

# Project Financing in Islamic Perspective

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**Abstract:** The treatment of project financing along with the underlying political economy of financing, institutional structure and development in Islam requires a methodology very different from the received methods of mainstream economics. In this paper, differences are brought out and the alternative methods expounded. The paper argues the relevance of the principles of Islamic political economy and explains the difference in the underlying systemic approach in the light of the unity of systemic knowledge, according to the Qur'ān. The case of Islamic banking and finance is treated as a special case of the general context in which project valuation issues are studied in the Islamic context.

## I. Background and Objective

This paper discusses some aspects of project financing and evaluation in comparative Islamic perspectives. There are specific points relating to the social and economic appropriateness of a project the financier needs to keep in view, not only from the profitability perspective of a privately owned project, but also for its social profitability. The private and social cost components of project financing, and the components of revenues generated from the nature of the project, are to be treated within the financing formula, in accordance with the social and economic awareness in writing up a project feasibility report to be used in project evaluation and financing.

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The question of average and marginal costs, in the pricing of goods and services over time, needs to be examined in comparative Islamic perspectives. The issue of the time value of money and its use in asset-valuation will be questioned. It will be replaced by the appropriate Islamic asset-valuation model. In the light of the worldview of unity of systemic knowledge, we will show that the only way to replace interest-based transactions and valuation of assets is to link up money and finance with the real economy, in the light of the recommended outlets of investment and selection of projects without interest, according to Islamic Law.

## **II. Introduction**

### **2.1. Time-Dependent Treatment of Costs and Benefits Linked with Project Financing**

Project financing involves a structure of costs and benefits over time. An analytical problem arises as to how fixed and variable costs are understood and measured in the time-dependent case for perfect and imperfect competition. It is well known that fixed and variable costs are studied in the framework of a static relationship between cost and output. The effect of time is treated exogenously, by assigning the technological effect on the cost and benefit curves to the time variable. We now take up this problem of understanding and measuring the time-dependent structure of fixed and variable costs associated with project evaluation.

### **2.2. Time-Dependent Evolution of Average Total Cost**

The adjustment of average total cost and profits, in the case of a firm in perfect competition, is explained by the movement of short-run profits and average total cost from a state of positive economic profit to the long-run case of normal profits and minimum average total cost condition, where marginal cost for pricing the product equals the minimum average total cost. Also the marginal revenue equals the marginal revenue of production.

Time has no role in the definition of the short-run and long-run adjustments in this case. Instead, these concepts are linked with the scale of production whereby the factors of production and the technology of the firm can change sufficiently, in order to adjust the

costs and revenues to a stable state. In the short-run such factor adjustments in terms of their costs, pricing and use remain variable. Consequently, the upward rising marginal cost curve above the minimum of the average total cost curve, also the supply curve of output of the firm in perfect competition, reflects the effect of the variable factor costs leading to its final adjustment at the minimum point of the average total cost curve in the long run. This is the point where the selling price of the output of the firm in perfect competition is determined in value equal to the long-run adjustment in the marginal cost of production. All of this adjustment is explained without invoking time in the process, except via a technological induction using the proxy of the time variable.

The problem of time in the marginal cost pricing and the determination of marginal revenue in perfect competition is equally unsettled in the case of imperfect competition with monopoly and monopolistic competition. The difference though is that normal profits do not appear in the case of monopoly production as they appear in the case of the long-run state of adjustment in marginal and average total costs and revenues in perfect competition and the marginal revenue and marginal cost adjustment to equality in the case of monopolistic competition.

What, then, is the pricing and average and marginal source of the net profits that we capitalize over time in the present-valuation formula? Since there is no relationship with the profit of the static case and the time-dependent case, the marginal values cannot prevail over time. Besides, the conception of evaluating a consequence (output, project, firm) over time, is not based on the direct cost-output, relationship as provided by the theory of pricing of output. Rather, prices are now assigned on an exogenously determined notion of risk, given that a static conception of cost-profit has been applied in the static case at given points of time. While the pricing and output determination within a given point of time is assumed to have a direct relationship with the average and marginal costs and revenues, the risk of such factors is an exogenous factor in the average and marginal cost and revenue relationship. Such a risk as an exogenous factor in the time-dependent pricing mechanism, is measured as a price for postponing the receipt of net profit when the related price and output cannot be determined by the static case of the marginal cost and

revenue equations. Risk pricing of this kind is referred to as the time value of money. It appears as a discount factor in the present-valuation formula.

### III. The Islamic Financial and Economic Approach to Risk and Valuation

In segmented and competing dichotomous markets of real output and financial papers, liquidity of financial instruments leads to money being held in high and speculative interest bearing instruments. Thereby, money as liquid asset on the one hand, and real assets on the other hand, are made to become gross substitutes of each other. Now savings compete as withdrawal with spending as resource mobilization in productive activities. The volatility of interest rates and its risk indeterminacy effect on the real economy cause the asset valuation model of project financing to become unusable in reality. It becomes a mere quantitative nicety.

The methodological ineptness in project valuation of the present-value model (and its prototypes such as the internal rate of return and terminal-value methods), is also due to the inability to assign a correct measure of costs and benefits over time, as known in the static case of the average and marginal price theory of the firm.

These kinds of problems are circumvented in the Islamic valuation methodology by the theory of money and real economy linkage. The issue is of an epistemological nature on methodological grounds of the *Tawhīdi* worldview. The end result of these epistemological and real issues of project valuation respecting cost, benefits and the appropriate way of estimating measured risk, leads to a new method of asset valuation. We will present this methodology and show by means of it how debt swapping can be done and debt retired by equity.

#### 3.1. Measurement of Cost and Benefit in the Static and Dynamic Case

On the epistemological ground of the *Tawhīdi* knowledge-centered worldview, time loses its substantive meaning in valuation. Time is replaced by the primal function of knowledge-flows in the light of the unity of knowledge, in systems derived by discursion, the pervasively

relational worldview of the Qur'an spanning all things in the universe and by the development financing instruments that carry the unification relationship between institutions, financing and socio-economic variables and the economy. Time flow is now seen merely as the medium for recording the consequences of interaction and integration, followed by knowledge-induced evolution.

#### IV. Formalism with Costs and Benefits in Time-Dependent Costs and Benefits of Project Financing and Valuation

We treat total cost of the following types:

##### 4.1. Private Direct Cost

Private direct cost of production is defined as the direct outlay of financial resources in employing labour, capital, land and other productive factors of production.

The knowledge induction of private direct cost comes about by means of sharing of such direct costs, by co-operating producers of goods and services and related agents. The sharing is carried out under the principal development financing instruments of profit and loss sharing (*muḍārabah*), equity participation (*mushārah*), cost-plus pricing (*murābahah*), foreign trade contracts and secondary financial activities revolving around the principal ones. Besides, in the joint production menus the productive factors, among themselves and with owners, are organized interactively to establish co-determination of choices of menus, technology and to share the cost of the producers as shareholders. The knowledge-flows caused by discursive processes are denoted as ordinal values of the variable  $\{\theta\}$ .

In the discursive knowledge-induced interactive, integrative and evolutionary processes relating to the sharing of cost and joint production menus with productive co-determination of outcomes, the dynamic nature of cost exists always. The direct private cost function is now given by,

$$C(\theta, \mathbf{x}(\theta)) = \sum_{i=1}^n C_i(\theta, x_i(\theta)) = \sum_{i=1}^n (w+b+r+d)_i [\theta] x_i(\theta) \quad (1)$$

Here,  $C(\theta, \mathbf{x}(\theta))$  denotes the total cost as a function of the knowledge-flows ordinally measured to reflect the degree of unity of knowledge or complementarity gained between the vector of variables

$x(\theta)$  in accordance with the Tawhīdi worldview and its instruments and discourses developed within the discursive process.

$C_i(\theta, x_i(\theta))$  are the shares of total cost for each of the  $i$ -participants in the joint venture on co-operative basis if *muḍārabah*, *mushārahah*, *murābahah* (mark-up) and other project financing instruments revolve around these principal ones.

$(w+b+r+d)_i[\theta]$  denotes the total payment to  $i$ th factor of production  $x_i$ , distributed as wages  $w$ , bonus  $b$ , retirement benefit  $r$  and dividends  $d$ . All of these are influenced by co-operative management of the productive venue between the factors as in the joint production function to be explained later in this Lesson. Such a co-operative learning variable is the consensual knowledge-flow variable denoted by  $\theta$ .

#### 4.2. Private Indirect Cost

Private indirect cost is defined as transaction costs. Examples are transportation cost, insurance cost, property tax and environmental cost caused by unexpected and uncontrollable factors, such as sudden drought, famine and wars. Within private indirect cost we do not include those costs that can be shared by subsidiary production systems in the Islamic economy with joint production menus. In fact, with a sectoral extension of the co-operative management of joint productions almost all of the private indirect cost can be comprised within a social perspective. When the social sharing of cost in a variant of expression (1) takes place in a privatization venue, we have the nature of sharing as market driven.

#### 4.3. Social Costs

Social costs are spillover costs as consequences of the action of others or other enviroing factors. Such costs can be caused by diseconomies of scale, when the production expansion in one firm or sector causes an increase in the cost of production in other related firms and sectors. Social costs in the financial markets are caused by unmeasured risk due to the actions of others and the enviroing unknowns. Examples here are moral hazard caused by free riding on interest free loans and soft loans; asymmetric information caused by

withholding information in monopolistic and oligopolistic competition and adverse selection caused by asymmetric information on choices. It may be pointed out here that these kinds of risks are minimized in the case of Islamic production. This is because extensive complementarity across diversely linked projects, sectors and production menus enable disclosure and transparency to become automatically governed, without costly mechanisms as in mainstream ideas of corporate governance.

Since the total cost function can be expressed in terms of the joint product, then:

$$Q = \prod_{i=1}^n Q_i(\theta, \mathbf{x}(\theta)) \quad (2)$$

Therefore,

$$\log Q = \sum \log Q_i(\theta, \mathbf{x}(\theta)) \quad (3)$$

As  $C(\theta, \mathbf{x}(\theta)) = C(Q)$ , there are two ways to express this:

$$C(\theta, \mathbf{x}(\theta)) = \sum_{i=1}^n C_i(Q_i(\theta, \mathbf{x}(\theta))), \text{ or} \quad (4)$$

$$= \sqrt[n]{\prod C_i(Q_i(\theta, \mathbf{x}(\theta)))} \quad (5)$$

$$\text{Clearly, } (1/n) \sum_{i=1}^n C_i(Q_i(\theta, \mathbf{x}(\theta))) > \sqrt[n]{\prod C_i(Q_i(\theta, \mathbf{x}(\theta)))} \quad (6)$$

We can now compute the average total cost ( $ATC(\theta)$ ) in the following case of an Islamising economy with  $\theta \rightarrow \theta^*$  in an institutional discursive process.

$$\text{Lim}[\theta \rightarrow \theta^*] \{ATC(\theta)\} = [\sum_{i=1}^n C_i(Q_i(\theta, \mathbf{x}(\theta)))] / [Q = \prod_{i=1}^n Q_i(\theta, \mathbf{x}(\theta))] \quad (7)$$

or

$$= \sqrt[n]{\prod C_i(Q_i(\theta, \mathbf{x}(\theta)))} / [Q = \prod_{i=1}^n Q_i(\theta, \mathbf{x}(\theta))] \quad (8)$$

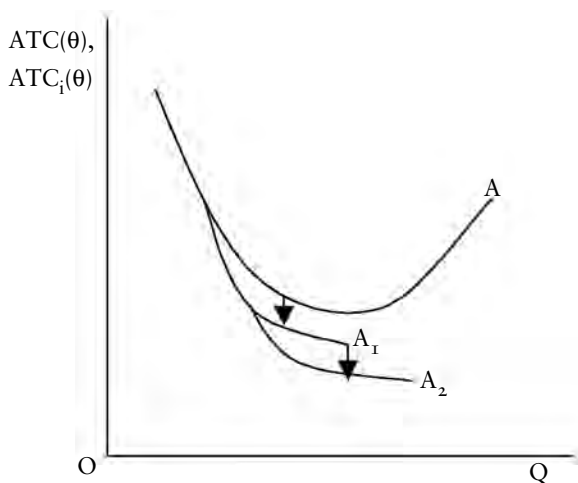
Expression (8) can be re-written as,

$$\begin{aligned} \text{Lim}[\theta \rightarrow \theta^*] \{ATC(\theta)\} &= \sqrt[n]{\prod_{i=1}^n [C_i(Q_i(\theta, \mathbf{x}(\theta)))/Q_i(\theta, \mathbf{x}(\theta))] [1/Q]} \\ &= \sqrt[n]{\prod_{i=1}^n [ATC_i(\theta)/Q_i(\theta, \mathbf{x}(\theta))]} \quad (9) \end{aligned}$$

Expression (9) means that the  $ATC(\theta)$  for the joint production menu experiences a continuously downwards shift with the growth of

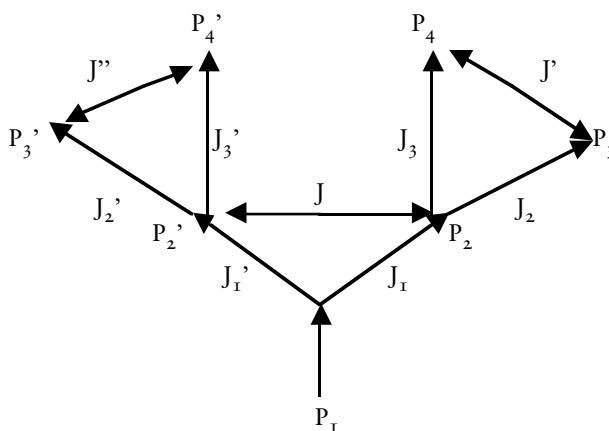
the joint output. This phenomenon is shown in Figure 1 by the shifts  $A_1, A_2$  from the position  $A$ .

Figure 1: Downward Shifting  $ATC(Q)$  due to Continuous Learning Along the Joint Production Menu  $Q = \prod_{i=1}^n Q_i(\theta, x(\theta))$ .



### V. Joint Production Function as the Interactively Processes of Production Occurring in Pairs

Figure 2: Joint Production Menus Linked to Multiple Processes as the Islamic Perspective in Project Financing





$P_i$ s are production processes that give rise to other processes of similar type from a given production linked with each of the processes. Thus  $J$ s denote the branches of the production menus. Continuous technical and organizational pairing between the processes causes such evolutions from any particular production level to multiple production processes. Such a pairing of processes is the result of the circular causation in the discursive processes. Project financing in the Islamic economic framework must be looking for such linkage possibilities called joint production functions. They are the cause and effect for diversification of products and risks and the sharing of project costs of all types. The end result is the continuous lowering of the average total cost of production, including all kinds of costs as mentioned above.

From expressions (7) and (8) we note by comparison that,

$$ATC = [TC(Q) = \sum_i TC_i] / [Q = \sum_i Q_i] \quad (10)$$

where  $ATC$  is linear independent case of production menus and costs.

Therefore,

$$= \sqrt[n]{\prod_{i=1}^n [ATC_i(\theta) / Q_i(\theta, x(\theta))]} = ATC(\theta) \quad (11)$$

where  $ATC(\theta)$  is the case of joint production function and shared cost.

As  $ATC_i(\theta) / Q_i(\theta, x(\theta))$  continues on to experience downward shifts due to the progressive increase in the joint production menu  $Q$  with the gains in the learning parameter, as  $\lim[\theta \rightarrow \theta^*]$ .

## VI. The Measurement of Financial Returns in Project Financing

Like cost and risk, profits are shared in the Islamic joint production and joint venture schemes. When investment, financing risk and costs are shared by partners according to the financing instruments of *muḍārabah*, *mushārahah*, *murābahah* and the secondary financing instruments revolving around these principal ones, profits are raised by sharing between partners who are spread over sectors and projects. The profit function, like the cost function, is now appropriately a geometrical mean of the product of the individual sectoral and project-specific profit functions in relation to the joint process-specific outputs.

Hence, the joint profit function takes the form,

$$\pi(Q) = \sqrt[n]{\prod_{i=1}^n \pi_i(Q_i)}, \quad (12)$$

with  $Q$  as joint production given by expression (2).

Consequently, the profit sharing ratio  $\rho_n$  is given by,

$$\rho_n = \pi_n(Q_n)/\pi(Q) = \pi_n(Q_n)/[\sqrt[n]{\prod_{i=1}^n \pi_i(Q_i)}] \quad (13)$$

In the Islamic production, cost and risk sharing environment, with joint production menu and risk and production, the profit sharing ratio must be equal to the cost-sharing ratio.

Let the cost-sharing ratio for the  $n$ th firm be,

$$c_n = C_n(Q_n)/C(Q) = C_n(Q_n)/[\sqrt[n]{\prod_{i=1}^{n-1} C_i(Q_i)}] \quad (14)$$

Since,  $\rho_n = c_n$ , therefore,

$$\pi_n(Q_n)/[\sqrt[n]{\prod_{i=1}^n \pi_i(Q_i)}] = C_n(Q_n)/[\sqrt[n]{\prod_{i=1}^{n-1} C_i(Q_i)}]. \quad (15)$$

$$\text{That is, } \pi_n(Q_n)/C_n(Q_n) = [\sqrt[n]{\prod_{i=1}^n \{\pi_i(Q_i)/C_i(Q_i)\}}]. \quad (16)$$

From this we obtain,

$$g(\lambda_n) = (1/n) \sum_{i=1}^{n-1} g(\lambda_i), \quad (17)$$

where  $\lambda_j = \pi_j(Q_j)/C_j(Q_j)$ , and  $j = 1, 2, \dots, n$ .

Since this result is true for all firms, no firm enjoys an undue average profit related cost over another. This is a feature of the continuously discursive nature of Islamic financing contracts revolving around *muḍārabah* and *mushārahah*. This discursive nature of the contracts can be gained by means of the knowledge induction along the evolution of the dynamic regimes of life-fulfilling goods and services that characterize the Islamic political economy.

Thus if we are studying the political economy of Islamic banking and finance then the link between these is intrinsically embedded in the discourse and linkages by means of the unity of knowledge caused by a conscious invoking of *tawhīd* and the instruments that bring

about such complementarities. This kind of organization of thought and its application to the case of Islamic banking and finance is not a cursory one. Systemic linkages come about in the study of the political economy of Islamic banking and finance via two sources. First, there is discourse between the human agents in deriving and developing appropriate knowledge that reflect unity of entities in diverse world-systems, all of which are governed by the Tawhīdī worldview. At the same time the anti-thesis – dualism, multiplicity, marginal substitution and methodological individualism and systemic independence – is rejected in the same methodological approach.

The epistemological sources for this methodology are the Qur'an and Sunnah taken up in concert with each other. This fundamental epistemology is then followed by discourse of the learned participants in *Sharī'ah* and *Mu'āmalāt*. This first and continuous experience of knowledge evolution, in the Islamic political economy, requires development of Islamic consciousness followed by investigative scholarship. These two together establish what is known as devotional knowledge acquisition of *Tawhīd*. It is termed *Tawhīd*. Knowledge formation through such participation, in which interaction leads to integration of consensus and is followed by further creative evolution to more of the same, through the medium of post-evaluation and re-generation of knowledge, marks the first and essential basis of Islamic political economy. In the case of Islamic banking and finance, it will require understanding of the principle of universal complementarities as presented in the unity of knowledge of *Tawhīd*. It will also involve the practical translation of this principle into such diverse instruments as can establish the unity of systemic complementarities across the most diverse of goals, variables, their interrelations and development systems (Pieterse, 2000).

The level of discursive knowledge formation out of the *Shūratic* (or the interactive, integrative and evolutionary) principle of unity of knowledge mentioned above, is simultaneously and causally linked with the formation of circular interrelations in world-systems. In the case of Islamic banking and finance such world-systems are capital markets, resource mobilization, diverse development perspectives, property rights and individual rights and freedoms, financial security, social goals and *ummatic* integration. All of these and much more, as determined by the advance of discursive knowledge of *Tawhīd* unity,

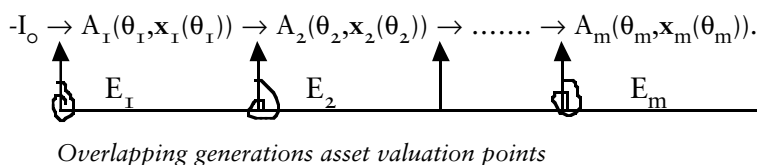
are then evaluated by the social well-being criterion function. This post-evaluation medium is followed by the re-origination of knowledge and knowledge-induced entities of world-systems thereby.

In this way, none of the instruments of Islamic banking and finance is independent of the conscious understanding, application and creative evolution of *Tawhīdi* knowledge, and the organic understanding of development in the framework of the principle of complementarities as invoked by the *Tawhīdi* worldview. *Tawhīdi* now becomes a formal system of understanding and application to world-systems, in which Islamic banking and finance are embedded (Choudhury, 1998, 2003).

### VII. Using the Joint Production Method in Project Valuation by the Overlapping Generations Valuation Model

Every process point  $P_i$  in Figure 2 can be seen as the point of linkage and discourse between the socio-economic variables and their relations and the institutional policy variables. The net result of these *interrelationships* and their further evolution is caused by the simulation of  $\{\theta_t, x_t(\theta_t)\}$ -values through the evolutionary values of  $W$ , which is now taken as the overlapping generations valuation model shown below. The knowledge-induced cash flows over time ( $t$ ) are shown in Figure 3:

Figure 3: Recursively Generated Knowledge-induced Cash Flows in the Overlapping Generations Valuation Model



At the time periods,  $t_1, t_2, \dots, t_m$  there are the corresponding recursive interrelations between the  $(\theta, x(\theta))$ -variables in the sense of knowledge-induced simulations. This method is explained below.

The recursive relations are shown by  $E_1, E_2, \dots, E_m$ . Clearly now, an infinite-term compounding is not applicable, because only finite-term decision-making is possible in the discursive process.

$$\mathbf{x}_t'(\theta_t) = f(\theta_{t-1}, \mathbf{x}_t(\theta_{t-1})). \quad (18)$$

Here  $\mathbf{x}_t'(\theta_t)$  denotes the vector of all variables except the one that becomes the dependent variable at a period of time in the simulation system of recursive *interrelations*.

$$\theta_t' = g(\theta_{t-1}, \mathbf{x}_t(\theta_t)), \quad (19)$$

$$\theta_t = \lim_{j=1 \rightarrow m} \{\theta_{tj}\}, \quad (20)$$

for interaction at time  $t$  denoted by  $j = 1, 2, \dots, m$  within each time period, for  $t = 1, 2, \dots, n$ .

The overlapping generations valuation model can be used for debt-equity swap. In that case, let  $\mathbf{x}_t(\theta_t) = \{D/K, g(K)/g(D), d\}[\theta_t]$ , where  $D$  denotes value of debt,  $K$  denotes capital formation generated by equity participation;  $g(K)$  and  $g(D)$  denote growth rates of capital linked with equity and debt, respectively. Take  $\theta_t$ -values to be consensually derived knowledge values over time, and centered on directing foreign investment into debt-equity swaps through the doors of *mushārahah*, joint ventures, re-*Takāful* (re-insurance), and thereby, effectively replacing interest-based financing by profit sharing. All these together bring about *ummatic* transformation, which is the regime of  $(\theta_{t-1}, \mathbf{x}_t(\theta_{t-1}))$ -values over time, and hence of attaining evolutionary simulated values of the well-being function,  $W$ .

Every flow of foreign equity capital like  $I_0$  used in debt-equity swap yields a terminal value of cash flows or asset valuation at time  $t$  equal to  $A_t(\theta_t, \mathbf{x}_t(\theta_t))$ , which then accumulates by the equity profit-sharing rate till maturity of the debt-equity swap. All such values are determined and accumulated recursively from the previous cash flows. These complementary *interrelationships* enter the well-being function,  $W(\theta_t, \mathbf{x}_t(\theta_t))$ .

We now have the overlapping generations valuation model based on the simulated  $(\theta_t, \mathbf{x}_t(\theta_t))$ -values. An appropriate selection of the  $\mathbf{x}_t$ -vector is  $\{(K/D)$ -ratio,  $(g(K)/g(D))$ -ratio}. These two ratios are moved towards equality with each other by means of a discursive control of the  $\delta$ -parameter in the presence of limiting  $\theta_t$ -values. In this case as well, the  $\delta$ -parameter would be treated as a policy control variable.

The complete simulation of the overlapping generations valuation model is given by,

$$\text{Simulate } \{\theta_t\} W(\theta) = \sum_{t=I}^n [A_t(\theta_t, x_t(\theta_t))] - I_0, \tag{21}$$

with  $\theta$  denoting the sequence of consensual  $\theta_t$ -values over time, subject to the knowledge and time dependent recursive interrelations shown in (18)-(20).

With  $x_t(\theta_t) = \{D/K, g(K)/g(D), \delta\}$ , we would have the following kind of simulative knowledge-induction: As foreign investments ( $I(\theta)$ ) are directed into *mushārah* projects through reinsurance, ( $D/K$ ) tends adaptively towards ( $g(K)/g(D)$ ) as  $\delta$  assumes a value near to unity, when all of the debt is swapped by a proportion of the foreign investment flow. Simulative  $\theta_t$ -values appear from the discursive decision-making and polity-market processes by dint of using ways and means of effectively mobilizing such foreign investments into *mushārah* projects and in sustaining complementary relations between debt reduction and equity swaps, and as an interest-based regime is progressively replaced by *mushārah* profit-sharing rates.

In this specific case of debt-equity swap the *wellbeing criterion* means the sum-total of all debt write-offs by the progressive upward movement of the  $\delta$ -ratios.

For the particular case where cash flows denote compounded values of profit-sharing rates ( $r_t$ ) at every time-period, we take  $x_t(\theta_t) = r_t(\theta_t)$ .

$$W(\theta) = \sum_{t=I}^n A_t(\theta_t, x_t(\theta_t)) = \sum_{t=I}^n [A_t(\theta_t) \cdot \prod_{s=I}^{t-1} (1+r_s(\theta_s)^t)] - I_0. \tag{22}$$

If we assume deductions from the asset value over time, say,  $d_t$  at time  $t$ , the expression (22) takes the form,

$$\begin{aligned} W(\theta) &= \sum_{t=I}^n (1-d_t) A_t(\theta_t, x_t(\theta_t)) \\ &= \sum_{t=I}^n [(1-d_t) A_t(\theta_t) \cdot \prod_{s=I}^{t-1} (1+r_s(\theta_s)^t)] - I_0 \end{aligned} \tag{23}$$

The simulation of  $W$  is now subject to the complementary recursive relations,

$$r_t = f_t(\theta_{t-1}, r_{t-1}), \tag{24}$$

where  $r_t$  itself can be an expected value of a system of rates of returns obtained from the debt-swap portfolio with different contingencies across diverse projects that may prevail. This part of the contingency-based averaging process is not shown (see Hirshleifer, 1970). See Choudhury (1999) for a version of the intergenerational valuation model in Islamic perspective.  $r_t$  would be better represented by geometric averaging than arithmetical averaging, because of the underlying term structure of the rates subject to different contingencies and portfolios, all simulated under non-linear complexity by recursive knowledge induction.

We also have the  $\theta$ -assignment problem as in the discursive process shown above by,

$$\theta_t = \lim_{i=I \rightarrow m} \{\theta_{ti}\} \quad (25)$$

Interaction at time  $t$  are denoted by  $i = I, 2, \dots, m$  for  $t = I, 2, \dots, n$ .

For several equity projects used in swapping debts with a sequence of foreign investments,  $I_{ts}$  say,  $s = I, 2, \dots, S$ , and  $t = I, 2, \dots, n$ , starting and terminating at the same or different points in time in the future, the above valuation model would be a sinking fund of such foreign investment flows,

$$\begin{aligned} W &= \sum_s \sum_t A_{ts}(\theta_{ts}, x(\theta_{ts})) \\ &= \sum_s \sum_t [A_{ts} \prod_{t=I}^n (1+r_{ts})^t][\theta_{ts}] - \sum_s \sum_t I_{ts}(\theta_{ts}) \end{aligned} \quad (26)$$

The complementary recursive relations are once again of the type,

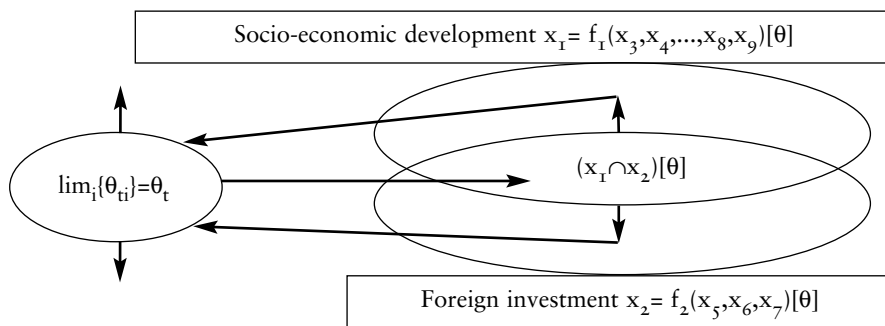
$$r_{js} = f(\theta_{j-I,s}, r_{j-I,s}), \quad (27)$$

where,  $r_{ts}$ , means the profit-sharing rate in a project that is cooperatively complemented with all other projects,  $s = I, 2, \dots, S$ . Such joint ventures and *musharakah* projects would be multilateral projects in the Muslim World (Choudhury 1997). The equivalence for the expression (23) can be readily formulated.

### VIII. Quantitative Directions in the Overlapping Generations Valuation Model

The principal information required for the overlapping generations valuation model is the limiting value  $\theta_t$  of the discoursed knowledge values  $\{\theta_{ti}\}$  over interactions ( $i$ ) and time ( $t$ ) as in the discursive process methodology. Next there is the data requirement for the knowledge-induced socio-economic variables,  $\{x_t(\theta_t)\}$ . These together enter the  $W(\theta_t, x_t(\theta_t))$  function as shown before. The important aspect of the feedback shown in Figure 4 brings out the specific nature of information generation for the valuation model.

Figure 4: Recursive Feedback and Knowledge-Induced Expansion of the Interactive, Integrative and Evolutionary sets



There are two ways to generate  $\theta_t$ -values and the  $[x_1 \cap x_2][\theta_t]$  feedback (Choudhury, 2000):

(i). The discursive way is based on the methodology of the rhetoric of economics (McCloskey, 1985), and is adopted at every point of interaction, integration (consensus value). These values institutionally assign ordinal  $\theta_t$ -values in terms of the feedback.

(ii).  $\theta_t$ -values are assigned numerical values, such as,  $\theta_t \geq 1$  (high value),  $1/2 \leq \theta_t \leq 1$  (medium value),  $0 \leq \theta_t \leq 1/2$  (low value), based on the performance of the guidance policies in concert with the market realities.

(iii). The values of  $\{\theta_t, x_t(\theta_t)\}$  are then recursively determined.



For example expressions (19) and (20) can be specified as follows:

$$\begin{aligned}
 20\% \leq \delta = (I/D)[1 \leq \theta] &\leq 50\%, \text{ or, } 10\% \leq r \leq 20\%; \\
 10\% \leq \delta = (I/D)[1/2 \leq \theta \leq 1] &\leq 20\%, \text{ or, } 5\% \leq r \leq 10\%; \\
 0\% \leq \delta = (I/D)[0 \leq \theta \leq 1/2] &\leq 10\%, \text{ or, } 0\% \leq r \leq 5\%.
 \end{aligned}$$

### IX. Nature of Feasibility Study for Islamic Project Financing

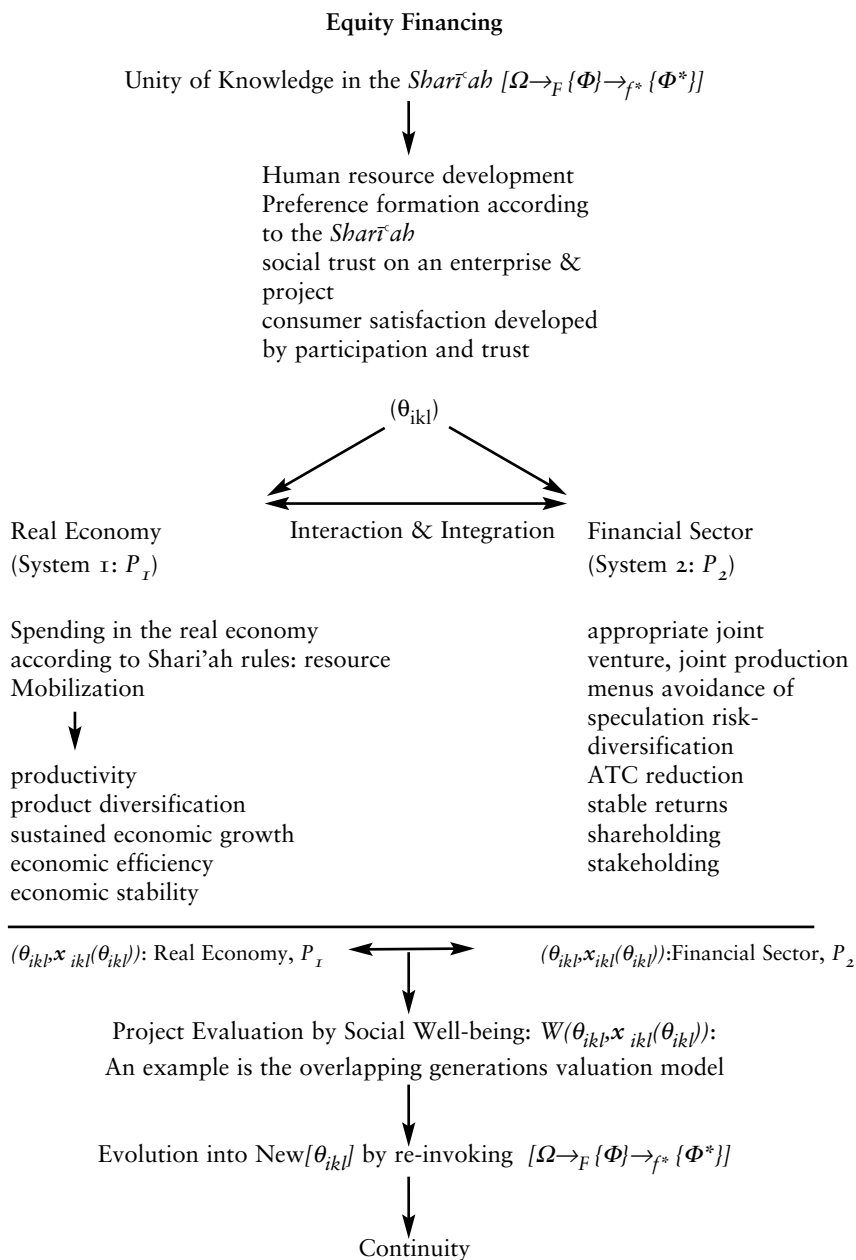
The processes  $P_i$  shown above, and implicated with both joint production menu and the diversity of interaction, integration and evolution across socio-economic and policy variables, that arise from the institutional discursive processes of the *tawhīdi* epistemological methodology are explained below.

Numbered systems, such as the joint venture projects, joint menus of production, are denoted by  $l$  and  $k$ , with  $k \neq l$  ( $= 1, 2, \dots$ ).  $i = 1, 2, \dots, n$  denote the number of interaction. The discursive processes giving circular causation interrelationships are shown in expression (28).  $P_1, P_2$  etc. are similar processes with dynamic evolution of the knowledge-flow variable,  $\{\theta\}$ . The complementary or ‘paired’ nature of the diverse socio-economic and policy variables both within a system (process) and across systems (processes) conveys the meaning of circular causation in this unified methodology of systems.

	$\xrightarrow{P_1}$	$\xrightarrow{P_2}$	
$\Omega \rightarrow_{\Phi} \{\Phi\} \rightarrow_{\Phi^*} \{\Phi^*\} \rightarrow_{f_i} [\theta_{ikl}] \rightarrow_{[f(i,kl)]} [x_{ikl}(\{\theta_{ikl}\})] \rightarrow \downarrow \rightarrow_{[f'(i,kl)]} \text{New}[\theta_{ikl}] \rightarrow \Omega = H$	Formation of knowledge flows, $\{\theta_{ikl}\}$	knowledge induction of socio-economic and policy variables, $x_{ikl}(\{\theta_{ikl}\})$	$[\text{W}([\theta_{ikl}], [X_{ikl}(\theta_{ikl})])]$ Social wellbeing function to evaluate the degree of complementarity among diverse knowledge-induced variables
<i>Tawhīdi</i> episteme	<i>Sharīah</i> rules $\{\Phi^*\}$		New continuity processes till the Hereafter

The square brackets indicate the matrices of variables, relations and wellbeing functions corresponding to the  $([\theta_{ikl}], [X_{ikl}(\theta_{ikl})])$ -entries across  $(k, l)$ -systems for given numbers of interactions (i). The same matrix meaning applies to every monotonic transformation of the

Figure 5: An Example of Critical Complementary Relations between Socio-Economic and Policy Variables



relations of expression (28) starting from  $f^*$  onwards except  $\Omega=H$ , which cannot be augmented due to the nature of its super-cardinal completeness.

In Islamic project feasibility, the above methodology is applied by identifying the socio-economic and policy variables in the short, medium and long-run cases, and identifying their complementary interaction, with the objective of simulating the social well-being function. Figure 5 gives an example of such a social specification of a project.

## X. Conclusion

The topic of project financing and evaluation in Islamic perspective has proven to be profoundly epistemological in methodology. This is one more link in the chain of that universal methodology of Tawhīd, as unity of divine knowledge that expresses itself in various ways. In our case, of studying the methodology and content of project financing, we invoked the Tawhīdi worldview as a systemic understanding of the unity of knowledge. In this we explained the Tawhīdi unity of knowledge according to the exegesis of the Qur'ān, further explicated by the Sunnah, and applied to the conceptual construct and application of the groundwork of the Shari'ah to the complementarity or paired nature of systemic entities. The topic of project financing brought out this context in terms of the Islamic basis of linkages between shareholders, joint production menus, inter-sectoral and inter-agent interaction, leading to consensus on ways to do things. Such interactive consensus evolves along the dynamic path of the knowledge-induced nature of such interrelationships. We have argued that many of the known ways of project financing and project evaluation, in mainstream financial and economics literature, do not hold up on logical grounds of the tenets of the Shari'ah.

In this category we have questioned the method of present valuation, money value of time, project financing by interest rate instruments and thus the concept of resource mobilization versus savings. The neoclassical concept of factor substitution, in the production menu, was found to be inapplicable in the extensively participatory and complementary relationship between factors and between the enterprise and its shareholders. Hence joint production

and the consequential changes in the formulation of the cost and benefit of the enterprise were studied. In the case of Islamic project valuation, the overlapping generations model of asset valuation replaced the present-value model of discounting cash flows.

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