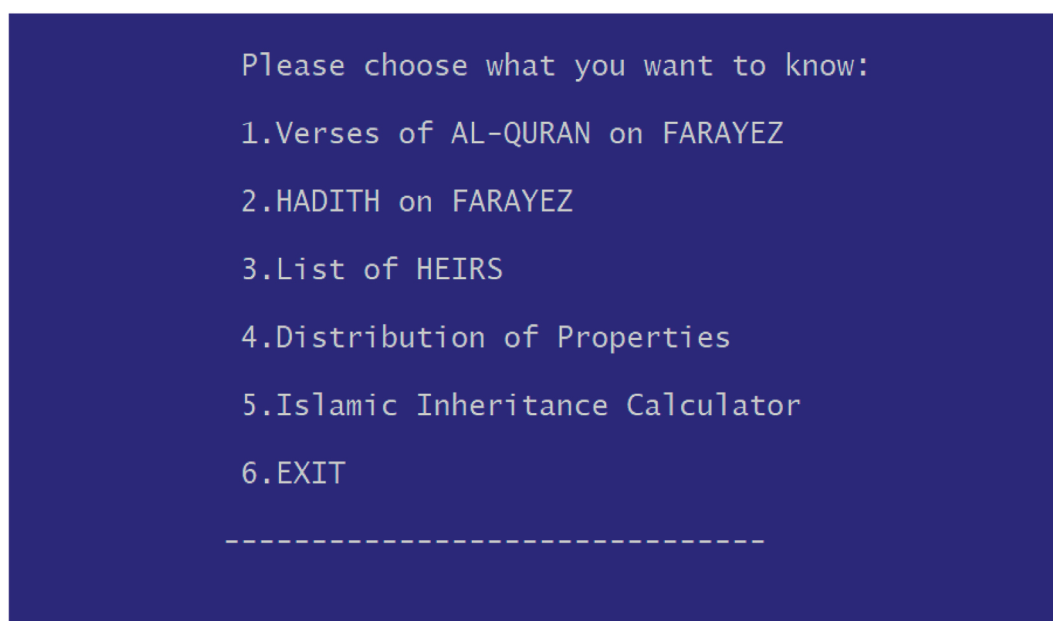
FIGURE 13. Home Screen

CONCLUSION

All believers in Islam trust they will be accountable in hereafter for their deed when they alive. For this reason, the wealth of deceased must be allocated to the deserved heirs. A software system for distributing shares plays a vital role to ease the calculation. The system has been analyzed successfully in this paper where all processes have been showed through three levels of DFDs based on one fixed scenario. Since the processes are independent and separate, the maintainability of the system is high. Moreover, the laws of Farayez are not changeable, since it is divine. But the laws can be expressed through mathematical equations which is very challenging task. However this challenging task has been performed in this paper effectively. The effectiveness of these mathematical models has been proved by applying those on some real complex cases, where the actual result and simulated result from the proposed model are same. Therefore, these proposed computational models make the Farayez system reliable to allot the shares of deceased among eligible relatives and get all necessary Quran and Hadith related information. Nonetheless the computational model is working properly for full brother and full sister not for step brother and sister which can be extended in future. Again, the proposed system has been analyzed and developed applying SSAD approach and can be implemented using Structure Oriented Programming Language. But the maintainability and usability of the system are not satisfactory enough at all. Recently, a new technique has been invented for analyzing and designing the system called Object Oriented System Analysis (OOAD) which makes any system more reliable, maintainable and usable. Thus this work can be extended by modeling the system using OOAD which helps to implement a web based or android system employing Object Oriented Language in future.

REFERENCES

Abid, H. 2017. Islamic Laws of Inheritance, Islam101, www. islam101.com. Accessed on: 7 February 2018.
Article and Essays. 2018. http://www.zawaj.com. Accessed on: 1 July 2018.
Akkila, A.N. & Samy, S.A.N. 2016. Proposed expert system for calculating inheritance in Islam. *World-wide Journal of Multidisciplinary Research and Development* 2(9): 38-48.
Al-Quran, Surah An-Nisa (4:11,12,176)
Alan, D., Barbara, H.W. & Roberta, M.R. 2012. *System Analysis and Design*. 5th edition. John Wiley and Sons.13-14.
Asghar, D., Zubair, M., Kundi, F.M. & Khan, A.R. 2004. Inheritance evaluation eystem using Islamic law. *Journal of Higher Education Institutions* 9(6): 163-171.
Bukhari, Hadith No: 2742 and Muslim, Hadith No: 1628.
Burhan, U. I. K., Bisma, R. M., Mueen, U.I.M., Ajaz, A.H, Binyamin, A.A., Rashidah, F. & Olanrewaju. 2017. Linking software engineering paradigms to Islamic values. *Journal of Theoretical and Applied Information Technology* 95(7): 1405-1417.
Dinesh, T. 2017. Requirements Analysis in Software Engineering, EComputer Notes.

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Ian, S. 2011. Software Engineering, Pearson Education Inc. 9th edition.

Imron, B.A. & Somchai, L. 2017. Inheritance management method for set of indivisible item based on Islamic law. DMCIT '17 Proceedings of the 2017 *International Conference on Data Mining, Communications and Information Technology*, Article No. 10. doi: 10.1145/3089871.3089881.

Islamic Wealth Inheritance Calculator (IWIC). 2017. Jalal Foundation. http://www.jalalfoundation.org. Accessed on:1 July 2018.

Lubnaa Inheritance calculator,Lubnaa.com. 2017. http://www.lubnaa.com. Accessed on: 1 July 2018.

Mahesh, P.M. 2014. Object-oriented analysis and design using UML PHI learning private limited, *International Journal of Soft Computing and Engineering(TM),* Eastern Economy Edition, Page No-1.

Muhammad, I.M. 2012. *Inheritance in Islam : An attempt to simplify one of the complex branches of Shari'ah*. 1st edition. Sadaqatu Tayyibatun Foundation.

Shihab, A. H. 2009. Software engineering ethical principles based on Islamic values. *Journal of Software* 4: 563-570.

Sahil, B., Ankur, S. & Usha, R. 2017. A detailed study of Software Development Life Cycle (SDLC) models, *International Journal Of Engineering And Computer* 6: 22097-22100.

Uttaradhikarbangla. 2016. Property Calculation by Click A2i project, Prime Minister's Office, Bangladesh. www.inheritance.gov.bd. Accessed on: 1 July 2018.