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Theme of the thesis

*Analysis of the Islamic finance contribution
in the financing of the economy: case of
project financing*

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DEDICATION

TO MY DEAR PARENTS.

IN MEMORY OF MR. NASSER BOUYAHIAOUI.

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Alhamdulillah! All thanks to *Allah* for blessing and guiding me in realising this thesis.

At the end of the realization of this thesis, I am convinced that the dissertation is far from being a solitary work. Thus, I want to pay attribute to *Dr. Nasser BOUYAHIAOUI* (my supervisor during the first three years of this work) and thank him for his confidence, his many advices and for all the time he has devoted to me. I would also like to tell him how much I appreciated his great availability and that I have been extremely sensitive to his human qualities of listening, generosity and modesty. May Allah welcome him to his vast paradise.

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Abstract

This thesis aims to show how Islamic finance could serve the economy, including project financing. To carry out the research, we used an analytical approach. We start with theoretical and conceptual study related to the literature review in order to present paradigm of Islamic finance, project financing and project financing *shari'ah*-compliant. Then, we deal with an empirical study about the contribution of the Islamic Development Bank in project financing in the Middle East and North Africa (MENA) countries, during the period of 1997-2016, based on a panel data analysis. The results show that Islamic finance is not just a fad phenomenon and has a potential to serve economy.

Keywords: *Islamic finance, financing economy, project financing, Islamic Development Bank, MENA region.*

Résumé

Cette thèse a pour objet de montrer en quoi la finance islamique pourrait être au service de l'économie, notamment du project financing. Pour ce faire, nous avons utilisé une approche analytique. Nous avons procédé à une étude théorique et conceptuelle, reliée à la revue de littérature, afin de présenter le paradigme de la finance islamique, le project financing et le project financing islamique. Puis, nous avons entrepris une étude quantitative sur la contribution de la Banque Islamique de Développement dans le project financing dans la région du MENA, durant la période 1997-2016, basée sur l'analyse de données de panel. Les résultats montrent que la finance islamique n'est pas qu'un simple effet de mode et dispose d'un potentiel pour servir l'économie.

Mots clés : *finance islamique, financement de l'économie, project financing, Banque Islamique de Développement, région MENA.*

ملخص

الهدف من هذه الأطروحة هو دراسة إمكانية اعتبار المالية الإسلامية كنظام فعال لتمويل الاقتصاد وتمويل المشاريع الضخمة خاصة. من أجل ذلك، قمنا بتبني المنهج التحليلي. تطرقنا أولاً إلى دراسة نظرية واصطلاحية، قائمة على الدراسات السابقة، للتعريف بكل من المالية الإسلامية، تمويل المشاريع الضخمة والتمويل الإسلامي للمشاريع الضخمة. بعدها قمنا بدراسة تطبيقية حول مساهمة البنك الإسلامي للتنمية في تمويل المشاريع الضخمة في منطقة شمال أفريقيا والشرق الأوسط، خلال الفترة 1997-2016، مبنية على تحليل بيانات بانل. تظهر النتائج ان المالية الإسلامية ذات إمكانيات تسمح لها بخدمة الاقتصاد.

كلمات مفتاحية: *المالية الإسلامية، تمويل الاقتصاد، تمويل المشاريع الضخمة، البنك الإسلامي للتنمية، منطقة شمال أفريقيا والشرق الأوسط.*

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List of abbreviations

ASEAN	Association of South East Asian Nations
BOT	Build Operate Transfer
Exp :	Exportation
GCC	Gulf Cooperation Council
GDP:	Gross domestic product
GDPperC:	Gross domestic product per capita
IDB:	Islamic Development Bank
Inf :	Inflation
Imp:	Importation
MENA	Middle East and North Africa
OECD	Organization for Economic Cooperation and Development
OIC	Organization of Islamic Cooperation
RGDP:	Real gross domestic product
SME	Small and Middle Enterprise
SVP	Special Purpose Vehicule
UAE	United Arab Emirates
USA	United States of America

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INTRODUCTION TO THE RESEARCH

Introduction

Finance is a key driver of economic growth and development. Indeed, the domestic and/or international financial system motivate savers to save by providing a range of instruments to meet their financial needs; the funds collected will be channelled to various types of investments, thereby increasing the growth of the real sector, consumption, employment and contribution to economic development, i.e.: *project financing*. Project financing is “*a method of raising long-term debt financing for major projects through ‘financial engineering’ based on lending against the cash flow generated by the project alone; it depends on a detailed evaluation of project’s construction, operating and revenue risks, and their allocation between investors, lenders, and other parties through contractual and other arrangements.*” (Yescombe, 2002)

Globally, firms finance a record \$415 billion of capital expenditures using project finance in 2013, and the use of project financed-investment has grown at a compound rate of 8% over the past 15 years despite several macroeconomic crises (Esty, 2014). In 2017, global project finance loans was \$229.6 billion from 791 deals and the power sector remained the most active with \$122.8 billion from 546 deals and accounted for 53.5% of market activity (Thomson Reuters; 2017).

The importance of projects in an economy and the peculiarity of their funding require a constant search for new ways to raise funds and their funding, namely: the need for an engineering of project financing. Thereby, if for a long time, conventional finance was the only mode of project financing, other types of funding exist and that contribute to the project financing, such as ethic finance, participatory finance, socially responsible finance and particularly Islamic finance.

Islamic finance is “*a component of a broad financial system in which the design and operation of financial instruments, institutions, markets, and infrastructure are based, where relevant, on contracts and governance arrangements that apply Shari’a rules and principles*” (Sundararajan; 2011). It proved that it is able to offer a wide range of funding opportunities for the economy (financing of SMEs, agriculture, trade, industry, infrastructure,...) to satisfy a large number of investors, including investors who wish to submit to the dictates of Islamic law (*Shari’ah*).

The use of Islamic finance is also involved as a part of project financing, through the development of an Islamic engineering of project financing. Indeed, Islamic finance offers various means of financing such as: musharaka, mudaraba, istisna, and sukuk; or inspired from conventional engineering, such as investment funds, BOT structure, joint ventures, venture capital, ... It is necessary to note that this recourse to the Islamic project financing no longer limited to Muslim countries, but also to non-Muslims.

For example, the UAE (United Arab Emirates) having procured USD 35,347 million for 48 projects (petrochemical industry) from 2002 to 2012, through Islamic financial schemes (*Kwon & Sung, 2013*). In Saudi Arabia, from 2004 to 2012, USD 14.8 billion have been funded through Islamic project financing for 31 projects (petrochemical and information and communications) (*Kwon & Sung, 2013*). In Malaysia, 96 projects were funded by Islamic BOT (energy, telecommunications, transport, water and sanitation), valued at USD50,605 million, between 1990 and 2008 (*Markom et.al, 2012*). In the United States (Texas), the construction of the "Maconda Park Apartments" has also been financed by Islamic funds (*Azman, nd*).

1. Motivation and objectives

Our interest and motivation in choosing this subject has its origins in a statement: the interconnection between the real economy and the financial sector, the international financial instability and the expansion of financial risks represent obstacles facing the financing of the economy and different projects, generating a slowdown in the growth and development of countries.

The requirements of some investors about the adoption of ethics, social responsibility or the principles of a religion in the management of their portfolios, can also be barriers face to finance the economy and projects, especially in Muslim countries that are struggling to adopt the Western patterns of economic and financial system. Thereby, the constant search for alternatives meeting needs, expectations and requirements of investors is a need to financing the economy, in general, and projects, in particular, to ensure better growth and better economic development.

This research, hence, has the objective of exploring and analysing the Islamic finance as an alternative to financing the economy, as a whole, and to project financing, in particular. It is also aims to present a comprehensive conceptual model of project financing shari'ah-compliant as a mean of financing the economy. The research attempts to use the

Islamic Development Bank as a case study to show the feasibility and the possibility of a transition from a theoretical demonstration to a concrete case of Islamic project financing.

2. Problematic and hypothesis of research

Financing the economy is a need for countries to ensure their growth and economic development. Thereby, the important role of project financing in an economy requires the search for alternatives funding, to ensure a wide range of financing instruments that can meet the needs and requirements of different types of investors. Thus, we will try to analyse the following problematic:

Can Islamic finance contribute to financing the economy, particularly the project financing?

From the problematic, arise other questions that will make it possible to achieve the stated objectives and will explain the progression of the thesis, namely.

- What are the legal, historical and conceptual foundations of Islamic finance?
- What is the project financing shari'ah-compliant and how does it differ from the conventional one?
- Are there any experiments that concretize project financing shari'ah-compliant?

To analyse the problematic of research, two hypotheses are presented:

H₁: Islamic finance, as an integral part of the international financial system, presents potentialities allowing it to contribute to the financing the economy and the project financing, in particular.

H₂: Islamic finance is only a fad phenomenon, whose development and potentialities are still limited and cannot contribute to the financing of financing the economy and the project financing, in particular.

3. Literature review

As in every academic research work, it is important to share the literature used for the conduct of this thesis, which allowed us to determine the principle points developed, or not, by authors on our research topic, and that could be a guide in the realization of our work.

This literature review is based on various academic journals and databases (studies and working papers from outstanding researchers) and it will be divided into two main points in which we will present and discuss selected researches on the thesis' topic. The first concerns the studies on the project financing in the conventional context. The second deals with the case of the Shariah-compliant project financing.

3.1.Previous studies on project financing

A number of authors tried to give a meaning to “*project financing*” (as we will present in the chapter III), such as *Nevitt & Fabozzi (2000)*, *McMillen (2000)*, *Yescombe (2002)*, *Fight (2006)*, *Finnerty (2007)*, *Khan & Parra (2003)* and *Gatti (2013)*. In addition, many theoretical, conceptual and empirical papers studies from the literature review had been made on the project financing, trying to understand it from different approaches and in different context. For this purpose, *Dirk (2013)* gave an overview of the current state of research in project finance, between 2009 and 2013, and he identified four main areas of research that we summarize as follow:

- *Contractual arrangements and legal framework of project finance*: refer to the set of rules negotiated between the stakeholders of a project finance endeavour. This area was developed after the analysis of the study of *Scanella (2012)*, *Akbiyikli et.al (2011)*, *Erol & Ozoturk (2011)*, and *Aslan & Bezen (2010)*.
- *Project risk measurement and project selection modes*: describe methods used to derive qualitative and quantitative measures of risk either at the individual project level portfolio of projects. The author refered to *Busciano et.al (2012)*, *Papovié et.al (2012)*, *Girardo & Snaith (2011)*, *Elazouni & Abido (2011)*, *Biorgonovo et.al (2010)*, *Corilli et.al (2010)*, and *Laishman & Kalidindi (2009)*,
- *Globalization and regulation of project development*: includes research that investigates the growing complexities in cross-border investing. To develop this area, the author based his study on the research of *Kumar (2012)*, *Neshaiwat (2012)*, *Quesada & Barquero (2012)*, *Shiferaw (2012)*, and *Wang (2012)*.
- *Projects under the Kyoto protocol (KP) and renewable energy projects*: projects under the KP play a special role. They implemented by following a set of approved

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methodologies and often include renewable energy technologies. In this case, the author referred to *Bayer et.al (2013)*, and *Hofman et.al (2013)*.

Dirk's paper presents a limit in terms of the approach taken into consideration to study project finance and other approaches would have been important to expose. Indeed, we can refer to the fundamental of project financing, which is presented by *Kripa & Xhafa (2013)* through the main theories of project financing:

- *Williamson (1975)* and *Kleum, Crawford and Alchian (1978)* developed the theory of the role of a special economic structure, as well as financial and organizational governance (with the creation of Special Purpose Vehicle 'SPV'). This theory was supported by *Esty (2003)* too. He supported the hypothesis that the unique structure that characterizes the project finance minimizes the cost of hold-up problem between parties of a transaction who have invested in a specific project.
- *Jensen & Meckling (1976)* was among the first authors who analyzed and measured agency costs arising conflicts between firm managers and major shareholders, i.e. the owners of structure. *Esty (2003)* supported the hypothesis that project financing reduces agency costs arising from the conflict between managers and shareholders because of the particular structure characterizing this technique.
- *Shah & Thakor (1987)* showed that the use of project financing reduces the cost of capital, especially for projects that are characterized by high risks. This is due to the symmetric information between the participatory parties.
- *Chemmanur & John (1996)* referred to the financing of project through the role of benefits of managers arising from the advantages that they have over information and control of the projects.

Some authors focus on the source of project financing, such as *Daube et.al (2008)* who consider that the public sector projects are usually funded by project financing, or non-recourse forfeiting of instalments model.

Likewise, it seems interesting to come back to the critical success factors influencing of private finance initiative, which is an important component of project financing. For this, we

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will summarize the study of *Yati et.al (2015)*, based on 64 factors identified and categorized into five groups, namely:

- *Project attributes*: characteristics and parameters of the project providing key project information;
- *Special purpose vehicle attributes*: refers to SPV qualities in managing the project;
- *Government attributes*: refer to the government characteristics including its role, power and management;
- *Financing attributes*: refer to the financing conditions and financing qualities; and
- *Political and economic environment*: represent significant factors affecting the evolvement of financiers' involvement in any industry or business.

However, the previous factors cannot be considered exhaustive, and others may be added to them. Thus, we can refer to the importance of information and security design as explained by *Cantale & Lukin (2012)* in their study when they showed that the choice of financing, separate financing or joint financing, depends on the structure of information available (asymmetric information) to outside investors and adverse selection. Previous studies had shown similar resultants such as *De Marzo (2005)*, *Chowdhry et.al (2002)*, *Fulghieri & Lukin (2001)*, *Habib et.al (1997)*, and *Ala Grossman & Stiglitz (1980)*. Other authors (*Esty, 1999, 2003; Griffith & Fuzzo, 2004; Farrell, 2003; Hainz & Kleimeier, 2006; Chan, 2010*) showed that project financing can lower the borrowing costs through solving leverage-induced underinvestment, and can also reduce information costs, incentive conflicts, principal-agency risk, country risks of projects in emerging markets, costs of financial distress and corporate taxes.

Mok et.al (2015) highlighted the importance of the stakeholder management in mega construction project, through analysis the stakeholders' interests and influences, management process, analysis process and engagement; and which is subject to national context of the project, indicating a need to identify the impact of national culture social network approach.

However, the main studies on project financing had been especially focused on the infrastructures' role in economic growth and socio-economic development, excluding industry. The first study on the topic was presented by *Aschauer (1989)* through which he highlighted the importance of American public infrastructures in the economic productivity, based on the Cobb Douglas method. The work was followed by *Barro (1990, 1991)* study with similar

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results. Early, many authors responded to Aschauer in order to show the contribution of private firms in this field; we refer to *Munnell (1990)*, *Fox & Smith (1990)*, *Eberts (1990)*, *Hulten & Schwab (1991)*, *Lynde (1992)* and *Carlino (1993)*.

Other studies were focused on some sectors and countries, and wish the results show a positive relationship between infrastructures and economic growth and socio-economic development. Among the studies, *Metin-Ozcan & Tausel (2005)*, *Ismihan et.al (2005)*, *Pekbas (2008)*, *Erugur et.al (2012)*, *Uzbay & Lenger (2012)*, and *Serdaroglu (2016)* on transportation & telecommunication infrastructure investment in Turkey. *Frone & Frone (2012)* on the water sector infrastructures in European Union (20 countries), Romania, Norway, Turkey, Former Yugoslavia and Iceland. *Zerkane (2004)*, *Benabdellah (2008)* and *Berkane & Mahali (2013)* focused on the case of Algeria. Concerning *Mankiw et.al (1992)* and *Sala-i-Martin et.al (2004)* they concentrated their studies on the OECD members. *Kripa & Xhafa (2013)* work had done on the energy sector infrastructures in Malaysia.

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Table 1: summary of the main available empirical studies on project financing (1999 -2016)

<i>Author(s)</i>	<i>Methodology</i>	<i>Technique(s)</i>	<i>Main results</i>
<i>Kleimeier.S & Megginson. W.L (1999)</i>	Comparative approach	-Descriptive analysis -OLS regression analyses -Probit and logit regression	A comparative study was carry out on a sample of 4.956 project finance (PF)loans to comparable samples of non-project loans booked on international capital markets since 1980. The results show that PF loans are more extended to non-US borrowers and to borrowers in riskier countries. In addition, PF are more likely to use fixed-rate rather than floating-rate loan pricing, and to be extended to borrowers in tangible-asset rich industries. PF loans are no larger than non-PF, but smaller than corporate or capital structure loans.
<i>Esty B.C & Megginson W. L (2001)</i>	Analytical approach	- Univariate analysis -Tobit regression -Sensitive analysis -Concentration analysis	Using a sample of 495 project finance loan tranches from 61 countries, between 1980 and 2000 to examine the relation between legal rules and syndicate structure as a way to improve our understanding of the government role played by banks in the project finance loan market. The results show that international project finance lenders structure syndicates to deter strategic default rather than to enhance monitoring incentives or facilitate low-cost re-contracting in the event of default.
<i>Gatti Stefano et.al (2007)</i>	Simultaneous estimation approach	-Regression analysis -Tobit model	The study on a sample of 4.122 project finance loans, arranged between 1991 and 2005 shows that certification creates economic value by reducing overall loan spreads. More prestigious arranging banks are not compensated with higher fees, but instead are compensated by capturing larger market shares.
<i>Alam Zinat. S (2010)</i>	Pure-play approach	-Univariate analysis -Multivariate analysis	The study had been done on a sample of 440 US and non-US firms that invested in 577 projects from 1990 to 2008. The results show that the probability of project finance increase in correlation between the firm and project cash flows when the cash flow (sales) volatility of the project is low and similar to that of the firm. Also, the likelihood of project finance is the highest when the correlation between sponsor and project cash flows is high and the risk of the project is different from the risk of the sponsor.

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<p><i>Basilio Maria</i> (2010)</p>	<p>Analytical and explanatory approaches</p>	<p>-Discrete choice model -Linear probability model with Ordinary Least Squares (OLS) regression -Probit and logit models</p>	<p>The participation of multilateral development agencies is higher for less populous and poorer countries, and the level of political risk and respect for human rights are not important to explain the multilateral participation in the projects. In the case of the private sector, the main risk taken into consideration is the economic risk. Also, statistically relevant is the country legal origin.</p>
<p><i>Nannan.Y & Jianing.M</i> (2012)</p>	<p>Econometric Cobb Douglas Model</p>	<p>Eviews.4, with and OLS regression analysis</p>	<p>The study was made using a dataset from 1988-2007, in China, and which found that infrastructure capital stock exerts a positive impact on economic growth and it will increase long-term economic growth rate, which could verify the appropriateness of the current 'infrastructure-stressed' investment policies if the Chinese government.</p>
<p><i>Frone. S & Frone. D</i> (2012)</p>	<p>Mathematical statistical research</p>	<p>S-curve, with simple regression and correlation analysis.</p>	<p>Through the equation of cross-country regression it has been showed that in the 25 countries (20 European, Romania, Norway, Turkey, Former Yugoslavia, and Iceland) chosen during 2009, there are a positive correlation between access to public sewerage network and the economic development indicator. However, the sewerage and wastewater treatment systems are less developed than water supply throughout Europe (especially in rural areas), and efforts are especially for investment to expand this network in the new member states and less developed regions, benefiting from structural instruments.</p>
<p><i>Berkane. Y & Mahli. K</i> (2013)</p>	<p>Econometric Cobb Douglas Model</p>	<p>Eviews.7, with: -Stationarity test: unit-root tests -Cointegration test -Error Correction Model (ECM)</p>	<p>The results show a positive relation between infrastructure projects and growth economic on short and long terms, in Algeria from 1996 to 2010. The social infrastructures had no effect on the long term. Administrative infrastructures had no effect on economic growth.</p>

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<i>Binti Yusof. A & Salami. B</i> (2013)	Questionnaire distributed	One-way ANOVA data analysis	Taking into consideration 33 factors for BOT power plant project in Iran, the study shows that they are all considered as important in BOT infrastructure projects. Otherwise, there is a good agreement in significant of success factors between government organization, consultants and concessionaires, with a difference in their ranking.
<i>Yati Md.L et.al</i> (2015)	-Exploratory study method -Distributed questionnaire and administrated interviews	-Content analysis -SPSS	The findings of the study indicate four main dimensions of critical success factors in obtaining finance for private finance initiative (PFI) in Malaysia, including project attributes; Special Purpose Vehicle (SPV) attributes; government attributes and financing attributes. An external environment factor affecting PFI financing was the political and economic environment.
<i>Serdaroglu Tuncay</i> (2016)	Econometric Cobb Douglas Model	-OLS regression	Using a dataset of the years of 1980-2013, in Turkey, the investigation of the relationship between public infrastructure investment and economic growth shows that public infrastructure capital investments are significant to boost economic growth when we take public physical and public social infrastructure together into account.
<i>Jandhyala Srividya</i> (2016)	Econometric method	-Logit regression	Based on a sample of 2117 infrastructure projects with private investment initiated in 45 developing countries from 1995 to 2009, the study shows that International Organizations can create an alternate system of governance by collaborating with firms. Multilateral Development Banks provide operational assistance to projects that ensure greater upfront review and development, more balanced allocation of risks between investor and States, and increased oversight in implementation.

Source: Adapted from the papers presented and summarized in the table 1 (see references for more detail)

3.2. Previous studies on *shariah*-compliant project financing

There are limited studies avoided to analyze the project financing in the Islamic finance context. However, we will present the main papers available in the literature review based on a various academic journals and databases, which aim to analyze the feasibility of project financing in the Islamic finance context.

Thus, a number of authors, such as *Al Omar (1999)*, *Khan (2007)*, *Ayub (2007)*, and *Sunf & Kwon (2013)*, agree to consider that it consists on the large-scale projects financing techniques used in accordance with the principles of Shari'ah. However, according to *McMillen (2007)*, the main characteristic of Shari'ah-compliant project financing structures is whether, or not, they involve a conventional interest-bearing debt component. *Babbai (1999)* showed several areas where Islamic finance could add value to the project financing in order to distinguish it from the conventional project financing. Moreover, *El-husseini (1988)* devoted his study on the comparison between the conventional and Islamic project financing, in terms of similarities and differences, based on (i) project evaluation and feasibility study, (ii) contractual arrangements, (iii) contractors' financing requirements, and (iv) risks involved in international financial operations.

The use of Islamic finance in project financing is based on the contractual relationship between all entities of the project, and for that, several types of contracts and financial arrangements are used. *McMillen (2001)* explained that an ad hoc structured is used, as well as on conventional project financing, in order to carry out operations related to Islamic financial structure and to uphold the contractual relationship; and the mitigating and the managing of all specific risks attached to Islamic financing are worked under an intermediary company.

The Islamic project financing contracts may different according to the mode, the source, the amount and the risk of funding, to the commodity off-take, and to the project phase. In the case of project financing, different types of Islamic financial structures might be used. For instance, not exhaustively, *Antonion (1999)* and *Ismail (2010)* group them into three categories: *equity-based financing*, *debt-based financing* and *service-based financing*. For *Kettell (2011)* these structures might be divided into two types, according to their characteristics: *profit-loss sharing (PLS) contract-based* and *debt contract-based*. Thus, *mudarahah* and *musharakah* are classified in the equity-based category and PLS contract-based. In the case of debt-based category and debt-based contract, we find *ijara*, *istisna'a*, *salam* and *sukuk*. *Kafalah* is considered as service-based financing structure. The *murabahah* is classified, basically, as

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trade-related financing (Ayomi...), but also as a debt-based financing (*Alexander, 2011*). Some authors focused on studying a unique type of contract, and other tried to present all the major contracts used in this field. For instance, *McMillen (2011)* studied the case of *murabahah*, *Zarqa (1997)* and *Wilson (1998)* refer to the *istisna*; *Ismail (2013)*, *Abdullah et.al (2014)*, *Dikun et.al (2015)* and *Biancome & Shakhathreh (2015)* refer to the *sukuk*. *Ebrahim (1999a, 1999b)* examined debt (*murabaha* and *ijara*), hybride (*mudaraba*), and equity (*musharaka*); *Ghoddussi & Khoshroo (2015)* explain the use of *ijara-istisna*, *sukuk* and *murabaha*; *Hassan & Soumaré (2007)* refer to the *mudaraba* and *musharaka*; and *Wilson (1998)* and *Markom et.al (2012)* conducted a study on the *Islamic BOT (Build operate Transfer)*.

However, studies that have been done on the Shari'as-compliant project financing are limited in terms of investigating modes, sectors and geographical area of financing. Indeed, the major researchers, such as *Hassan & Soumaré (2007)*, *Markom et.al (2012)*, *Umar et.al (2012)*, *Umar & Khamidi (2012)*, *Ismail (2013)*, *Jave & Fida (2015)* and *Biancome & Shakhathreh (2015)*, focused on the case of public-private-partnership (PPP) but without specify the nature of the private entities (banks, financial institutions, investment funds, ...). Yet, *Wilson (1998)* showed how Islamic project financing could deal with private funding schemes.

In terms of sectors, the main studies were specified to infrastructure (*Zarqa, 1997; McMillen, 2011; Umar et.al, 2012; Umar & Khamidi, 2012; Ismail, 2013; Jave & Fida, 2015*), then, resources (*West, 2013*), power plant project (*Khan, 1997*), oil and gas projects and (*Al Omar, 1999; Richardson, 2006; Adamu, 2014*) energy sectors. *Wood (1995)* and *Lingnieres (2005)* referred to different sectors and concluded that Islamic finance can be used to finance industrial sector (e.g. power generation, manufacturing), development of natural resources (e.g. oil fields, gas or mining), and construction and infrastructure development (e.g. ports, highways, and telecommunication).

In addition, studies were done on the geographical areas funded are still limited, in terms of the countries/regions selected and of the quality of information (lack of details). The greater part of work concern the Middle East, which we only find mainly the opportunity of project financing through the Islamic finance. We refer to *El-Husseini (1988)*, *Camacho (2005)*, *McMillen (2011)*, *Sengupta (2013)*, *Ghoddussi & Khoshroo (2015)* studies. Some authors have selected some countries in order to study the feasibility of project financing and Islamic finance as a whole or through a case study; the case of Kuwait (*Al Omar (1999)*), U.S (*Richardson, 2006*), Malaysia (*Markom et.al, 2012; Ismail, 2013*), Indonesia (*Ayomi, 2014*),

Nigeria (Adamu, 2014), Pakistan (Jave & Fida, 2015), and Italy (Biancome & Shakhathreh, 2015). Other authors referred to Muslim and no-Muslim/western countries such as Alexander (2011) and Gabbani (s.d).

Despite the fact that Islamic finance can be used in project financing, there are still some constraints that need to be addressed in order to a better implement Shari'a-compliant project financing. Researchers, like Babai (1999), McMillen (2001), Camacho (2005), Ahmed (2010), Alexander (2011), Sengupta (2013), Rarasati (2014), Jave & Fida (2015), and Dikun et.al (2015) listed the most limits and challenges facing the development of Islamic project financing. Then, the major results are: (i) the legal and economic environment in the geographical area of the financing, (ii) the problem of tradability and liquidity in the Islamic finance industry, (iii) the lack of qualification and expertise in the field of Islamic project financing, (iv) the need for mitigation instruments against risks specific to Islamic project financing, (v) the divergence of opinions and fatwa within Islamic legal rulings, and (vi) the need for a standardization of Islamic financial contracts at the international level.

From the literature review we found that in almost all the previous papers, no combination between conventional and Islamic finance, in studying project financing, had been made; for this reason we will present the both case while trying to highlight the common and divergence points. In addition, we noted that, in the case of the Shari'a-compliant project financing, only one empirical study had been conducted (we refer to Ayomi's thesis, 2014, for the Indonesia case). Thereby, from research we aim to enrich the literature review with a work that has a wider spatial and temporal delimitation. We finally remarked that no empirical study, on Islamic project financing, based on panel data has been treated; thus, this thesis is meant to be the first work to analyze a panel data through a statistical and econometric methods.

4. Methodology

The methodology considered appropriate for this study and to the analysis of the problematic is based on the empirical or historical-deductive method and hypothetico-deductive; both are analytical methods. The historical-deductive method is based on the empirical observation of the historical economic reality (in social science, empirical reality is historical), while the hypothetoci-deductive method consists on testing theories or hypotheses

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(*Bresser-Pereira, 2005*). Thus, it will be a question of a presentation of the theoretical elements of the subject, based on a theoretical and empirical review; followed by a quantitative study related the Islamic Development Bank's project financing in the Middle East and North Africa (MENA) countries, during the period of 1997-2016, based on an panel data analysis. The empirical study will allow us to determine whether or not the Bank takes into consideration, in project financing, the economic health of the countries concerned, and this by referring to the main economic indicators. For this purpose, statistical and econometric tools will be used.

To carry out the research, literature sources will be used, what we consider the best tool for theoretical part of the thesis. A privilege will be given to books on Islamic finance, project financing and panel data analysis. Much attention will also be paid to the various articles and research from papers published in journals and magazines, seminars and conferences. Furthermore, they will not neglected all documents, reports and thesis, as well as various Internet sources that can enrich this work. The empirical part of the thesis will be processed based on data collected on the official website of the Islamic Development Bank, the World Bank, and the International Monetary Fund.

5. Structure of the research

Four chapter to fulfil the objectives and analysis the problematic and hypotheses of research will follow this introduction to the research chapter. The first chapter introduces the fundamental notions that will be essential to the understanding of Islamic finance and its contribution on financing economy.

The second chapter is related to the presentation of project financing in term of its meaning, financial engineering, risks and valuation. The thirth chapter consists on understanding the project financing in the context of Islamic finance, with reference to the case of the Islamic Development Bank. The fourth and last chapter is devoted to the quantitative study that aims to present a concrete case of the contribution of Islamic finance to the financing of the economy through project financing.

The conclusion of this study should allow presenting some elements of answer to the problematic and confirming or disconfirming the hypotheses.

CHAPTER I

*ISLAMIC FINANCE: FROM
FOUNDATIONS TO THE
CONTEMPORARY ERA*

Introduction

Islam is a religion that embraces the different aspects of human life, such as spiritual, personal, family, social, political and economic, by grouping into three main categories, namely *aqidah* (set of beliefs), *shari'ah* (set of laws) and *akhlaq* (set of morals), based on the concept of *tawhid* (uniqueness of God). Among the acts having a great place in any society and in a person's life, the economic, commercial and financial activities, in their different forms. For this reason, Islam offers a set of laws and principles of governance presented in the "*fiqh el-muamalat*" (a section of the shari'ah dedicated to the business field) to ensure ethics and justice in the social environment.

This chapter aims to give an understanding of the Shari'ah-compliant finance that it is used nowadays in project financing. Thus, it will be important to start with presenting Islamic finance paradigm and then the contemporary Islamic financial system. After that, it will be a matter of giving an overview of the size of this industry, to finish with highlighting the Islamic finance and financing economy nexus.

1. Islamic finance paradigm

In order to understand how Islamic project financing works, it is important to know its paradigm, namely the Islamic finance paradigm, from the understanding of the Islamic law (*shari'ah*) to the emergence of this finance.

1.1. The *shari'ah*: the foundation of the Islamic finance

Literally¹, the word *shari'ah* means a way to the watering place or a path trodden by camels to a water source. It is often translated, by scholars, as "*Islamic law*", although it is mentioned in the Quran only once (in *Al-Jathya*, 45: 18). Moreover, this approach follows the same tradition as the revelation made to Moses, translated by "the law", and to Jesus, translated by "the Gospel" (designing "the law"). As a result, the use of the term "law" confirms the Judo-Christian-Islamic nature of the Islam (*Yahia, 2010*).

In the Islamic sense and its common usage, shari'ah refers to a set of laws, rules and values that govern the Muslim's life, through both civil and criminal justice system, as well as a number of principles relating to the behavior of individuals (personal, moral, ethical, political,

¹ *Lissen al-Arab Dictionary* . In <http://www.maajim.com>

social and economic spheres). It is a belief system that includes, not only the relationship of man with God, but also his relationship with himself and others (*Esposito, 2011*).

Ibn Qayyim al-Jawziyyah explains that in its entirety, shari'ah represents justice, mercy and wisdom, and its aim is to safeguard people's interest (*Kamali, 2008*). In this sense, for Imam Ahmed al-Ghazali, the purpose of shari'ah is the achievement of five main objectives known as "*maqasid al-shari'ah*", which, in order of priority, concern the protection of religion and faith (*deen*), human life (*nafs*), intellect (*aql*), offspring (*nasl*) and property and wealth (*mal*). In order to attain these objectives, shari'ah identifies three areas that present its constituent elements, namely the education of individual, the establishment of justice and the realization benefit for the people (*Jumaliah & Suhaily, 2013*). For that, two fundamental principles are used: removal of hardship (*raf' al-haraj*) and prevention of harm (*daf' al-darar*) (*Kamali, 2008*).

1.1.1. *Shari'ah and fiqh*

The science from which derives the shari'ah values is the "*science of fiqh*" or simply "*fiqh*", and it has been defined by Abu Hanifah, in general ways, as the self-knowledge of what is to its advantages and disadvantages (*Aghnides, 1916*). According to Ibn Khaldun the fiqh is the knowledge of the divine rules relating to the acts and the behaviors of the people in order to determine what is obligatory (*wajib*), prohibited and illicit (*haram*), advised and recommended (*mandub*), disapproved (*makrouh*) and what is authorized and lawful (*mubah*) (*Levy, 1957*).

However, it is only in the eighteenth and nineteenth century that the fiqh was developed by jurist-theologians and taught in Mecca, Medina, Basra Kufa and Baghdad, which has given rise to several school of *fiqh*, known as *madhahib* (ways of thinking), and the main ones are (*Caratini, 2001*):

- The four *Sunni* schools: *Malikite* (Malik Ibn Anas), *Hanafite* (Abu Hanifa al-Nou'man), *Hanbalite* (Ahmed Ibn Hanbal) and *Shafi'ite* (Mohamed Ibn Adres al-Shafi'i);
- The *Shiite* school: *Ja'farite* (Jafar al-Sediq);
- Other schools exist such as: *Zaydidite*, *Zahirite*, *Tabari*, *Qurtubi* and *Sufism* school.

The *fiqh* has been classified, by the majority of scholars, into four main categories (*al-Zuyahli, 1997; Jumaliah & Suhaily, 2013; Jalil et.al, 2014*):

- *Fiqh al-ibadat*: corresponds to the rules relating to the relation of man with God and his adoration (prayer, fasting, pilgrimage, ect);
- *Fiqh al-ahwal ashakhsiya*: corresponds to the rules about personal relationships, family affairs, marriage and divorce;
- *Fiqh al-muamalat*: corresponds to the rules on economic, financial and commercial transactions; and
- *Fiqh al-uqubat* or *al-jinayat*: corresponds to the rules on criminal proceedings.

There is a very close relationship between *shari'ah* and *fiqh* that has been summarized by *Alhowaimil (2013)* in his study. Thus, although *shari'ah* is the origin of the *fiqh*, this one provides him a clarification and represents the foundation of its development and explanation, but also its adaptation in time and space. However, it is important to differentiate between these two concepts, because the *shari'ah* refers to the divine revelations, while the *fiqh* represents the human interpretation of the *shari'ah*. In addition, the *shari'ah* includes general principles and teachings of Islam, whereas the *fiqh* deals more with specific issues.

Thus, it is to be understood that the main sources of *shari'ah* are the *Quran* and the tradition of the Prophet Muhammad (*Sunnah*). Nevertheless, different instruments of interpretation and analysis of these main sources, but also the deduction of different advisory opinions (*fatwa*), have been developed by the efforts of the scholars (*ijtihad*), and are also considered as secondary sources of Islamic law, called “*fiqh*”. These instruments are based on consensus (*ijma'*), analogy (*qiyas*), preferential judgment (*istihsan*), public and people interest (*istislah*) and custom (*urf*) (*Simizu, 1989; Kamali, 2008; Shanmugan & Bala, 2009; Jamaliah & Suhaily, 2013*).

1.1.2. *Fiqh al-muamalat*

Fiqh al-muamalat is a branch of the *fiqh* that refers to the laws governing the relations between people, whose interpretation has its origin in the literal² meaning of the term *al-muamalat* (plural of *muamalah*), which means “treatment” and “transaction”. It is, therefore, *fiqh* grouping any mutual dealings, transactions and relationships between, people, whether economic, diplomatic, personal, family, etc. however, since the establishment of *Majallah al-Ahkam al-Adliya (1876)*, the *fiqh al-muamalat* has been limited to economic, financial and commercial transactions.

² *Lissen al-Arab Dictionary* . In <http://www.maajim.com>

The rules and laws of fiqh al-muamalat are based on a number of principles, namely (*Gait & Worthingto, 2009; Kahn 2003; Amir et.al, 2012; Jamaliah & Suhaily, 2013*):

- Permissibility of all transactions until evidence is given that a certain matter is prohibited (through *shari'ah*);
- Conclusion of contracts is based on the mutual consent between the counterparties;
- Conformity of contracts with *maqasid al-shari'ah*;
- Combination between stability and flexibility;
- Transparency in contracts and transactions; and
- Justice and fair dealing.

Economic activities (including financial and commercial ones) are permitted as long as they do not violate the principles of *shari'ah*. This maxim, based on unanimous opinion of the four great Islamic thought schools, stipulates that if transactions are against the *shari'ah*, they will be considered as invalid, or illicit. Thus, no contract should bear any of the prohibitions presented in table 2.

Table 2: The main prohibitions in fiqh al-muamalat

Prohibitions	Meaning
<i>Riba</i> (interest/usury)	Increase and surplus in a loan transaction or exchange of goods of the same kind, which return profit to one of the parties, with no equivalent counter-value in return, to the other party.
<i>Gharar</i> (excessive uncertainty)	Transaction of probable whose the existence or characteristics are uncertain, due to an excessive lack of information or ignorance of the essential elements of the transaction to one of the parties to a contract.
<i>Maisir</i> (gambling)	Form of contract in which the right of the contracting parties depends on a random event.
Illicit investments	Investment in sectors that have a negative impact on ethics and morals within a society, or on the well-being and health of individuals is prohibited, such as: alcoholic beverages, pork, drugs, arming, pornography, casinos, etc.
<i>Iktinaz</i> (hoarding)	Accumulation of wealth, while keeping it outside the economic circuit/unproductive accumulation of wealth.
<i>Ihtikar</i> (grabbing)	Hoarding of commodities of any kind, especially foodstuffs, with a view to creating an artificial shortage and rising prices.
<i>Tadlis</i> (fraud)	Concealment of defects in goods during a sale, as well as information relating to transactions.

Source: Adapted from: Gait Alsadek. H & Worthingto Andrew. (2009). *A primer on Islamic finance: Definitions, sources, principles and methods*. Griffith Business School, Australia.

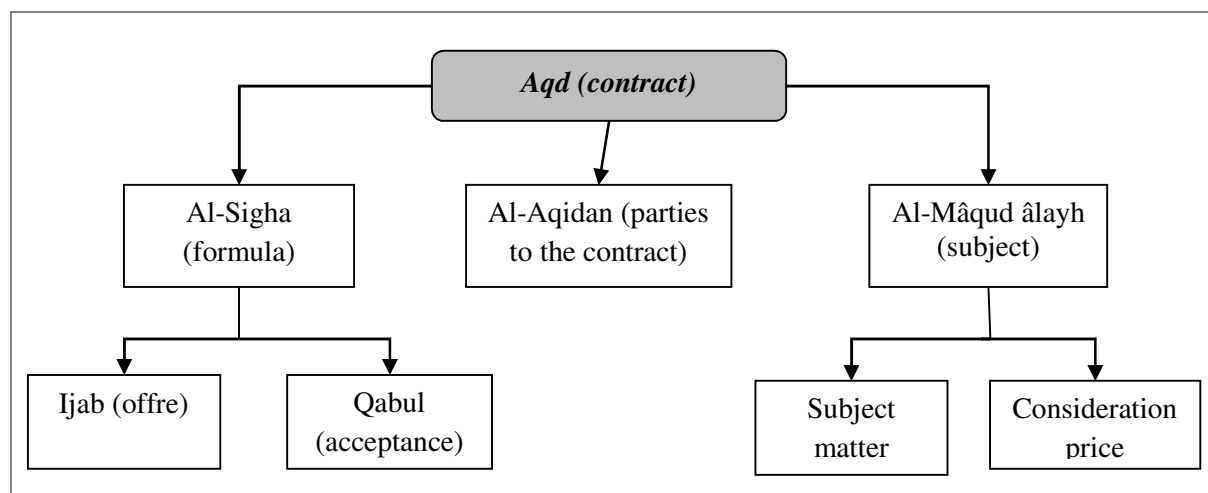
Khan Muhammad Akram, (2003). *Islamic economics and finance: A glossary*. 2nd edition. Routledge publishing, London & New York.

Furthermore, there are basic rules and principles that must to be respected in transactions, among the fundamental ones those, in contemporary Islamic economic and finance, known as “*principle of profit-loss sharing*” and “*principle of ownership*”:

- *Principle of profit-loss sharing (PLS)*: it is based on the rule “*al-ghunm bi al-ghurm*”, which means that whoever receives something must bear the damage and loss as much as the benefit (*Atiya, 2007*). No one can claim any remuneration without *sharing the risks* associated with investment, a principle that is widely accepted in Islamic legal and economic literature as the cornerstone of Islamic finance (*Chong & Liu, 2009*).
- *Principle of ownership*: based on the rule “*la tabi’ ma laysa ‘indak*”, means that at the time of the contract, the object of the sale must exist and be down by the seller, because the purpose is to transfer its ownership to the buyer and ownership of the price to the seller. This taking possession is known in Islamic jurisprudence as *qabd*, which, in general, may be physical possession (*qabd haqiqi*) and legal possession (*qabd hukmi*) (*Dusuki & Mokhtar, 2010*).

In *fiqh al-muamalat*, economic activities are based on a contract, called “*aqd*”, a term that, literally³, means “knot”. However, in Islamic legal literature, the notion of contract is used in different ways. Thus, *al-aqd* can refer to an obligation, promise, covenant, oath or agreement (bilateral or multilateral) in any field. In the context of economic, financial and commercial transactions, a contract represents an undertaking, by mutual consent, between two or more parties, in a mandatory manner, which involves a transaction of goods and / or services or a partnership operation. The validity of a contract in Islamic law requires the existence of its main elements: *al-sigha*, *al-aqidan* and *al-ma’qud alaih*, and must not relate to any of the prohibitions. (*Jamaliah & Suhaily, 2013; Alhowaimil, 2013*).

³ Dictionnaire *Lissen al-Arab*. In <http://www.maajim.com>

Figure 1: The main elements of a contract in Islam

Source: Jamaliah Said & Suhaily Hasnan. (2013). *Islamic finance and muamalat*. Journal of Financial Reporting and Accounting. Volume 11, Issue 1. PP 1-107

Basically, contracts (bilateral and multilateral) fall into six categories (a non-exhaustive classification due to innovation and mutations in terms of transactions) and from which other types may result (*Alhowaimil, 2013*):

- Contracts of exchange (*'uqud al-mu'awadat*);
- Contracts of security (*'uqud al-tawthiqat*);
- Contracts of partnership (*shirkah*);
- Contracts of safe custody (*wadi'ah*);
- Contracts pertaining to the utilization of usufruct (*iqud al-manfa'ah*); and
- Contracts pertaining to do a work (eg: *wakalah*)

1.2. Methodology and philosophy

Understanding methodology and philosophy, or ideology, of Islamic economics is important for a meaningful development of Islamic finance.

1.2.1. The basic methodology

According to *Kahf (2003)* the methodology of obtaining knowledge is through hearing, observing and logical deduction. An authenticity test must always be applied to any piece of revelation before it is accepted as Divine. The principles sources of Islamic economics are the Quran and *sunnah*, thereby it is important to understand the texts of them as they are in classical concise standard Arabic language.

Also, it is necessary to know the history of Islam and the Prophet's life and his Companions, and their positions in economic context and axioms. It is too a matter of using *fiqh* and its rules, *qiyas* and *ijma'* through *ijtihad*. Then, methodology of Islamic economics system, including banking and finance, is almost the same methodology of rules of *fiqh* (*qawa'id al-fiqh*). This later depends heavily on mathematical logics: analogy. From *fiqh*, *fiqh al-muamalat* represents its fundamental branch for formulating theories of economic behaviour within the Islamic framework, and it is important to make a distinction between Islamic economics and *fiqh al-muamalat*. Islamic economics includes the study of human behaviour on its own nature; and *fiqh al-muamalat* is a study in business law.

Economics is a part of behaviour and social studies include sociology, psychology, anthropology, history ..., and it uses too mathematical and science such technology. *Fiqh* and Islamic history are indispensable sources of knowledge about Islamic economic methodology; and three tests may be applied in this purpose and they are:

- Theoretical test: means of basic's axioms of mathematical logic;
- Historical test: is laboratory of social science; and
- Empirical test: means of statistical methods.

In his study on methodology of Islamic economics, *Khan (1987)* found that two conclusions are relevant to the discussion on methodology:

- Islamic economics is a multi-disciplinary subject. It will not be meaningful nor would it achieve its objectives if it relies only on the traditional sources of economics;
- Islamic economics is a normative discipline. It does not study the economic problem for the sake problem. It has a normative role to explore ways and means for transforming the existing economics into Islamic economics.

1.2.2. Philosophy of Islamic economy and finance

Islam includes both spiritual and material pursuits as long as they are in accordance with God's guidance in promoting overall justice in society (*Ghazali, 1990*). Thus, according to *Asutay (2007)* Islamic moral economic paradigm aims to "a creation of Islamic economic system with its distinct values, norms, rules and institutions". In this sense, *Hannef (2005)* explains that moral economy is "an approach to, and process of, interpreting and solving the

economic problems of human beings based on the values, norms, laws and institutions found in, and derived from the sources of Islam”.

Asutay (2007b) found that the eminent Islamic economist (such as *Chapra (1992, 2000)*, *Naqvi (1981, 1994)*, *Ahmed (1979, 1994, 2003)*, *Ghazali (1990)* and *Sirageldin (2002)*), developed the philosophical foundations, or the foundational axioms of Islamic economic moral approach. This last defines the components of the conceptual framework through which economic and social policies deal with all aspects of human life (not only economic life, and they inherent in the spirit of Islam) and derive from the ontological and epistemological sources of the Quran and *Sunnah*. Economic agent in Islamic moral economic is represented by *homo-Islamicus* who is conceived as *khalifah-‘abd* (vicegerent of Allah on the earth) who has not only to maximize his own satisfaction but also to promote the spirit of fellowship, mutual support, sacrifice, cooperation, equity and fair play, as to greed injustice and exploitation in the society (*Haneef & Furqani, 2009*).

The Islamic economic system is considered as the only known social order that has strong features of ethical endogeneity due to its unique goals and principles, that are the fundamental pillars on which its stands; for that it is often described as an ethico-economic system (*Boutayba et al, 2014*). Furthermore, socioeconomic justice occupies a prominent place in this system. Indeed, in Islam, legitimate acquisition of wealth is permissible, but a narrow circulation of wealth among the rich and hoarding and accumulation of wealth for the love money are discouraged. The purpose is to strike a balance between private property rights and distributional concerns, and some of the main elements of wealth distribution in Islam, in addition to risk-sharing contracts, are: *zakat* (obligation alms), *sadaqah* (charitable giving), *waqf* (charitable trusts), *qard hasan* (interest-free loans) and inheritance (*Adeel et.al, 2014*).

1.3. Historical foundation of Islamic finance

Very often considered as a new finance, Islamic finance dates back to the advent of Islam. Its practice, as it is known today and which could attribute the adjective “contemporary” finds its first traces in the twentieth century.

1.3.1. Finance in the Prophet era

At the time of the prophet Muhammad, the only finance that existed was relatively public finance, split between the expenditures and resources of the Islamic State of that period (*Gafouri, 2000*).

Public expenditure was in monetary form, but also in the form of food and clothing; this has led to a diversity of capital that the State spends to meet general needs and to build a solidarity society. The principle of diversity is one of the most important principles of Islamic jurisprudence. In Mecca, the Muslim community had not constituted a public expenditure system and the need to create a *Bait al-mal* was not felt. Expenses were made either by the Prophet or by the Muslims voluntarily.

After the emigration of the Prophet and his followers to Medina (Hegira), the Muslims still did not have a budget or a public fund, but simply alms dispensed according to the most pressing needs, called “*zakat*” (even before it becomes an obligation).

The resources of the Islamic State were divided between the revenues of the State and the properties of the State. State revenues referred to *zakat*, *waqf*, *‘uchur*, *ghanima*, lands conquered and agricultural commodities. The properties of the State had to be exploited in such a way as to contribute to the construction society based on justice and fraternity for the well-being of the Muslim community or a part of the community (poor, needy...). The State could also sell or donate part of its land in the general interest of the Muslim community.

1.3.2. Finance in the Caliphs era

At the time of Abu Bakr Assidiq, the *bait al-mal* did not exist yet, this one having led the Muslim community just over two years had exercised the same financial practices as those of the Prophet.

It was only with the arrival of Omar Ibn Khatab time that the Muslim community attended a finance based on the establishment of the first accounting systems, and rigorous management of the State accounts was required with the territorial expansion of Islam. It was particularly to channel the collection of *zakat*, which was oriented to” *bait al-mal al-muslimin*” (or Treasury).

Othman Ibn Affan was the first to mint coin (although it is claimed that Omar was the first to do so). When Persia was conquered, three types of coins were in circulation in the

conquered territories, namely: Baghli of 8 dang⁴, Tabari of 4 dang, and Maghrebi of 3 dang. Omar made an innovation and created an Islamic Dirham of 6 dang. (*Saidan, 2009*).

1.3.3. The starting point of the development of economic thought in Islam

Muslim scholars used their reason and applied the principles derived from the Quran and *sunnah* to solve problems in the changing historical and economical conditions, and the process can be divided into three classifications (*Aliyar, 2010*):

- First phase, the formation period, which covers the period just after cessation of the revelation to the end of the Companions era (11-100 AH/632-718 AD);
- Second phase, the translation period, when foreign ideas were translated into Arabic, and Muslim scholars got an opportunity to benefit from the intellectual and practical works of other nations (2nd -5th /8th-11th century); and
- Third phase, the re-translation and transmission period, when Greco-Arab Islamic ideas reached Europe through translation and other contacts (6th-9th / 12th-15th century).

Muslim jurists of the 2nd and 3rd centuries of *hijar* included many economic theorems and views in their writings of *fiqh*. The earliest scholars are namely: Abu Yusuf (book: *Al-kharaj*) as a policy guide to the Abbasite Khalifa Harun Al-Rashid, Muhammad Bin Al-Hasan (book: *Al-iktisab fi al-rizq al-mustatab*), and Abu Ubaid Al-Qasim Bin Sallam (book: *Al-amwal*) (*Kahf, 2003*). Since, the Islamic economics developed gradually as an interdisciplinary subject in the writings of Quranic commentators, jurists, historians, and social, political and moral philosophers, and there were a large member of scholars including, Al-Masudi, Al-Mawavdi, Ibn-Hazan, Al-Sarkashi, Al-Tusi, Al-Gazali, Al-Dimashqi, Ibn Al-Ukhwah, Ibn Al-Aayyini, Al-Shatibi, Ibn Khaidusi, Al-Maqrizi, Al-Dawwani, and Shah Waliyullah (*Chapra, 2000*).

2. Contemporary Islamic financial system

The modern development of Islamic economics and finance came as a response to the challenge posed by the materialistic system of Capitalism and Marxism (*Aliyar, 2010*). Evidence exists that interest-free commercial financial transactions existed early in Muslim world. Indeed, it is for instance the interest-free loans made to Muslims in the 1890s by the institution Anjuman Mowodul Ikhwan of Hyderabad, India; and the case of the loans made to

⁴ Parity from one currency to another.

small businesses on a profit-sharing basis made, in Hyderabad, by the Anjuman Imdad-e-Bahmi Qardh Bila Sud, since its establishment in 1923 (*Shanmugam & Zahari, 2009*)

2.1.Principle concepts

The Islamic financial system, whose the main component is the bank, is based on Islamic economic principles, which in turn is based on *shari'ah* law. For that, for a better understanding of the Islamic finance concept, it would be necessary to define the concept of Islamic economic and Islamic banking.

2.1.1. Islamic economy

The term “Islamic economics” dates back to the late 1940s, when it was used for the first time by *Sayyid Manazir Ahsan Gilani* (a Professor of Islamic Studies at the Osmania University of India), in an Urdu language book published in 1947 that he gave the title “*Islamic economics*”. The term got a boost at the first International Conference on Islamic Economics held in Makkah in early 1976 (*Aliyar, 2010*).

Several economists and scholars defined Islamic economics differently. For instance, *Khan (1986)* says, “broadly speaking, the term ‘*Islamic economics*’ defines a complete system that prescribes a specific pattern of social and economic behaviour for all individuals. It deals with a wide-ranging set of issues, such as property rights, incentive system, allocation of resources, types of economic freedom, system of economic decision-making and proper role of the government. The over-riding objective of the system is social justice and specific patterns of income and wealth distribution and consequently economic policies are to be designed to achieve these ends.” *Zaman (2000)* defines Islamic economics as “the knowledge of application of injunctions and rules of the *shari'ah* that stop injustice in the acquisition and disposition of material resources in order to provide satisfaction to individuals and enable them to perform their obligations to Allah and society”. According to *Ahmed (2002)*, Islamic economics may be defined as “the science that studies the best possible use of all available economic resources, endowed by Allah, for the production of maximum possible output of *halal* goods and services that are needed for the community, now and in future, and the just distribution of this output within the framework of *shari'ah* and its intents”.

Therefore, *Ayub (2007)* argues that Islamic economics is a social science that studies the economic problem in the light of the values of Islam. Thus, once *shari'ah* adopted, it will determine various aspects of economic management like the contents of production, trade,

finance and distribution. It is a matter of a fair balance between material and spiritual needs and between the individual's and social needs:

- Equilibrium between work and worship;
- Human equality;
- Mutual responsibility in society;
- Distributive justice;
- Balanced and beneficent use of the “bounties of God”;
- Limited sovereignty of individuals in terms of “self interest” for the benefit of fellow beings and society;
- The principle of co-existence; and
- The freedom of conscience.

2.1.2. Islamic finance

Islamic finance is a financial system that is often claiming its specificity based on equity, solidarity and stability (*Siddiqi, 1967*). *Hassoun (2008)* defines Islamic finance as a compartment of the so-called “ethical finance”, a finance at the disposal and service of the real economy. In this sense, *Guéranger (2009)* says that Islamic finance is a compartment of ethical finance because it is characterized by a moral and socially responsible dimension, and could meet a need that goes beyond financing.

Some authors speak about “Islamic financial system” as a whole (*Siagh, 2007; Saadallah, 1992, Iqbal, 1997*). Thus, one of the definitions that best defined the Islamic financial system that given by *Sundararajan (2011)*, according to which the Islamic financial system is a component of a broader financial system in which the design and operation of financial instruments, institutions, markets, and infrastructure are based, where relevant, on contracts and governance arrangements that apply *shari'ah* rules and principles.

Among the most important goals of the Islamic financial system are: shari'ah-compliant financial products and services, stability in money value, economic development, social development, resource optimization and equitable distribution of resources (*Shanmugam & Zahari, 2009*).

2.1.3. Islamic banking

Islamic bank and Islamic windows of conventional banks are the major actors in the Islamic financial system, and they have been defined as follow *Shanmugam & Zahari (2009)*:

- The general secretariat of the Organization of the Islamic Conference defines an Islamic bank as “a financial institution whose statutes, rules, and procedures expressly state its commitment to the principle of shari’ah and to the banning of the receipt and payment of interest on any of its operations”;
- The Malaysian Islamic Banking Act 1983 states that an Islamic bank is “any company which carries on Islamic banking business and holds a valid license.” Islamic banking business is defined as that “ whose aims and operations do not involve any element which is not approved by the Religion of Islam”;
- The Central Bank of Kuwait stipulates that Islamic banks “exercise the activities pertaining to banking business and any activities considered by the Law of Commerce or by customary practice as banking activities in compliance with Islamic shrai’ah principles.”

The nature function of Islamic banking is based on a partnership and trade contracts. The depositors are considered as shareholders of the banks and shareholders of a particular investment project undertaken; thus, it is a matter of a direct participation and trading and not a lender-borrower relationship (*Al-Omar & Abdel-Haq, 1996*). Contrary to conventional banks, Islamic banks do not trade in debts, and as an alternative, they pool depositor’s funds in investment accounts to provide temporary equity funds to finance productive projects (*Al-Dehani et.al, 1999*).

2.2. Islamic financial system development

Although the foundations of Islamic finance go back to the advent of Islam, it remains a contemporary industry. Indeed, for centuries, there was not a complete financial system, alternative modes of financing were not proposed and we did not think that *shari’ah*-compliant financial institutions and organizations will be created.

2.2.1. The emergence and first steps

The Pakistani theologian Sayyid Abdul Ala Maududi, in the 1940s, was the first to formulate the theoretical principles of Islamic finance. But it was not until 1957 that the first Islamic financial institution was created by Saudi-Arabia, it was “Al-Rajhi Bank” transformed, in 1978, into a holding company “Al-Rajhi Trading and Exchange Corporation”. In August 1962, the “Pilgrims Saving Corporation” was created and launched on September 30th 1963, in Malaysia. Six years later, in 1969, the company was merged with “The Pilgrims Affairs Office” (operating since 1951 in Penang), which gave birth to “The Pilgrims Management and Fund Board”.

It was in 1963 that the first Muslim savings bank the “Mit Ghamr Saving Bank” was born in the Egyptian village of Mit Ghamr, which was founded by the economist Ahmed El-Naggar; but after four successful years, the bank’s activities ended for political reasons. In 1969, “Dallah AlBaraka” was founded in Riyadh (Saudi Arabia) by Sheikh Saleh Kamel as a small business, which has evolved over a period of forty years into a diversified international conglomerate in more than forty countries. Dallah Albaraka is head of AlBaraka Banking Group, Altawfeeq Financial Group and Altawfeeq Company for investment funds.

It was at the crossroads of the rise of pan-Islamism and the oil boom in the 1970s that modern Islamic finance saw its true beginnings with the birth of many major Islamic financial institutions (such the Islamic Development Bank and Dubai Islamic Bank). From the year 1980 to 2000, Islamic financial institutions and the volume of their assets grow steadily and consolidate their deposit base and operators take advantage of financial innovations to expand their product offering. This acceleration is fuelled mainly by oil revenue, and the focus is on finding concrete solutions that both respect the *shari’ah* and the remuneration of capital invested and the expertise of the bank. The first significant contributions in the development of the Islamic finance and bank were (*Rarasati, 2014*):

- The first International Conference on Islamic Economics (Makkah, 1976),
- International Conference on Islamic and the New International Economic Order (London, 1977),
- Two Seminars on Monetary and Fiscal Economics of Islam (Makkah, 1978; Islamabad, 1981),
- Conference on Islamic Banking and Strategies for Economic Cooperation (West Germany at Ben-Baden, 1982),

- The second International Conference on Islamic Economics (Islamabad, 1983), and
- The Conference on Islamic Banking (London, 1984), under the aegis of the Middle East Association.

The emergence of Islamic finance has continued since the 2000s, with the creation of Islamic financial markets, a multitude of financial institutions (banking, insurance, investment funds, governance, auditing ...) and diversification of financial products and services. The main international Islamic financial infrastructure institutions that contribute to the development of this industry are presented in the table 3.

Table 3: Main international Islamic financial infrastructure institutions

IDB (1973)	The Islamic Development Bank promotes economic and social progress and in member countries, provides financial assistance and technical assistance, and contributes to the training of staff engaged in <i>shari'ah</i> -compliant development activities.
AAOIFI (1991)	The Accounting and Auditing Organization for Islamic financial institutions prepares and issues accounting, auditing, and corporate governance standards, as well as ethics and <i>Shar'iah</i> standards, for IFBIs. It has also planned a Certified Islamic Public Accountant program for accountancy education.
MASB (1997)	The Malaysian Accounting Standards Board's primary role is to develop accounting and financial reporting standards. Its financial reporting standards are developed in harmony with the international accounting standards organization and the AAOIFI. The standards are developed specifically to meet the needs of Islamic financial practices as well as the needs of the regulatory and economic structure in Malaysia.
IIFM (2001)	The International Islamic Financial Market is one of the core infrastructure institutions of the Islamic financial industry. The not-for-profit organization was founded, jointly by the central banks and monetary authorities of Bahrain, Brunei, Indonesia, Malaysia, Sudan, and the Islamic Development Bank (Jeddah, Saudi Arabia). Its primary function is to enhance cooperation among Islamic countries and their financial institutions, specifically in promoting trading in the secondary market for <i>Shari'ah</i> -compliant financial instruments.
CBFI (2001)	The General Council for Islamic Banks and Financial Institutions is an international autonomous not-for-profit corporate body that represents IFBIs globally. Its key aims are follows: <ul style="list-style-type: none"> • Disseminating information on <i>Shari'ah</i> concepts and the rules and provisions related to them in order to help develop the Islamic financial industry, • Enhancing cooperation among its members, • Providing information related to Islamic financial institutions, and • Promoting the interests of its members and helping them overcome common difficulties and challenges.

Table 3: Main international Islamic financial infrastructure institutions (continued)

<i>IFSB</i> (2002)	The Islamic Financial Services Board serves as an international standard-setting body for regulatory and supervisory agencies. It has pronounced on corporate governance, risk management, capital adequacy, supervisory review processes, transparency, market discipline, recognition of ratings on <i>Shari'ah</i> -compliant financial instruments, and the development of money markets. It also arranges summits, conferences, and workshops on issues relating to Islamic banking.
<i>IIRA</i> (2005)	The Islamic International Rating Agency started operations in July 2005 with the aim of assisting the development of regional financial markets. It assesses the risk profiles of market participants and financial instruments to help inform investor decision making.
<i>LMC</i> (2010)	The Liquidity Management Centre seeks to develop an active secondary market for short-term <i>Shari'ah</i> -compliant treasury products. It helps Islamic financial institutions effectively manage their asset/liability mismatch and improve the quality of their portfolios.

Source: adapted from: Shanmugam. B & Zahari A. R. (2009). *A primer on Islamic finance*. The Research Foundation of CFA Institute; Virginia. P 89. & official websites of the institutions presented in the table.

2.2.2. Composition of the Islamic financial system

In recent years, Islamic finance has made a considerable progress in terms of various aspects of this industry (products and services innovation, governance and management, institutions and so on) that are developing rapidly with an international recognition. Currently, the Islamic financial system and its institutional infrastructure are composed of (*IDB et.al; n.d*):

- ***Islamic banks:*** that is, deposit-taking and financing institutions, including full-fledge Islamic banks, Islamic subsidiaries and windows of conventional banks;
- ***Islamic non-bank financial institutions :*** including Islamic leasing and factoring companies, finance companies, *ijarah* and *mudarabah* companies, Islamic housing cooperatives, Islamic microfinance institutions, credit sale subsidiaries of trading companies and other similar institutions, and private equity/venture capital, as well as institutions managing *haj* funds, *awqaf*, *zakah* and *qadaqah*;
- Islamic insurance, ***takaful***, and re-insurance, ***re-takaful***, operators;
- ***Islamic capital markets and their players***, such as brokerage houses, investment banks, etc., as well as fund management institutions including Islamic asset management companies (such as mutual funds/unit trusts, hedge funds, ect.); and
- ***Islamic financial architecture and infrastructure***, including
 - Payment-settlement systems and infrastructures;

- Financial markets and products, including market microstructures (*shari'ah* screening and product identification system), trading and clearance systems, and e-business infrastructure;
- Support facility providers, legal institutions and framework, safety net, liquidity support providers;
- Regulators and supervisors, including licensing authorities;
- Governance infrastructure, including *shari'ah* governance institutions;
- Standard setters for financial supervision and infrastructure, including financial reporting, accounting and auditing, capital adequacy and solvency, risk management, transparency and disclosure, and corporate governance;
- Rating external credit assessment institutions;
- Financial statistics and information providers;
- Knowledge management and human resource development institutions and programs; and
- Research and development institutions and programs.

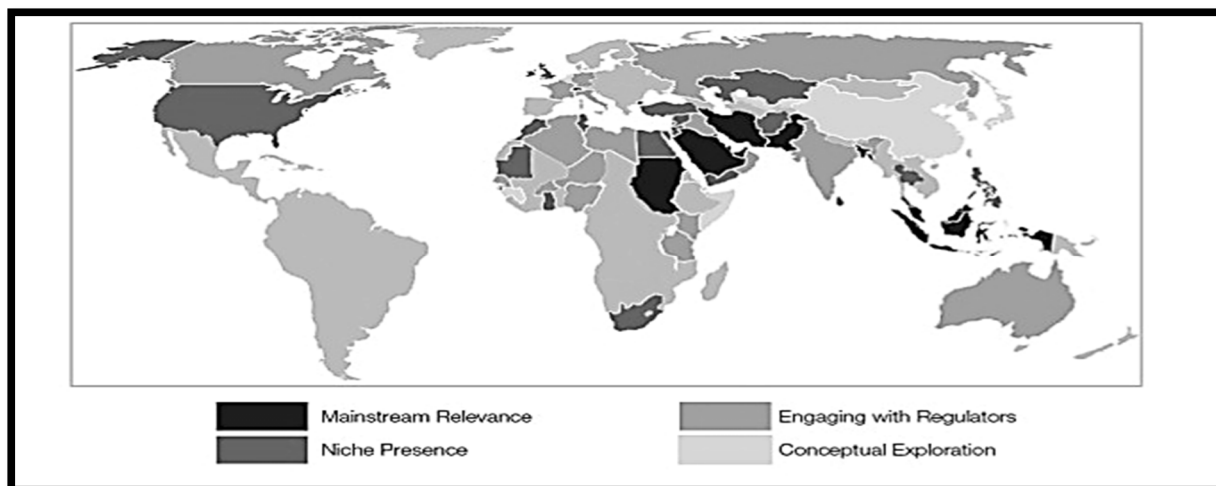
The increased demand for Islamic finance and the rapid development of its composition have led to international Islamic financial places competing with each other; the leader is Bahrain followed by London, Malaysia and Dubai. Bahrain is considered as the host of the largest concentration of Islamic financial institutions in the Middle East, the first *sukuk* market, and the Central Bank has put in place a regulatory framework in favour of this industry. Also, Bahrain hosts a number of central agencies and organizations for the development of Islamic finance, namely: the Accounting and Auditing Organization of Islamic Financial Institutions (AAOIFI), the Liquidity Management Centre (LMC), the International Islamic Financial Market (IIFM) and the Islamic International Rating Agency (IIRA). The other places are making significant progress and they adopt policies and strategies to develop this financial system, with a remarkable support from the government to create a favourable regulatory framework for Islamic finance (*Ouendi, 2014*).

3. State of the global Islamic finance industry

Islamic finance industry is an important part of development programs in many countries and the international financial landscape. It is present in 70 countries (characterized as mainstream relevance or a niche presence) with more than 600 financial institutions offering

shari'ah-compliant products and services (*Bank Nagara Malaysia, 2015*). The figure 2 gives an overview of the geographical presence of the Islamic finance industry in the world.

Figure 2: Geographical presence of islamic finance



Source: Bank Nagara Malaysia. (2015). *US: Potential market for Islamic finance*. Malaysia. P 3.

3.1. The size of the Islamic finance industry

The Islamic finance industry is composed mainly of four sectors: banking, *sukuk* (bonds), equity and funds, and *takaful* (insurance). The industry is dominated by the banking sector with approximately 75% of all Islamic financial assets under management, in 2016. The second largest sector is *sukuk*, which comprise 15% of the global Islamic financial industry. Islamic investment funds (with 4%), *takaful* (with 1%) and Islamic microfinance (with 1%) have yet to see any significant growth. Islamic financial industry assets are domiciled predominantly in Gulf Cooperation Council (GCC) countries (\$922 billion), Southeast Asia (\$473 billion), and Middle East excluding GCC countries (\$453 billion). In non-Muslim majority countries, Europe and the Americas, Islamic finance maintains a limited presence (*Dubai Islamic Bank, 2017*).

Although, Islamic finance is one the fastest growing financial industry in 21st century (from \$600 billion, in 2007, to over \$1.3 trillion, in 2012) (*Konwicki, 2017*). The fact is that, during the period 2014-2016, the Islamic finance industry knew a year of slowdown after almost a decade of two-digit growth (9.3% in 2014, 7.3% in 2015 and 7.0% in 2016). This is may be

attributed to a number of factors, including an unfavourable political and economic climate (especially due to low oil prices), rate depreciation in some of the key markets, and natural mutation of the industry (*IFSB, 2017; Dubai Islamic Bank, 2017*). However, the *IFSB (2017)* estimates that under the current economic and political circumstances, the overall performance of the industry can be considered “satisfactory”.

The banking sector continues to dominate the Islamic finance industry, representing approximately 78% (*IFSB, 2017*) of the total Islamic finance assets; and this even its slowdown growth during the last three, about 6%, due to mainly the decreased in oil prices. Thus, Islamic banking assets went from \$1.300 billion in 2012 to \$1.598 billion in 2016 (*Thomson Reuters, 2017*). In 2016, Islamic banks’ market share increased in 18 jurisdictions, decreasing marginally or remaining unchanged in further 13. There was also a change in terms of assets allocations geographically. The assets of MENA (ex-GCC) dropped from \$607 billion to \$541 billion because of the strong depreciation of the Iranian currency. The share of total Islamic financial assets of MENA (ex-GCC) decreased to 30%, the GCC increased to 42%, and Asia remained at 22% (*ISFB, 2017*). The top three countries in Islamic banking assets in 2016 were: Iran, Saudi Arabia, and Malaysia (*Thomson Reuters*).

After a short term of decline in the volume of issuances, *sukuk* market rebounded in 2016, expanding by 6%, and reached \$75 billion, bringing the volume of outstanding *sukuk* close to \$320 billion, 79% of the issuances originated from sovereigns, whom grew in volume by 36.4% compared to 2015, only 21% were corporate issuances (*IFSB, 2017*). Over half (50.8%) was issued by Malaysia, Indonesia (14.7%), UAE (8.1%), Saudi Arabia (6.7%), and Turkey (5.1%). In terms of issuances by sector, the major was by governmental (42.9%) and financial (31%) services, infrastructure-linked (16.7%, and real estate (4.1%). Most issuances (49%) were asset-based (mostly based on *ijarah* or *wakalah*) (*Sidlo, 2017*).

The global stock markets generally ended 2016 on a relatively positive note, in contrast to 2015. The performance of Islamic equity and of the *sukuk* influences the performance of Islamic investment funds. In 2016, Islamic funds had 37% growth with a total of \$91 billion (*Thomson Reuters, 2017*). They are concentrated in Saudi Arabia (38%) and Malaysia (29%), followed by Ireland (8%), USA and Luxembourg (5% each) (*IFSB, 2017*).

As for *takaful* market, despite that its high growth (12%, in 2016) by volume still a small industry with total contributions of \$25 billion and only 305 *takaful* and *retakaful* operators and windows (*IFSB, 2017*). Saudi Arabia and Iran are the major contributors (71%) of global

takaful industry, followed by Malaysia, UEA, and Indonesia (*Thomson Reuters, 2017*), Saudi Arabia and Iran growth rates saw, however, a decline (mostly because of the currency depreciation) and UAE saw an increase of 24%. In ASEAN countries (Brunei Darussalam, Indonesia, Malaysia, Singapore, and Thailand) saw similarly high growth of 22% observed between 2012 and 2014 (*Sidlo, 2017*).

3.2. The challenges of the Islamic finance

Although Islamic finance is in an increasingly favourable environment for its development, growth and adaptation by several countries, nevertheless it should be emphasized that it faces a number of challenges. *Iqbal et.al (1998)* and *Konwicki, (2017)* summarized the main challenges as follows:

- *Building proper institutional framework*: mutually supporting institutions/arrangements are needed to perform various functions. These include providing alternative ways and means to meet the needs of venture capital, consumer finance, short capital, long-term capital, security markets, investment banks and equity institutions such as mutual funds and pension plans, lender of the last resort, etc.
- *Increased competition*: Islamic financial institutions, especially Islamic banks, should provide more efforts to maintain a reasonable rate of growth in future. It must be realized that much of the deposits now with the Islamic banks are not due to the attraction of higher returns or better services but because of religious reasons. In addition, Islamic banks are now facing ever-increasing competition with the entry of some conventional banks including some major multinational Western banks in this market that have a large advantage over Islamic banks in terms of their size, experience, market coverage and long standing in the industry.
- *Building bridges and strategic alliances*: the competition is expected to increase further in near future due to globalization and the fast development in markets, and Islamic financial institutions cannot remain aloof of these developments. For this reason, they must adjust their strategies, increase the size of their operations as well as form strategic alliances with other institutions, and build bridges between existing Islamic institutions and their conventional counterpart.

- *Need to increase the size of Islamic financial institutions:* Islamic financial institutions are below the optimum size due to their small size (in comparison with conventional one), which is also a major factor for lack of portfolio diversification. Resources at their disposal are not sufficiently large to minimize risk through portfolio diversification.
- *Geographical concentration:* the poor risk profiles of many Islamic institutions, resulting from their small size and over-exposure to few sectors, are further weakened by heavy geographical concentration of their operations. Most of these institutions have only local presence, making them vulnerable to local economic shocks.
- *Financial engineering:* the Islamic financials tools have essentially been limited to classical instruments and their variants. The small size of institutions does not support financial innovation and are pushed towards offering simplified products within limited business areas. Although some effort, in the light of the principles of *ijtihad*, was observed in the Islamic market, engineers in modern finance have design several new instruments such as mortgage, options, derivatives, hedging, insurance pension plans, etc.
- *Shari'ah aspects:* Almost all Islamic financial institutions have their own *shari'ah* boards of *shari'ah* advisers who must certify (ex-ante) and to monitor (ex-post) all financial contracts, transactions, and further activities of the institution on behalf of shareholders, stakeholders, and clients to ensure that they are compliant with *shari'ah*. Yet, in the contemporary financial era, *shari'ah* board have found quite difficult to issue verdicts, basically due to an acute shortage of scholars with dual specialization or at least working knowledge of modern finance and *shari'ah* at the same time. There is an urgent need to increase the supply of scholars with dual specialization. There is also a need for standardization of verdicts issuing to harmonize the functioning of this industry on an international level.
- *Teaching, training, research and development:* most of the managers of Islamic banks are not very well trained in the use of Islamic modes of finance, and it is extremely important to have the persons with the right kind of skills and commitment to run the Islamic financial institutions. Another important component is the availability of authentic information. Indeed, there is no consistent data series on the activities of these

institutions. Islamic financial institutions spend no sizeable amount on research and development.

- *Appropriate supervisory framework*: most of Islamic financial institutions in the contemporary world operate in a mixed environment (with reference to interest-based institutions) and the central banks subject them to the same controls, conditions and regulations without taking into consideration the specificity of these industry.

3.3.Outlook for the future

Many experts in Islamic finance predict a slowdown in the growth of the industry, decrease in profitability, and potential decline of Islamic assets' quality, at least in a short term (*Sidlo, 2017*). According to *Thomson Reuters & Dinar Standards (2016)*, total Islamic finance assets are expected to reach \$3.5 trillion by 2021, with a 12% increase of Islamic banking responsible for most of this growth, and projected to reach \$2.7 trillion in assets by 2021, 16% increase in the number of Islamic finance institutions, a 13% increase in the number of outstanding *sukuk*, and a 20% increase in the number of *shari'ah* scholars. *Dubai Islamic Bank (2017)* predicts that forecast of between \$3 trillion and \$4.4 trillion by 2020, and *Deloitte (2016)* projects \$3.3 trillion by 2020. For *Dubai Islamic Bank (2017)*, 2052 will be the year at which the supply of Islamic financial products meets the demand.

Despite the fact that it is predicted that Islamic finance industry will meet a slowdown growth, however some of its sectors will not same expand, especially through the expand in specific national markets and changes in Islamic finance framework. Thus, it is expected that Islamic banking to grow 1.5 times between 2016 and 2020. Iran and Saudi Arabia are undergoing economic transformations that could lead a bigger role for Islamic banks. It is to note that, the Islamic banking sector's share of the industry is expected to decline over coming years, to 64% by 2022 from 73% in 2016, because of the larger role played by other Islamic finance sectors and assets classes (*Thomson Reuters, 2017*).

The Islamic asset management sectors has the highest potential and it is expected to reach \$403 billion by 2022, with a focus on the largest markets: Malaysia, Saudi Arabia and Iran (*Thomson Reuters, 2017*). *Sukuk* market is not expected to be expanded in 2018, but a study done by Thomson Reuters showed that 23% of 172 industry leaders respondents see *sukuk* infrastructure financing as the major growth opportunity for this industry, and so-called *green sukuk*, used to secure funding environmentally-friendly investments, is considered as a new

promising field of development (*Sidlo, 2017*). Indeed, *sukuk* has significant potential in new markets, but also those that have previously issued sovereign *sukuk* are planning to return to the market, such as UK's planned issue after Brexit in 2019, which could rise up to GBP 1 billion. In addition, Africa has the highest potential for further sovereign issuance given recent announcements by North African nations and issuance by countries such as Nigeria (*Thomson Reuters, 2017*).

There is no consensus between experts about the future of *takaful*. Thus, *S&P (2017)* estimates that, this sector will not expand in 2018 despite its potential for growth in more favourable regulatory environment underlined by IFSB who believes that, this should be helped by the introduction of obligatory insurance in Saudi Arabia and the changes in legislation in Malaysia and Indonesia for assisting the *takaful* to reach its potential (*IFSB, 2017*). Researchers from UAE expect that *takaful* will also enter markets of the EU, East Europe, USA, Canada, Argentina, India and China, due to the presence in increase of Muslim communities (*Baydoun et.al, 2015*).

The other promising sector in the Islamic financial industry is pension funds. In March 2016, Malaysia introduced the largest *shari'ah*-compliant pension scheme in the world: the Islamic Saving Plan, worth \$24.6 billion. Indonesia announced plans to follow the Malaysian initiative (*Thomson Reuters, 2017a*).

4. Role of Islamic finance in financing the economy

Many economists are introducing religion as determinant of economic performance with the aim of evaluating the impact of religiosity on individual behaviour and hence economic performance (*Ebrahim et.al, 2012*). Religious activity may influence economic performance at the level of the individual, group, or country through, at least, two channels (*Noland, 2005*). The first approach related to Adam Smith's (1776) classic treatise, presented religion as an instrument to augment human capital and to enjoy two economic advantages, namely reduction in risk and establishment of trust, which in turn improve efficiency. The second approach is associated to Max Weber (1905), who estimated that religious belief might influence economic performance, productivity, investment and growth.

In the case of Islam, many theoretical studies showed that integrating *shari'ah* principles in finance and banking enhance the economy activity, such as studies of *Chapra (1988 & 2003)*, *Hasan & Dridi (2010)*, *Tag El-Din (2008)*, and *Khan & Bashar (2008)*. However, there are very few empirical studies about the contribution of this industry in financing economy, and

most of them compare the effectiveness of the interest-free monetary and financial system to the interest-based one, such as studies of *Darrat (1988)*, *Yousefi et.al (1997)*, *Furqani & Mulyany (2009)*, *Charles et.al (2011)*, and *Arouri et.al (2012)*.⁵

4.1. Intermediation in Islamic finance

Financial intermediation is the main element on which the financing of the economy is based. Financial intermediation means taking funds from people who have more than they need at this juncture in time and providing those funds to persons who need them for their economic transactions and activities (*Khaf, 2007*). It carry out five basic functions that serve economy: (i) facilitate the trading, hedging, diversifying, and pooling of risk; (ii) allocate resources; (iii) monitor managers and exert corporate control; (iv) mobilize savings; and (v) facilitate the exchange of goods and services (*Levine, 1997*).

In Islamic history, financial intermediation has made significant contributions to economic development. Financiers in the early days of Islam were known as *sarrafs* and undertook many of the traditional and basic functions of a conventional financial institution, such as an intermediation between borrowers and lenders, operating a secure and reliable domestic and cross-border payment system and offering services, such as the issuance of promissory notes and letters of credit. Historians like Udovitch considered them as “bankers without banks”. (*Iqbal & Mirakhor; 2011*)

Financial intermediation is the core function of a modern banking system, conventional as well as Islamic one. However, Islamic banks make their financial intermediation based on several *shari'ah*-compliant contracts and rely on a combination of three principles: sharing, leasing and sale (the main contracts are presented in the chapter IV) (*Khaf, 2007*). According to *Iqbal & Ahmed (2005)*, Islamic financial system, mainly Islamic banking, presents a viable and efficient method of financial intermediation, and the table 4 shows that there is sufficient diversity on both the asset and liability sides of an Islamic bank to undertake all critical functions expected from an efficient financial intermediary.

⁵ Hachicha N & Amar A.B. (2015). *Islamic finance and economic growth: the Malaysian case*. In El-Karanshawy et.al. (Eds), Volume 2: Islamic economic: Theory, policy and social justice. Bloomsbury Qatar Foundation. Doha, Qatar. PP 173- 182.

Table 4: Functional components of an Islamic financial intermediary

Assets	Liabilities
Cash 100-percent reserves	Demand deposits (<i>amanah</i>)
Trade finance portfolio Term: short term Risk level: very low Instruments: <i>mudarabah, salam</i>	Short-term investment deposits (<i>mudarabah</i>)
Portfolio of consumer and corporate asset financing Term: short-and-medium-term Risk level: low Instruments: <i>ijarah, istisn'a mortgages</i>	Restricted investment deposits for varying maturities (<i>mudarabah</i>)
Sundicated investment portfolio Term : medium-to long-term Risk level: moderate to high Instruments: <i>mudarabah, musharakah</i>	Restricted and unrestricted investment deposits (<i>muadarabah</i>)
Fund management Private equity Joint venture Term: long-term Risk level: high Instruments: <i>mudarabah, musharakah</i>	Wealth management (<i>mudarabah, wakala, musharakah</i>)
Fund of funds Diversified portfolio specializing in market securities and investments in asset-linked securities of various risk and maturity profiles	Investments through deposits or through tradable securities (<i>mudarabah, musharakah</i>)
Fee-generating activities Underwriting Asset management Research	Equity capital (<i>musharakah</i>) reserves

Source: Iqbal. Z & Mirakhor. A. (2011). *An introduction to Islamic finance: Theory and practice*. Second Edition. John Wiley & Sons (Asia) Pte. Ltd. Singapore. P 169.

The core principle mode of financial intermediation function in Islamic finance and banking is the “agency theory” on which the bank operates as an agent of the investor (depositor) under the PLS and risk sharing principles (*Iqbal & Mirakhor; 2011*). *Ben Jdidia & Ben Ayed (2012)* explored the potential of Islamic financial intermediation in promoting growth, through its effect in mitigating ex-post and ex-ante asymmetric information that

characterized financial intermediation. The PLS principal provides a strong information signal than short run financing, because Islamic financial institutions by participating in the business have access to more important information and collect them at a lower cost, and as result, they have control over the performance of firms. In long term, PLS financing supervision cost is greatly reduced due to reputation gathered over time.

Financial intermediation is not limited to banks; this also concerns non-bank financial institutions (NBFIs). However, there is a lack in the Islamic financial literature on this topic. NBFIs include private-equity and venture-capital firms, leasing and factoring companies, sector-specific financiers, cooperatives, credit unions, microfinance institutions, and development-focused lending institutions. Generally, NBFIs mediate the transfer of funds between capita-surplus and capital-deficit economic agents, with their delivery channels ranging from informal moneylenders to investment banking firms. These comprise institutions engaged in: (i) asset and fund management (for example, mutual, commodity, and leasing funds); (ii) specialized sector finance companies (for example, mortgage, leasing, and *mudarabah* companies); (iii) development institutions (for example, multilateral and microfinance institutions); and (iv) *takaful* (Islamic insurance). (*Iqbal & Mirakhor; 2011*)

4.2. Islamic finance and economic growth and development

There are a lack of studies, especially empirical ones, on the impact of Islamic financial system on economic growth and development, and those are available are, generally, limited to the banking role and to one country.

The principal characteristic of Islamic finance is its direct undetachable link to the real economy or physical transactions. No financing can find its way to the Islamic system without passing through the production and/or exchange of real goods and services. Consequently, the nature of Islamic finance makes it exclusively restricted to the construction, establishment and expansion of productive projects and to the exchange and trade of commodities and services. (*Kahf, 2007*)

Johnson's study (2013) shows that absent of interest in Islamic financial and banking system should increase stability, thereby stimulating growth; and the fact that it is based on risk-sharing model, theoretically should exercise more deliberation and prudence in the decisions to lend to firms, which could potentially lead to a more economically optimal distribution of liquidity. *Ben Jdidia & Ben Ayed (2012)* and *Imam & Kpodar (2015)* highlighted advantages and features of Islamic banking in contributing to economic growth:

- *Encourages lending (to individuals without assets):* the PLS and risk-sharing characteristic of Islamic banking should encourage more investment, especially by individuals who could not borrow because of a lack of assets that could act as a guarantee, and thereby growth.
- *Raises savings:* Islamic banking can raise the savings of individuals who refrain from using interest-based banks, which could thereby increase financial intermediation and access to finance, with savings increase commensurately.
- *More stable and less inflationary growth:* in PLS financing, banks do not create money *ex nihilo* causing an excessive inflation and thereby monetary expansion would be in step with the growth of the real sphere. Consequently, these connections guarantee stability, avoid speculative bubble and engender a macroeconomic stability.
- *A sustained economic growth:* Islamic finance is more focused on projects profitability than on creditworthiness. Then, the process of capital accumulation is accelerated, which reinforces the process of real wealth creation and strengthens growth; and encourages entrepreneurship.
- *Social responsible, equitable and moral growth:* Islamic finance is socially responsible since it selects projects with high social benefits and forbids unethical use of funds causing high social costs and presenting harmful effects on the long run. It also permits to promote economic justice that is assured by the risk sharing and the prohibition of *riba*. It carries out a more equitable distribution of resources without hindering individual

In addition to stimulating economic growth, it is also the responsibility of the money and banking system to contribute to the achievement of socio-economic development and eliminate economic problems (poverty, social and economic injustice, inequality of income and wealth...). The main objectives and functions of the Islamic finance system include economic well-being with full employment and maximum rate of economic growth, equal distributions of income and wealth, and the generation of sufficient savings and their productive mobilization and stability in the value of money. (*Chapra, 2000*)

Askari & Rehman (2013) highlight that Islam is a rule-based religion that promotes material growth through higher productivity. Rules, or good institutions, are crucial for economic growth: property rights protection, the enforcement of contracts, and good governance are emphasized in both the Quran and the *Sunnah*. It is also widely recognized that free markets (functioning under Islamic law) should have a prominent role on the distribution of goods and services. People are, in Islam, encouraged to compete in business, work hard for economic gain, and own private property. Thus, it is clear that, there is nothing in Islam that discourages economic prosperity and growth.

4.3. The social responsibility of Islamic finance

Several authors, such as *Abdouli (1991)*, *Kahf, Ahmed & Homud (1998)*, *Siddiqi (2002)*, and *Iqbal (1997)*, agree that Islamic financial system is not concerned only by maximizing of profitability and that its function is based on ethical and moral values. They also state that this industry do not depend on intangible collaterals and lead to a better distribution of income, allowing access to finance for poor , and resulting in greater benefits for social justice and long term growth. (*El-Ghattis; 2010*). For this purpose, many means are offered by Islamic financial system, mainly the use of microfinance, *zakat* and *waqf*.

4.3.1. Islamic Microfinance

Islamic finance should serve social interests in establishing its financial optimality such that it offers ethical and social solutions to development and new methods of financing can be developed, such as the case of microfinance. Indeed, microfinance is viewed as a critical tool against poverty and allows poor to access to financial services that can generate jobs, income, and wealth. Thereby, giving the poor the opportunity to become stakeholders in the economy. Islamic financial system offers variable solutions to the microfinance: instruments (*musharakah* and *mudarabah*, for instance), institutions (such as banks and insurance), but also *waqf* and *zakat*. Thus, there is compatibility and complementarily between the objectives and operational mechanism of microfinance and Islamic finance (*Asutay, 2010*).

Islam's emphasis on economic and social justice through financial inclusion and risk sharing is the foundation for Islamic microfinance. As Islamic finance is establishing itself, attempts have been made to establish *shari'ah*-compliant microfinance institutions. Nowadays, Islamic microfinance institutions include non-governmental organizations (NGOs), rural

cooperatives, credit unions, self-help schemes, and *qard hassan*⁶ funds. In addition, some conventional NGOs operating in Muslim communities have Islamic windows and offer *shari'ah*-compliant products among their financing options. (*Iqbal & Mirakhor; 2011*).

Micro-*takaful* is considered as one of the most promising segments among other *shari'ah*-compliant financial products, especially microfinance products. It is different from *takaful* by targeting the low-income individuals who are living slightly above the poverty line and usually work in informal sectors. The main argument is that policyholders benefit by increased access to a wider range of products with increased coverage and greater sustainability; and the partnering insurance institutions gain access to a new market without taking extensive marketing, distribution, or administration costs. Micro-*takaful* helps under-privileged people sustain their financial wellbeing, provides them with a feeling of togetherness, solidarity, and security, and opens avenues for joint efforts for mutual benefits. As many micro-*takaful* institutions, funds may be raised from *zakat* (*Mohieldin et.al, 2012*).

Qard Hassan is the other kind mode of Islamic microfinance that is considered as an alternative to the interest-based micro-credit. There are several countries including Bosnia Herzegovina, Iran, Indonesia, Pakistan, and UK where *qard Hassan* is being used for extending microfinance (*Iqbal et.al; 2015*).

4.3.2. Zakat in financing the economy

Zakat is a sum that all well-off Muslim having wealth above an exemption limit (*nisab*) at a rate fixed by the *shari'ah* to the poor Muslims and the needy. It is levied on cash, cattle, agricultural produce, minerals, capital invested in industry and business, etc (*Khan, 2003*).

Zakat is considered as an important component of the Islamic economic and financial system and *Kantakji (n.d)* tried to explain its role in the economy, as presented in the figure 3. He shows that *zakat* is attributed to the needy whose propensity to consume tends to one, that is to say that all their income, including *zakat*, is destined for consumption (no savings). An increase in income, due to *zakat*, will lead to an increase in global demand, in the short term, and therefore to a rise in prices in a situation of not achieving full employment (according to classical theory), encouraging producers to increase production of consumer goods to meet growing demand and generate more profits; but also to increase the production elements (capital

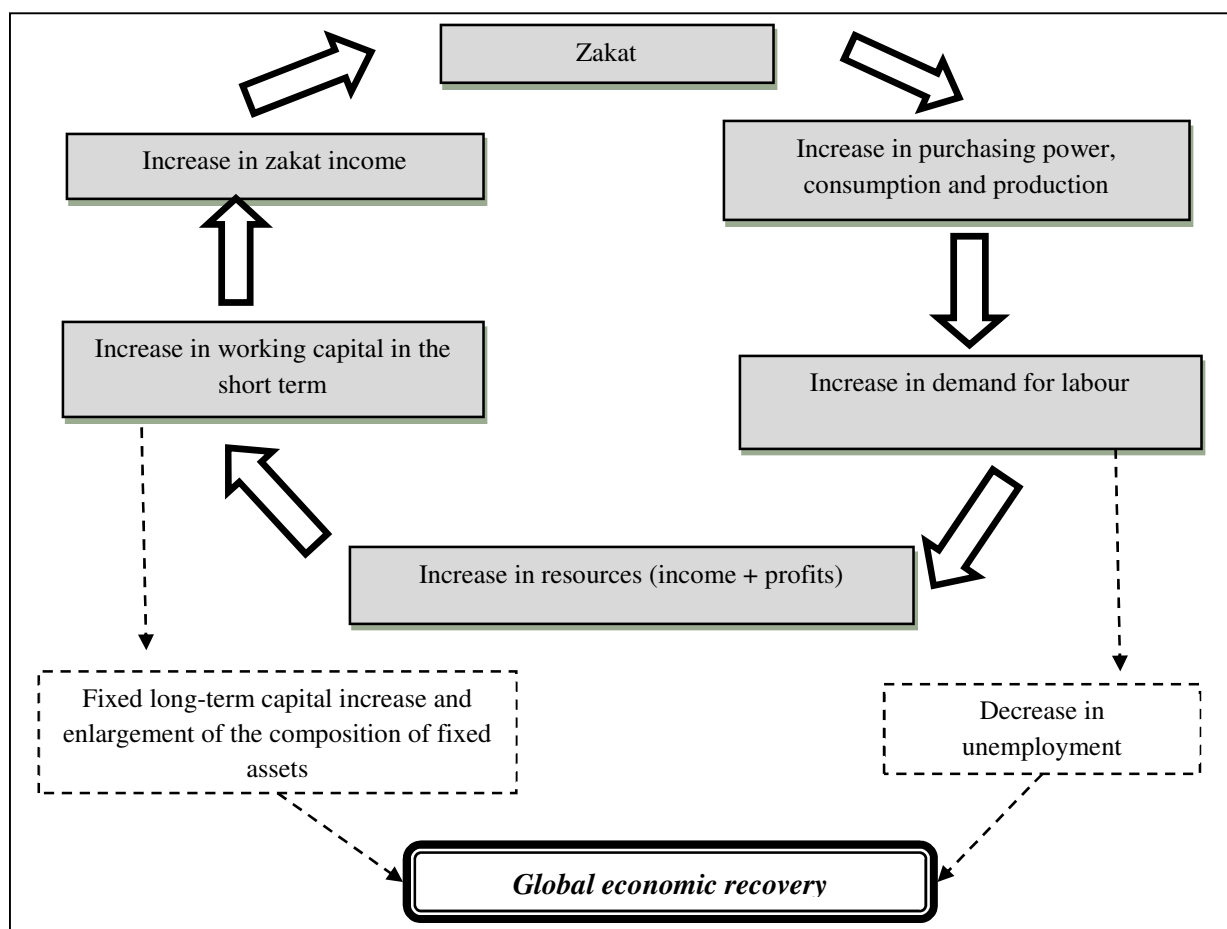
⁶ A loan with the stipulation to return the principal sum in the future without any increase.

and labour). Thus, there will be an increase in the demand for labour, which leads to reducing unemployment, raising wages and reducing poverty.

The increase in producer profits and the demand for labour would allow a global economic recovery due to *zakat*. Indeed, very often producers represent the rich class of society and therefore with the increasing of their profits, their wealth also increases and then the share of *zakat* to pay too.

The author also proposes the use of *zakat* fund in the creation of investment companies, whose shares will be the beneficiaries of *zakat* and this through the use of several Islamic financial instruments of Islamic finance (*musharakah*, *mudarabah*, *ijara* and *qard hasan*). He adds that a *musharakah* contract between the *zakat* fund and the *waqf* fund for the creation businesses for the benefit of the poor can also be concluded.

Figure 3: The economic circle of *zakat*



Source: adapted from قنطقجي سامر مظهر. . الزكاة و دورها في محاربة الفقر و البطالة، بين المحلية و العالمية. ص 8 في <http://www.kantakji.org>

4.3.3. The potential of *waqf*

Waqf is an irrevocable donation in perpetuity intended in favour of public utility, pious and charitable purposes, which cannot be sold, offered or inherited, and whose usufruct returns to these purposes (*Sabit et.al, 2006; Hassa & Shahid, 2010*). Unlike *zakat*, *waqf* is not an obligation and may be in favor of Muslims and non-Muslims (*Stibbard et.al, 2012*).

Waqf has a long history of contributing to the socio-economic sector, especially in the Ottoman era, such as agriculture, health, the creation of micro-enterprises (*Ahmed, 2007*), and the construction of several cities in Turkey, such as Istanbul, Bursa, Edirne, Amasya and Manisa. Currently, several non-governmental organizations (NGOs) have developed different mechanisms based on *waqf* in order to solve socio-economic problems. In instance, the case of Islamic Relief (UK), Awqaf South Africa (South Africa) and International Waqf and Zakat Foundation (Malaysia) that use the *waqf* for the creation of mini-projects creating wealth and jobs, the acquisition of agricultural equipment and financing infrastructure projects (communal libraries, schools, hospitals and health, medical research centers, ...) (*Nor Saeran & Kasri, 2016*).

Today, *waqf* is a driving force for economic development, which henceforth is not based only on the use of restricted means (income generated by the heritage itself, the contribution of the beneficiaries of the *waqf* income, the contribution of the State and the collection of donations), but uses the Islamic financial instruments and markets. The *waqf* allows the financing of investment projects thus contributing to the creation of employment and the increase of the production of goods and services, the financing of public institutions (schools, hospitals, culture and leisure centers, mosques, ...), the financing of scientific research centers and project financing (such as highways) (*Ben Azzouz, 2004*).

Sukuk are instrument that attract more *waqf* institutions, as they help to mobilize funds and allocate them for medium and long term financing. Singapore and Saudi-Arabia are two success stories in *sukuk* issuance for *waqf* assets (*Nor Saeran & Kasri, 2016*). The *sukuk-musharakah* issued in Singapore, in 2002, is a joint-venture project undertaken by Baitulmal, Majlis Ugama Islam Singapore (MUIS), Warees Investments Pte Ltd, and the *waqf* fund which raised \$60 million for the creation of a mosque, commercial malls, 104 service apartments and a commercial complex of 6 floors. In 2000, Saudi-Arabia issued \$390 million of *sukuk al-intifa'* for the use of *waqf* lands, located next to the Great Mosque of Mecca, to build the Zamzam Tower of 31 floors and 1240 apartments) using a 28-year build operate transfer (BOT) contract.

Conclusion

From this chapter, we can conclude that the understanding of the Islamic economy and finance requires, first, the knowledge of its paradigm and foundations. The latter originate from *sahri'ah*, whose deduction of laws and principles refer to the *fiqh*, based on the *ijtihad* of scholars, especially in issuing of *fatwa* in the different areas of the life of a human being, such as the domain of *muamalat*.

In the contemporary era, Islamic *muamalat* includes economic, financial and commercial field and has evolved rapidly, both theoretically and empirically. Islamic financial system development is seen in terms of component and geographical presence. The growth of this industry still positive, despite its slowdown in recent years, due to some economical and geopolitical instability. However, experts predict a better environment and results for Islamic finance industry.

The principles of Islamic finance make that there is a strong link between this industry and real economy; for this, there is a large potential for it to contribute significantly to the economic growth and development and financing projects and investments, both in the private and in public sector. Islamic finance is considered as a promising of ethical and socially responsible mode of financing.

CHAPTER II

AN UNDERSTANDING OF PROJECT FINANCING

Introduction

The growing need for infrastructure and other large-scale projects increased the demand for project financing, which represents an important way for funding projects and the economy. Indeed, this type of projects has been for a long time financed with public funds. However, because of many economic and financial problems facing governments (public debt, public deficit, lack of expertise, crisis...) it was necessary to look for an alternative source of financing, enabling project financing to meet this need.

This chapters aims to present the concept of project financing, as a whole, before trying to show its feasibility in the Islamic finance context. Thus, it will be first a question of the understanding of project financing through its meaning, historical, features and the main stakeholders and parties. As in any business, project financing is not without risks, so it will be important to present the main risks of the different phases of the project financing, and the process of their management. After that, it will be about the modes of financing and the financial engineering used in the project financing. Then, the main methods of project financing valuation will be presented.

1. Understanding of project financing

Not confusing between “project financing” and “financing project” is important, because projects can have many means to be financed, among them project financing that will be presented in following.

1.1. Definition of project financing

There is no universal definition of the “project financing” concept and several authors tried to present their view. Thus, according to *Nevitt & Fabozzi (2000)*, project finance refers to a financing of particular economic unit, in which a lender is satisfied to look initially to the cash flows and earnings of that economic units as the source of funds, from which a loan will be repaid and to the assets of the economic unit as collateral for the loan.

McMillen (2000) defines project financing as the financing of an economic unit, in which the lenders look initially to the cash flows from operation of that economic unit for repayment of the project loan and to those cash flows and the other assets comprising the economic unit as collateral for the loan.

For *Yescombe (2002)*, project finance is a method of raising long term debt financing for major projects through “financial engineering”, based on lending against the cash flow generated by the project alone; it depends on a detailed evaluation of project’s construction, operating and revenue risks, and their allocation between investors, lenders, and other parties through contractual and other arrangements.

For *Khan & Parra (2003)*, a project finance transaction involves the mobilization of debt, equity, contingent equity, hedges and a variety of limited guarantees through a newly organized company, partnership or contractual joint venture (a project vehicle). In such a transaction, lenders look to the assets of the project vehicle as collateral and its projected cash flow for full recovery of their loans.

Fight (2006) considers that the term of project financing refers to huge projects, infrastructure and public and private venture capital need, such as building highways, metro systems, or airport. It is generally used to refer to a non-recourse or limited recourse financing structure, in which debt, equity and credit enhancement are combined for the construction and operation, or the refinancing of a particular facility in a capital-intensive industry.

Finnerty (2007) says that project financing may be defined as the raising of funds on a limited-recourse or nonrecourse basis to finance an economically separable capital investment project, in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project. It is a tool that allows financing projects include pipelines, refineries, electric generating facilities, hydroelectric projects, dock facilities, mines toll roads, and mineral processing facilities.

Gatti (2013) defines project finance like the structured financing of a specific economic entity, or special purpose vehicle (SPV), also known as the project company, created by sponsors using equity or mezzanine debt, and for which the lender considers cash flow as being the primary source of loan reimbursement, whereas assets represented only collateral.

From the above different definitions, we find that the authors agree on some common elements that define the "project financing", mainly: the financing of huge projects, a long term projects, the existence of an economic unit, raising of funds (nonrecourse or limited recourse), risk-taking, looking to cash flows and the involvement of several contract counterparties. Hereof, we could suggest the following definition:

“Project financing may be defined as a tool that uses financial engineering in order to finance long-term huge projects and it may be used to finance broad range of services and assets. Its sources provide from the raising of funds that will be limited-recourse or nonrecourse, through the creation of a specific unit economic, known as a SPV (special purpose vehicle), by sponsors using equity; loans provided by lending institutions and all fund provided from the other contract counterparties. The project financing includes a high risk-taking, which is secured by all the project assets and the cash flow.”

As presented in the above definitions, two main types of project financing ought to be distinguished, which are presented by **Fight (2006)** as following:

- *Nonrecourse project financing*: means that there is no recourse to the project sponsor’s assets for the debts or liabilities of an individual project. Therefore, it depends purely on the merits of a project rather than the creditworthiness of the project sponsor, and the credit appraisal resides on the anticipated cash flows of the project. In such a case, the project sponsor has not direct legal obligation to repay the project debt or make interest payments.
- *Limited recourse project financing*: means that there are limited obligations and responsibilities of the project sponsor. The main issue here is not that the guarantees offered fully mitigate the project but rather implicate the sponsor’s involvement sufficiently deeply in order to incentivize sponsor to ensure the technical success of the project.

However, traditional finance is *corporate finance*, where the primary source of repayment for investors and creditors is the sponsoring company, backed by its entire balance sheet, not the project alone. Although, creditors will usually still seek to assure themselves of the economic viability of the project being financed, therefore, that it is not a drain on the corporate sponsor’s existing pool of assets, an important influence on their credit decision is the overall strength. Creditors will still retain a significant level of comfort in being repaid even if the individual project fails, in corporate finance, if a project fails, its lenders do not necessarily suffer, as long as the company investors and creditors can expect significant losses. (**Anita & Xinghai; 1999**)

The principal differences between project financing and corporate financing could be highlighted and presented in the table 5.

Table 5: Main differences between corporate financing and project financing

Factors	Corporate financing	Project financing
<i>Guarantees for financing</i>	Assets of the borrower (already-in-place firms)	Project assets
<i>Effect on financial elasticity</i>	Reduction of financial elasticity for the borrower	No or heavy reduced effect for sponsors
<i>Accounting treatment</i>	On-balance sheet	Off-balance sheet (the only effect will be either disbursement to subscribe equity in the SPV or for subordinated loans)
<i>Main variables underlying the granting of financing</i>	Customer relations Solvency of balance sheet Profitability	Future cash flows
<i>Degree of leverage utilizable</i>	Depends on effects on borrower's balance sheet	Depends on cash flows generated by the project (leverage is usually much higher)

Source: Gatti Stepheno, (2013), "*Project finance in theory and practice: Designing, structuring and financing private and public projects*", Academic Press edition, London, UK; p 3.

1.2. Historical overview of project financing

Project financing is not a recent financing method. Indeed, according to *Tan (2007)*, its origin date back to Antiquity, with the construction of large-scale infrastructure that was largely financed by the State through taxation or looting of the assets of enemies. This technique was already used during the Roman Empire to finance imports and exports of goods moving to and from Roman colonies, as reported by *Gatti (2013)*. *Lands (1999)* said that in the Middle ages, merchants began raising money to finance shipping. However, due to the high risk, prospectors had only limited recourse if a ship sank. Some bridges, canals and roads were also financed by apportioning shares to each member of the community, a procedure that could potentially lead to disputes over whether the ability to pay principle or benefit principles should apply when it came to charging fees. Grand churches and monasteries were also built either from church coffers or from endowments.

As presented by *Merna (2010)*, one of the oldest recorded applications of project financing dates back to 1299, when the English Crown negotiated a loan from Frescobaldi, a leading Italian merchant bank, for which payment was to be made in the form of output from

the Devon silver mines. The bank receive a one-year lease for the total output of the mines in exchange for paying all operating costs without recourse to the Crown if the value or amount of the extracted ore was less than predicted. Today such a loan arrangement is known as a *production payment loan*. Early trading expeditions, in 17th and 18th centuries, were also financed on a project basis. Investors provided funds to the Dutch East India Company and the British East India Company for voyages to Asia after which they were repaid according to their share of the liquidate cargoes. Over time as other forms of more permanent capital became available, firms curtailed their use of project-specific financing. (*Eiterman et al; 1998*)

Nonetheless, modern project finance dates back to the development of railroads in America from 1840 to 1870 (*Gatti Stepheno; 2013*). In the early 20th century, its applications were in natural resources and real estates. Thus, In the 1930s, the project financing was used to finance oilfield exploration, by “Wildcat” explorers, in Texas and Oklahoma (*Smith & Ingo; 1990*). After World War II, large-scale infrastructure was largely financed by the State through tax revenues, borrowings, State subsidy or simply over-printing of money by tolerating some inflation. In addition, in the 1950s and 1960s, few private firms were able to undertake such huge and lumpy projects without State assistance or assurances against confiscation of project assets or changes in taxes or regulation (*Tan; 2007*). One of the more important of these projects is the Trans Alaska Pipeline System (TAPS) Project, which was developed between 1969 and 1977. TAPS was a joint venture of eight of the world’s largest oil companies. It involved the construction of an 800-mile pipeline, at a cost of \$7.7 billion, to transport crude oil and natural gas liquids from the North Slope of Alaska to the port of Valdez in southern Alaska (*Finnerty; 2007*).

This technique was imported into Europe to finance large projects such as the North Sea oilfields, in the late 1970s, by British Petroleum, which raised \$945 million on a project basis from a syndicate of 66 banks. Following the success of North Sea developments, project financing has been associated with many financial and operating success stories include the Ras Laffan LNG project in Qatar, the Shajiao power station in China, and the Petrozuata heavy oil project in Venezuela, as well as numerous independent power projects (IPPs) in the United States (*Merna & Al-Thani; 2010*). The need to finance new plants with long-term power purchase agreements created a natural application for project financing. In fact, more than two-third of the projects completed during the 1980s were power projects. For this reason, project essentially synonymous with domestic power finance until the early 1990s. Since then, project

financing has broadened out into a much wider array of asset types and geographic locations. (*Harris & Krueger; 1999*).

Project financing has been evolving with the potential for significant innovation, especially in the area of collaboration public-private financing. The private finance initiative (PFI) was introduced to enhance the involvement of the private sector in financing and managing infrastructure projects and service provision in the UK, in 1992. This combination in project financing has spread worldwide and includes numerous industrial projects such as power stations, gas pipelines, waste-disposal plants, waste-to-energy plants, telecommunication facilities, bridges, tunnels, toll roads, railway networks, city centre tram links and now the building of hospital, education facilities, government accommodation and tourist facilities. The technique has also been applied to aircraft and ship financing. (*Merna & Al-Thani; 2010*)

1.3. Features, advantages and disadvantages of project financing

Project financing structures differ between various industry sectors. Thus, there is no “standard project financing” since each deal has its own unique characteristics. Nevertheless, there are common principles underlying the project financing approach. *Yescombe (2002)* presents some typical characteristics of project financing as following:

- It is provided for a “ring-fenced” project through a special purpose legal entity (usually a company) whose only business is the project (the “project company”);
- It is usually for a new project rather than an established business (although project finance loans may be refinanced);
- There is a high ratio of debt to equity (leverage), which may cover 70 to 90% of the cost of a project;
- There are no guarantees from investors in the project company (nonrecourse financing), or only limited guarantees (limited-recourse financing) for the project financing debt;
- Lenders rely on the future cash flow projected to be generated by the project for interest and debt repayment (debt service), rather than value of its assets or analysis of historical financial results;
- The main security for lenders is the project company’s contracts, licenses, or ownership of rights to natural resources; the project company’s physical assets are likely to be worth much less than the debt if they are sold off after a default on the financing; and

- The project has a finite life, based on such factors as the length of the contracts or licenses or the reserves of natural resources, and therefore the project finance debt must be fully repaid by the end of this life.

Well-capitalized corporations often select a project financing structure to assist in undertaking large debt commitments while minimizing any direct impacts on the corporate balance sheet. Important financial objectives sought by such corporations when mobilizing project financing for their individual projects include, according to *Khan & Parra (2003)*:

- Minimizing, as well as tailoring, the equity commitment to be delivered to any one particular project;
- Negotiating risk-sharing arrangements that are appropriate to the project being developed, the primary purpose being to move risk away from the project as well as its sponsors, with the intention of reallocating it to some other party and thereby improving the potential for project leverage;
- Segregating project's liabilities from the corporate balance sheet from a commercial and accounting perspective. This is achieved generally by creating a special-purpose vehicle to undertake the project;
- Reducing taxes by using a limited partnership or contractual joint-venture structure to implement the project-avoiding the double taxation that the tax authorities impose on corporations;
- Avoiding restrictive covenants on the corporate balance sheet arising from the projects debt financing;
- Achieving diversification of exposure and revenue among a future portfolio of projects; and
- Matching each commercial undertaking with the specific assets and liabilities required to build and operate it.

In addition, depending in the project, corresponding disadvantages of a project financing may include, as presented by *Fight (2006)*:

- Project financing is a complex technique involving many participants with diverse interests, which results conflicts on risk allocation, and increase costs to compensate third parties for accepting risks;

- Since banks are not equity risk takers, the means available to enhance the credit risk to acceptable levels are limited, which results in higher prices;
- Interest rates on project financing may be higher than on direct loans made to the project sponsor since the transaction structure is complex and the loan documentation lengthy;
- The nonrecourse project financing means that risks need to be mitigated, which may be through insurance, but can greatly increase costs; and
- The time consuming nature of negotiations amongst various parties and government bodies, restrictive covenants, and limited control of project assets, and burgeoning legal costs may all work together to render the transaction infeasible.

1.4. Principle parties to a project financing

The complexity of funding a large-scale project involves a fundraising with multiple entities. Almost all literally works (*Yescombe, 2002; Davis, 2005; Fernnety, 2006; Fight, 2006, Tan, 2007; ...*) allow us to give an overview of the principle parties that contribute to project financing.

1.4.1. Project sponsors

For *Fight (2006)*, a project sponsor is the entity that manages the project. It generally becomes equity owner of the SPV and will receive any profit, either via equity ownership (dividend streams), or management contracts (fees). The project sponsor generally brings management, operational and technical experience to the project. It may be required to provide guarantee to cover certain liabilities or risks of the project. This is not so much for security purposes, but rather to ensure that the sponsor is appropriately incentivized as the project's success. According to *Yescombe (2002)*, project sponsors can be presented from different types, including:

- Companies who wish to improve their return on equity, or spread their risks among a wider portfolio in the relevant industry than could be financed on balance sheet with corporate debt;
- Companies in industries that are regulated in their own market, or in which there is limited room for expansion, and which therefore need to expand elsewhere (eg: power utilities);
- Contractors, who use the investment in a project as a way of developing captive contracting business;

- Equipment suppliers, again using their investment to develop captive business;
- Operators, here also using the investment to develop their business;
- Offtakers of the project's products (eg: electricity) who do not wish (or are not able) to fund the construction of the project directly, or who are constrained from doing so by government policy, but who have the resources to invest part of the equity (or are offered equity in return for signing an Offtake Contract).
- Fuel or other Input Suppliers, who use the project as a way of selling their products (eg: a company supplying natural gas to a power project).

1.4.2. Project Company/ Special Purpose Vehicle (SPV)

Merna et al (2010) define the Special Purpose Vehicle (SPV) as an independent legal entity, which will be committed and responsible to a contractual agreement with the parties involved in the project financing transaction. SPV is used in variety of transactions, including securitizations, project financing and leasing. Thus, for *Davis (2005)*, SPV is a legally and economically independent project company financed with non/limited recourse debt for financing a single purpose, capital asset usually with a limited life. (*Davis; 2005*)

1.4.3. Construction Company

Khan & Parra (2003) explain that the Construction Company is the entity that builds the project under an engineering procurement and construction (EPC) contract, the terms of which guarantee the fixed-price, required specifications and schedule of construction and commissioning associated with the facility. The EPC contractor backs up its guarantees through contractual liquidated damage provisions in addition to performance bonds, retention bonds and other instruments contractually imposed on the contractor and which can be called upon to remedy any breach thereof.

Lenders prefer a single EPC contract because it gives them a single-point responsible party for all subcontractors and activities. However, two separate contracts by two affiliated parties are occasionally used to define the construction arrangements: (i) an installation, erection and commissioning contract with one contractor; and (ii) a supply of equipment contract with another. To achieve the contractual equivalent of single-point responsibility, each contractor is required by the lenders to cross-guarantee the other's obligations.

1.4.4. Lenders

According to *Tan (2007)*, lenders in a project can be: (i) *construction lenders* often comprise a syndicate of banks that provides short-term construction and land loans for commercial projects or long-term loans for infrastructure projects. A syndicate of banks spreads the risk among lenders and also helps raise the substantial amount of funds required; and (ii) *permanent lenders* who are required in commercial property projects to ‘take-out’ the short-term loan from the construction lender. The permanent lender may comprise institutional investors such as Real Estate Investment Trusts (REITs) and insurance companies.

Vinter (1998) adds that lenders to a project company who are not commercial banks may of course have others or differing objectives. Bondholders will share the commercial banks’ objectives, but will tend to be less interventionist and rely on covenants, which are expressed in far more general language than those found in a loan agreement. Shareholders in a project company who lend money may view their loans as quasi-equity (especially if they have high interest rates or interest rates that vary with profits) and will usually accept a subordinate position to other lenders.

1.4.5. Host government

For *Fight (2006)*, the host government is the government of the country in where the project is located. It is typically involved as an issuer of permits, licenses, authorizations and concessions. It also might grant foreign exchange availability projections and tax concessions. In some projects, the host government is an owner of the project, whether majority or minority, or will become the owner of the project at the end of a specified period. It might also be involved as an offtake purchaser or a supplier of raw materials or fuel.

1.4.6. Insurance providers

As explained by *Khan & Parra (2003)*, the project sponsor(s) will procure all insurance coverage required by applicable law. In addition, the terms of the service agreement and the requirements of lenders often result in the need to obtain a broader portfolio of insurance policies and coverage. In some cases, sponsor(s) may seek additional insurance coverage, such as political-risk insurance, to protect their investment.

2. Understanding key project financing risks

Chance (2001) explains that the project financing risk represents the possibility of incurring some form of loss in a venture, which implies a need to have a structure to identify, analyze, quantify, allocate and mitigate the risk. The success of a project would depend on how risks are allocated and efficiently managed, according to *Hoffman (2001)*.

2.1. Project financing risk typology

There is not a complete and exhaustive list, with a clear and unique division and classification, of the project financing risks, because each project is different from other, and for each project its specificities. However, the usual risks typology, according to many authors (*Tan, 2007 Gatti, 2008; Merna.T, Chu.Y and Al-Thani.F.F, 2010; ...*), focusing on the common risks on the different phases of the most projects, are categorized on: precompletion or construction phase risks, postcompletion or operational phase risks, and generic or common risks to the both phases.

2.1.1. Precompletion or construction phase risks

The precompletion phase leading up to start of operations involves building the project facilities. It is characterized by a concentration of industrial risks, for the most part. These risks should be very carefully assessed because they emerge at the outset of the project, before the initiative actually begins to generate positive cash flows. The precompletion risks include, mainly, the completion risks and the technological risks (*Gatti, 2013*).

- **Completion risk:** *Wood (1995)* presents it as a threat that the project may not be completed on time or not completed at all. This risk is usually as a result of cost overruns, failure of technology used, force majeure situations or some necessary variation to the project structure (*Wood; 1995*). Three main factors might determine the degree of completion risk inherent in a project (*Dewar; 2011*): (i) the level of technical risk involved in the project, (ii) the technical capability and financial strength of the construction contractor, and (iii) the level of guarantees and sureties provided by the construction contractor or other third parties and their respective capacity to perform under those obligations.

According to *Finnerty (2007)*, completion risk has a monetary aspect and technical aspect (*Finnerty; 2007*):

- *The monetary aspect* concerns the profitability of the project, either that a higher-than-anticipated inflation rate, shortages of critical supplies, unexpected delays that slow down the construction schedules, or merely an underestimation of construction costs might cause such an increase in the capital expenditures required to get the project operational that the project would no longer be profitable. Or, that a lower-than-expected price for the project's output or higher-than-expected cost for a critical input might reduce the expected return rate to such an extent that the sponsors no longer find the project profitable.
 - *The technical aspect* relates to the technical process incorporated in the project. In spite of all, the expert assurances provided to the lenders prior to the financing, the project may prove to be technically infeasible or environmentally objectionable. Alternatively, it may require such large expenditures, in order to become technically feasible, that the project becomes uneconomic to complete.
- **Technological risk:** in some industrial and infrastructure sectors where project financing is applied, works can require the use of technologies that are not performing according to specificities or will become prematurely obsolete (*Finnerty, 2007*). The risk of technical obsolescence following completion becomes particularly important when a project involves a state of the art technology in an industry whose technology is rapidly evolving. Usually, such technical risks would preclude project financing. However, lenders might be willing to fund the project in spite of these risks, if creditworthy parties are willing to protect lenders from these risks.

2.1.2. Postcompletion or operational phase risks

The major risks in the postcompletion phase involve the supply of input, the performance of the plant as compared to project standards, and the sale of the product or service. These risks are as important as those in the precompletion phase since their occurrence can cause a reduction of cash flows generated by the project during its economic life. (*Gatti; 2013*)

- **Supply risk:** there is a risk that supplies, natural resources, raw materials or other factors of production necessary for the successful operation of the project may become depleted or unavailable during the life of the project. Therefore, the availability, transportation,

and prices of critical supplies must be secure in a manner consistent with the operating and financial plans of the project. A delay or shortfall in the delivery of supplies to a project may prevent the project company from complying with its obligations under the offtake or concession agreement. Additionally, it may affect the cash flow generation of such project and it may make the project company liable for penalties under these agreements. On the other hand, an increase in the prices of project supplies or in their transportation costs may cause operating cost overruns. (*Patramanis ; 2006*)

- **Operational risk:** it includes the possibility that (i) the cost of operating and maintaining the project will exceed budgeted forecasts, (ii) the facility will be unable to perform consistently at a level sufficient to meet the required performance criteria, and/or (iii) the project's operation will be interrupted by the acts or omissions of the operator. The operator must have the financial and technical expertise to operate the project in accordance with the cost and production specifications that form the basis of the project's original feasibility study. The necessary skills extend not only to routine operations, but also to undertaking or supervising major overhauls of complex equipment. A good management team and a well-structured operating agreement will provide sufficient incentives to ensure compliance with industry standards of performance and a successful project. (*Dewar ; 2011*)

- **Market risk:** it is the risk that the project company may not earn sufficient revenue to cover its operating costs, repay its debt, and leave an adequate return for investors at the heart of project finance. Lenders typically require a level of certainty as to the future demand and the sales price of the output produced by a project. Moreover, lenders usually verify the existence of a long-term need for a project output and confirm that the project is capable of delivering its output at market prices. (*Patramanis ; 2006*)

2.1.3. Generic or common risks to the both phases

Risks found in both the construction and operational phases, with differing intensity depending on the phase in the life economic cycle of the project, are those that might systematically arise during the life of the initiative. Several risks common to both phases concern the key macroeconomic and financial variables (interest rate, exchange rate, inflation), but also pertain political and environment aspect. (*Gatti Stepheno; 2013*)

- **Financial risk:** it observed in project financing sources, characteristics of lenders and borrowers, and the constraints imposed by financial market at the time of financial closure and during the cycle life of the project. It may result in a higher cost of funding and fundamentally affects the financial viability of the project. (*Delmon ; 2010*)
- **Credit risk:** this risk relates to the parties who enter into contracts with the SPV for various intents and purposes. Lenders, through an exhaustive due diligence process, carefully assess the creditworthiness of the contractor, the product buyer, the input supplier and the plant operator. The financial soundness of the counterparties is essential for financiers. The significance of credit risks in project financing deals lies in the nature of the venture itself: off-balance-sheet financing with limited recourse to shareholders/sponsors and a very high level of financial leverage. (*Gatti; 2013*)
- **Inflation risk:** it arises when the cost dynamic is subject to a sudden acceleration that cannot be transferred to a corresponding increase in revenues. Inflation risk derives from the fact that most contracts between SPVs and their commercial counterparties are based on revision mechanisms for rates or installments based on the behavior of a given price index. Both industrial and financial costs and revenues are impacted by inflation risk. It is only natural that in project financing, this point is crucial, considering the long tenor of the relative loans and the multiplicative effect of the capitalization factor applied to real cash flows. (*Gatti; 2013*)
- **Interest rate risk:** loans with floating interest rates may be used for infrastructure loans and long-term financing, as well as for working and short-term needs. Forecasts of future interest rates used or project capitalized construction costs and future debt's service requirements are dependent upon realistic interest rate assumptions. By advice on assumptions to be used in projections, it can be argued that a lender has assumed some responsibility for providing additional financing if future cash requirements are higher than expected, due to unanticipated increases in interest rates. (*Nevitt & Fabozzi; 2000*)
- **Exchange rate/currency risk:** there are two currency risks facing project companies. The first is exchange rate fluctuation, i.e: devaluation erodes the value of a contract or payment in the project company's home currency, or the currency in which it must

service its debt. The second is currency control, i.e: the sovereign government limits the project company's access to foreign exchange or curtails its ability to make foreign currency payments outside of the country. (*Comer; 1996*)

- **Political risk:** this is the exposure of the project to political issues, such as breakdown of the existing political order, imposition of new taxes, restrictions on repatriation of profits, risk of expropriation or nationalization, or a change regulatory interference (not favorable for to the project) (*Hoffman; 2001*). For instance, a change in the economic fortune of the investment might necessitate the imposition of new taxes; the state may in times of economic crisis breach terms of the contract. The project may be more vulnerable to the threat of expropriation if it is very crucial to the country's security of infrastructure. To mitigate risk, the host state could be required to fully guarantee the debt or lenders may take out political risk insurance to cover their exposure. (*Azaino ; 2012*)

- **Environment risk:** it is increasingly an issue of public concern, and it is increasingly subject to legislation controlling the adverse impact projects and the emissions, waste, hazardous substances and inefficient use of energy they may generate. Lenders need to insulate themselves from these risks. Some methods are (*Fight; 2006*):
 - Understand the relevant legal framework in the host country and its impact on project feasibility.
 - Evaluate the risks relating to the project site, supplies, transportation from the site, and the products, emission and waste that the project will generate.
 - Ensure that satisfaction of the relevant environment and regulatory issues are a condition precedent to making finance available, including ensuring that the project will be able to meet future tightening of environmental controls.
 - Documentation should contain representations, warranties and covenants on the borrower's part to ensure compliance with these issues.
 - Monitor the project on an ongoing basis to ensure that the project operates within required environmental parameters.

2.2. Project financing risk management process

Risk management is the systematic process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of adverse events to project objectives (*Project Management Institute; 2000*). *Berg (2010)* defines risk management as a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues (*Berg; 2010*). However, strategies to cope with risk are multiple and depend largely of the project, its attributes and its context.

For success in project financing arrangements, it is essential to work under an effective risk management. Risks must be managed in order to increase the probability and impact of positive events (opportunities), and decrease the probability and impact of negative events (threats) in the project. (*Lartey; 2011*)

Many types of the risk management process of project have been developed and suggested, and no universal process exists. However, according to the literature review, the authors (*Chapman and Ward, 2000; Schatteman et al, 2006; Merna and Faisal, 2008; ...*) agree that, generally, risk management is considered as an approach of identifying, analyzing, responding and monitoring. Thus it includes (*Caltrans ; 2012*):

- *Risk identification*: determining which risks might affect project and documenting their characteristics.
- *Qualitative risk analysis*: prioritizing risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact.
- *Quantitative risk analysis*: analyzing probabilistically the effect of identified risks on overall.
- *Risk response*: developing options and actions to enhance opportunities and to reduce threats to project objectives.
- *Risk monitoring*: tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness through the project cycle.

2.2.1. Risk identification

Risk identification is an iterative process that is conducted throughout the entire project life cycle. It allows determining which risks might affect the project and then documenting

characteristics of those risks; it includes project managers, project team members, stakeholders and subject matter experts. A risk severity is perceived as it relates to threats to project success, opportunities, and impact on schedule, costs, scope, quality, productivity, etc. Two types of risk can exist known risk and unknown risk. *Known risk* is that risk has been identified and can be analyzed, such as lack resources, poor project management practices, etc. Identifying this type of risks need to be proactively managed throughout the project life. On the other side, *unknown risk* that have not yet been identified, such as unexpected legal changes and natural disasters. (CDC Unified Process; 2006)

Chronological is the criterion used to identify risks, a generic parameter enough to be usable across different sectors of application. In its economic life cycle, a project has, at least, two main phases: the construction, or pre-completion, phase and operational, or post-completion, phase (Gatti; 2013), as oreviously presented.

2.2.2. Project risk analysis

Risk analysis aims to evaluate the potential impact of identified risks on cost, schedule, staffing, resources, quality, return, etc; and to estimate the probability of their occurrence. It is not a one-time event, but an iterative process that is throughout the life span of the project, which is performed continuously as new risks are identified and existing risks change (Marsh ; 2004). Qualitative analysis and qualitative analysis are the two methods used in project risk analysis, and which can be used separately or together (most modern risk analysts combine the two approaches) (Merna & Al-Thani; 2010):

- **Qualitative risk analysis:** following risk identification, this type of analysis describes the nature of the risk and helps to improve the understanding of the risk, to estimate the probability of a risk occurrence, to estimate the potential impact of the risk on the project, and to determine which risks are important enough to manage. Qualitative risk analysis provides a foundation for a focused quantitative and risk response plan.
- **Quantitative risk analysis:** it is a numerical and quantifying process analysis of the effect of risks identified on overall project objectives, using computer simulation to various scenarios. Quantitative risk methods use different tools, such as sensitivity analysis, probability analysis, decision trees, algorithmic methods and Monte Carlo analysis, the most widely used.

The impact of each identified risk can be assessed as one of the following three categories (*CDC Unified Process; 2006*) and presented in the figure 4:

- High: greater than 70% probability of occurrence. Risk that has the potential to greatly impact project cost, project schedule or performance. It is usually represented by red in the figure.
- Medium: between 30% and 70% probability of occurrence. Risk that has the potential slightly impact project cost, project schedule or performance. It is usually represented by yellow in the figure.
- Low: below 30% probability of occurrence. Risk that has relatively little impact on cost, schedule or performance. It is usually represented by green in the figure.

Figure 4: Impact and probability of risk according to project risk analysis

Impact	H			
	M			
	L			
		L	M	H
Probability				

Source: Centers for Disease Control and Prevention (CDC) Unified Process; (November 2006); “*Risk management*”; Practice Guide; Atlanta.GA; USA; p3.

2.2.3. Risk response

Risk response is the process of developing strategic options, and determining actions, to enhance opportunities and reduce threats to the project’s objectives. A project team member is assigned to take responsibility for each risk response (*Caltrans Agency; 2012*). The table 6 summarizes the risk response strategies that should be taken into consideration in a project risk management.

Table 6: Response risk strategies

For threats	For opportunities
<p>Avoid. Risk can be avoided by removing its cause or executing the project in a different way while still aiming to achieve the project objectives. Not all risks can be avoided or eliminated, and for others, this approach may be too expensive or time-consuming. However, this should be the first strategy considered.</p>	<p>Exploit. The aim is to ensure that the opportunity is realized. This strategy seeks to eliminate the uncertainty associated with a particular upside risk making the opportunity definitely happen. Exploit is an aggressive response strategy, best reserved for those “golden opportunities” having high probability and impacts.</p>
<p>Transfer. Transferring risk involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. The aim is to ensure that the risk is owned and managed by the party best able to deal with it effectively. Risk transfer usually involves payment of a premium, and the cost-effectiveness of this must be considered when deciding whether to adopt a transfer strategy.</p>	<p>Share. Allocate risk ownership of an opportunity to another party who is best to maximize its probability of occurrence and increase the potential benefits if it does occur. Transferring threats and sharing opportunities are similar in that a third party is used. Those to whom threats are transferred take on the liability and those to whom opportunities are allocated should be allowed to share in the potential benefits.</p>
<p>Mitigate. Risk mitigation reduces the probability and/or impact of an adverse risk event to an acceptable threshold. Taking early action to reduce the probability and/or impact of a risk is often more effective than trying to repair the damage after the risk has occurred. Risk mitigation may require resources or time and thus presents a tradeoff between doing nothing versus the cost of mitigating the risk.</p>	<p>Enhance. This response aims to modify the size of the positive risk. The opportunity is enhanced by increasing its probability and/or impact, thereby maximizing benefits realized for the project. If the probability can be increased to 100% this is effectively an exploit response.</p>
<p>Acceptance. This strategy is adopted when it is not possible or practical to respond to the risk by the other strategies, or a response is not warranted by the importance of the risk. When the project manager and the project team decide to accept a risk, they are agreeing to address the risk if, and when, it occurs. A contingency plan, workaround plan and/or contingency reserve may be developed for that eventuality.</p>	

Source: Caltrans Agency, (June 2012), “*Project risk management handbook: A scalable approach*”, Version 1, California, USA, p 27.

2.2.4. Risk monitoring

The final step in the risk management process is the monitoring and review of the identified risks. Monitoring process should encompass all aspects of the risk management process and be continuously for the purpose of ensuring that controls are effective and efficient in design and

operation, obtaining further information to improve risk assessment, analyzing and learning lessons from events, changes, successes and failures. (*Van Heerden; 2013*).

Risk monitoring aims to determine if (*Project Management Institute; 2000*):

- Risk responses have been implemented as planned,
- Risk response actions are as effective as expected, or if new responses should be developed,
- Project assumptions are still valid,
- Risk exposure has changed from its prior state, with analysis of trends, a risk trigger has occurred,
- Proper policies and procedures are followed, and
- Risks have occurred or arisen that were not previously identified.

3. Project financing modes

There are three major modes under which projects can be financed, namely: the public finance, the corporate finance and the public-private partnership (PPP).

3.1. The public finance and the corporate finance

The *public finance* is the traditional mode of public and infrastructure financing, which is based on the government budget and mostly by public-sector debt. The *corporate finance* is the mode used to fund private-sector project, in which large companies raise capital through corporate bonds and equity or by obtaining commercial bank loans. The table 7 shows the main characteristics of these two modes of financing.

Table 7: The public finance and the corporate finance modes of project financing

The public finance	The corporate finance
<ul style="list-style-type: none"> • A government borrows funds to finance an infrastructure project and gives a sovereign guarantee to lenders to repay all funds. Government may contribute its own equity in addition to the borrowed fund. • Lenders analyze the government's total ability to raise funds through taxation and general public enterprise revenues, including new tariff revenue from the project. • The sovereign guarantee shows up as a liability on government's list of financial obligations. 	<ul style="list-style-type: none"> • A private company borrows funds to construct a new power plant and guarantee to repay lenders from its available operating income and its total assets. • The company may choose to contribute its own equity as well. • In performing credit analysis, lenders look at the company's total income from operations, its portfolio of assets, and its existing liabilities. • The loan shows up as a liability on the company's balance sheet.

Source: Patramanis Theodoros, (June 2006), "Structured finance for hybrid infrastructure models: The application of project finance into public-private partnership for the construction and operation of infrastructure", Massachusetts Institute of Technology-USA, p 23-24.

However, both of governments and private companies have found those modes of project financing less attractive and they have started to avoid them, since the 1970s, because they strains their balance sheets and capacity, as well as limits their potential participation in other projects (*Patramanis; 2006*). This fact has stimulated the search of alternative modes of funding, and which consist on collaboration between the both sectors and creating what is known as "the public-private partnership".

3.2.The public-private partnership (PPP)

Nowadays, "Public-Private Partnership (PPP)", is considered as the most common mode of project financing. The *OECD (2008)* defines it as an arrangement between government and one, or more, private sector partners (which may include the operators and the financiers). The private partners deliver the service in such manner that the service delivery objective of the government are aligned with the profit objectives of the private partners, and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners.

Several types of PPP models have emerged and they vary according to the ownership of capital assets, the responsibility for investment, the assumption of risk, and the duration of contract. The classification of the PPP models is based, generally, but not always, on increased involvement and assumption of risks by the private sector. Each model has many variants and

a combination between them is possible, such as the BOT and lease. The table 8 presents a summary of the PPP models and their characteristics.

Table 8: Classification of PPP models

Broad category	Main variants	Ownership of capital assets	Responsibility of investment	Assumption of risk	Duration of contract (years)
<i>Supply and management contract</i>	Outsourcing	Public	Public	Public Private/public	1-3
	Maintenance management	Public	Public/private	Public	3-5
	Operational management	Public	Public	Private/public	3-5
<i>Turnkey</i>		Public	Public	Private/public	1-3
<i>Affermage/lease</i>	Affermage	Public	Public	Private/public	5-20
	Lease*	Public	Public	Private/public	5-20
<i>Concessions</i>	Franchise	Public/private	Private/public	Private/public	3-10
	BOT**	Public/private	Private/public	Private/public	15-30
<i>Private ownership of assets and PFI type</i>	BOO/DBFO	Private	Private	Private	Indefinite
	PFI***	Private/public	Private	Private/public	10-20
	Divestiture	Private	Private	Private	Indefinite

Source: United Nations, (2011), “A guidebook on Public-Private Partnership in infrastructure”, Economic and Social Commission for Asia and The Pacific (ESCAP), Bangkok-Thailand, p 5.

*Build-Lease-Transfer (BLT) is a variant.

**Build-Operate-Transfer (BOT) has many other variants such Build-Transfer-Operate (BTO), Build-Own-Operate6Transfer (BOOT) and Build-Rehabilitate-Operate-Transfer (BROT).

***The Private Finance Initiative (PFI) model has many other names. In some cases, asset ownership may be transferred to, or retained by, the public sector.

Each model of the PPP is discussed, briefly, bellow (*United Nations; 2011*):

- *Supply and management contract*: it is a contractual arrangement for the management of a part, or whole, of a public enterprise by the private sector, through service design and delivery, operational control, labour management and equipment procurement. The public sector retains the ownership of facility and equipment.

- **Turnkey:** also known as Design-Build, in which, generally, a private sector is selected through a bidding process. The private sector designs and builds a facility for a fixed fee, rate or total cost, which is one of the key criteria in selecting the winning bid. He assumes risks involved in the design and construction phases only.
- **Affermage/lease:** the operator takes responsibility of operating and maintaining the infrastructure and services, which are leased from the government for an agreed period of time, and he is, generally, not required to make any large investment only if this type of arrangement is combined with other models, such as build-rehabilitate-operate-transfer.
- **Concession:** the government defines and grants specific rights to, usually, a private company to build and operate a facility for a fixed period of time. The government may retain the ultimate ownership of the facility and/or right to supply the services. In a Build-Operate-Transfer (BOT), and its other variants, the concessionaire makes investments and operates the facility for a fixed period of time after which the ownership reverts to the public sector. The government has explicit and implicit contingent liabilities that may arise due to loan guarantees and sub-ordinate loans provided, and default of a sub-sovereign government and public or private entity on non-guaranteed loans. The concessionaire's revenue in a BOT project comes from managing and marketing of the user facilities and renting of commercial space where possible.
- **Private Finance Initiative (PFI):** the private sector remains responsible for the design, construction and operation of an infrastructure facility. In some cases, the public sector may relinquish the right of ownership of assets to private sector. The public sector purchases infrastructure services from the private sector through a long-term agreement. PFI model, therefore, bear direct financial obligations to the government in any event. In addition, explicit and implicit contingent liabilities may also arise due to loan guarantees provided to the lenders and default of public or private entity on non-guaranteed loans.

4. Financial engineering for project financing

In addition to significant funds, large and complex projects involve the use of a financial engineering. According to *Finnerty (1988)* financial engineering involves the design, the development and the implementation of innovative financial instruments and processes, and the formulation of creative solution to problems in finance. *Beidleman et al (1991)* describe financial engineering as involving the altering of the size, timing, quality and direction, or currency of cash flows to meet investors. Financial engineering for project financing requires a combination between a set of funds sources, which are increasingly sophisticated, and which the literature review presents through several studies (*Ahluwalia (1997)*, *Holmgren & Lindh (2002)*, *Meng Ndupuechi (2003)*, *Fight (2006)*, *Finnerty (2007)*, *Dewar (2011)*, ...). However, the choice of sources of funds depends on the project sector, the nature of risks and payoff periods. The major sources of funds used in project financing will be summarized in follow.

4.1. Equity

According to *OECD (2015)* equity refers to all financial resources provided to projects in return for an ownership interest. It usually used for infrastructure assets that seek long-term engagement investment and projects that have a high risk-return profile. A contribution of capital from the equity investors (from 10 to 40 per cent of the capital cost) is usually seen in project financing, even when a project's modeled cash-flow is strong enough to suggest that the funding could be 100 per cent debt. (*Dewar, 2011*)

Qi & Wang (2009) presented equity capital through three forms: (i) direct investment can be individual investors, legal person and from government agency, (ii) common and preferred stock are good for raising the discrete money, (iii) the surplus reserves and undistributed profits are the main sources of retained earnings. Even public utilities and domestic institutional investors may contribute to the project expansion; significant domestic equity support may be forthcoming for new infrastructure projects until there is a track record of performance. Thus, foreign sponsors may often be keen to link with domestic investors. (*Ahluwalia, 1997*)

Finnerty (2007) explained that, in general, fund managers form *committed investment funds* to make equity investments in certain specified types of projects. Investors reap the benefits of diversification, and they benefit from investment adviser's experience and expertise in evaluating projects of a particular type. Thus, to invest jointly rather than separately allow to

investors/sponsors the realization of economies from pooling information and sharing responsibility for monitoring their joint investments.

Some private sponsors choose to meet their equity finding obligations by way of debt financing; this is known as an *equity bridge financing*. The other lenders may accept an equity bridge financing in a project provided that is subordinated adequately to the repayment of any senior debt financing. Nevertheless, certain lenders may be unwilling to participate in a project involving little balance sheet financing by the sponsors that may be considered to demonstrate an absence of equity commitment to the relevant project. (*Dewar, 2011*)

4.2.Senior debt

Fight (2006) defined senior debt as the debt that is not subordinated to any other liability, in the other words, the first to be paid out if the company or project is placed under liquidity. Senior debt is considered as the main source for the larger portions of funding in project financing. He classified senior debt into two categories, namely (i) *unsecured loans*, which depend on the borrower's general creditworthiness and usually contain a negative pledge of assets, and (ii) *secured loans*, which are loans where the assets securing the loan have value as collateral, meaning that such assets are marketable and can readily be converted into cash.

For *Buljevich & Park (2007)*, the debt financing consists of (i) a construction loan facility, which is used for the financing of all the construction and start-up project costs, and (ii) a term loan facility, which typically is disbursed upon the occurrence of project completion and is applied to take out the construction loan. Debt repayment is done through the project revenues, the project company's assets given in collateral and the various credit enhancements granted by the sponsors and the other interested participants in the project.

It is explained by *Fight (2006)* that a syndicated loan is usually is created in the case of project financing in order to provide loan to the borrower, by two or more banks, which is governed by a single loan agreement. The loan is arranged and structured by an arranger and managed by an agent, who may also be participants. Thus, each participant provides a defined percentage of the loan, and receives the same percentage of repayments.

Despite that bank loans still the most source of debt financing, the project company may issue *corporate bonds*, usually based on its credit standing, to raise capital, as explained by *Wang Simiao, (2012)*. By issuing bond (interest is tax free) the project company has a lower

financing cost and the shareholders' control over the company is not diluted. The interest is the only payback during the project (more revenue is left for the shareholders).

4.3. Mezzanine

From a balance sheet perspective, *Giurca (2007)* considered mezzanine as a hybrid instrument that is a gap between senior debt and equity. As presented by *Levine (1998)*, the maturity period of mezzanine finance is normally longer than that for senior debt and this combined with the insecure nature of the finance makes it more expensive than bank; but it is less expensive than straight equity due to the higher returns required by the equity providers.

Giurca (2007) classified mezzanine into private placement instruments (private mezzanine) and capital market instruments (public mezzanine). Thus, the private mezzanines are:

- *Subordinated loans (junior debt)*: are the most common form of mezzanine financing and they are unsecured loans where the lender's claim for repayment in the event of bankruptcy ranks behind that of providers of "normal" loans (senior debt);
- *Participating loans*: are normal loans, but rather than being fixed, their remuneration is contingent upon the results of the business. Despite sharing in profits, participating loans do not give rise to an ownership relationship;
- *The "silent" participation*: is closer in legal form to a stockholding than are subordinated or participating loans. The distinguishing feature of this form of financing is that one or more persons take an equity stake in a project, but without assuming any liability to the company's creditors.

Regarding public mezzanines, they refer to:

- *Profit participation rights*: are equity investments under company law that entitle the holder to rights over the project's assets, but not to the right to be consulted on business decisions;
- *Convertible bonds/bonds with warrants*: give the holder, in addition to the usual right to fixed interest payments and repayments of principal, the right to acquire shares or other equity instruments of the project instead of accepting repayment of the bond.

Mezzanine finance improve the quality of the senior debt and hence the projects marketability, and as such appeals to investors looking for a share in the "up-side" risk of the

project. (*Meng Ndupuechi, 2003*). However, mezzanine is generally made available for a limited time in contrast to equity capital, until the project can generate sufficient equity capital from retained profits. (*Giurca; 2007*)

4.4.Capital market

As explained by *Dewar (2011)*, additional source of financing lay be obtain in the capital market and that encourages the participation of investors whose objective is to hold a portfolio of assets without necessarily having to undertake significant due diligence on each investment, creating a deep pool of capital seeking long-term, fixed income assets. However, it is generally only the strongest projects that have ready access to the capital markets.

Buljevich & Park (2007) estimated that capital market funding may be a viable alternative for a project financing as it can provide a fixed-rate financing at a cheaper cost and for a term usually longer than commercial banks, export credit and multilateral lending. Furthermore, capital market facilities generally comprise a more limited, simpler and faster structuring process, easier-to-meet conditions precedent for the underwriting of the debt securities and covenants that are more flexible, representations and warranties and events of default.

World Bank estimated that bonds market is among the ideal sources of large scales projects financing despite that the costs are higher thaw with syndicated loans and the fact that they have much longer maturities (ten to thirty years). The development of the project financing market and growing expertise encouraged promoters to access the bond markets directly as a means of improving project return and/or reducing the costs of financing. (*Meng Ndupuechi, 2003*)

Merna & Owen (1998) are of the opinion that bonds provide a lower degree of flexibility relating to possible cost overruns, cost savings during the construction phase and repayment delays during the operation phase. However, new infrastructure companies may be able to access bonds market in the post construction stage, when risk perceptions have diminished and projects begin to generate steady revenue streams in order to refinance shorter-term loans taken initially to finance the construction stage. *Ahluwalia (1997)*.

4.5.Bilateral and multilateral institutions

It is uncommon for countries, mainly developing ones, to appeal to international financial institutions to deal with large-scale project financing in order to address the efficiencies of

domestic financing. These institutions, which can be bilateral or multilateral, intervene in terms of financial consulting and advice, or by loans and equity participation; and sometimes by grants. Offering guarantee services is among the important features of these institutions, which could very significant in building or improving investor confidence in an otherwise seemingly risk project. (*Meng Ndupuechi, 2003*).

Fundamentally, multilateral financial institutions work to counterbalance the trend for private financial flows by increasing loans in periods of reduced interest from the financial market. In terms of political weights and financing volume, the World Bank is considered as the most important multilateral financial institution in project financing. In addition to the World Bank, several other multilateral institutions exist (major regional and continental development banks) such as the European Investment Bank, African Development Bank, or Inter-American Development Bank. (*Gatti et.al, 2013*)

About bilateral institutions, they are linked to governments of individual countries for economic policy purposes and commercial and international promotion of the countries business. In this case, it is to distinguish between development agencies and export credits agencies. (*Gatti et.al, 2013*)

- *Development Agencies*: act as financial investment houses that grant loans and invest in the equity capital of companies (often joint-ventures promoted by sponsors resident in countries in which the development agency operates).
- *Export Credit Agencies (ECAs)*: provide political risk coverage, total coverage or direct loans to exporting companies operating in the home country. They can also provide financial support through interest rate equalization to commercial banks, in addition to the insurance equity investment against political risks.

5. Project financing valuation

Despite the importance of the valuation of project financing, a few relevant and available academic literature papers are published on the topic, namely those of *Esty (1999)*, *Dailami et al (1999)*, *Gatti et al (2007, 2013)* and *Pietz (2010)*.

Esty (1999) estimated that the traditional discounting approaches based on equity cash flows valuation, namely the weighted average cost of capital “WACC” and the cost of equity, are too simple for valuing project financing and he considered that tools should be based on “multiple

discount rates” rather than a single discount rate. Thus, he illustrated the using of an equity cash flow valuation of a hypothetical project financing investment called “Petro Mexico” and the using of a “Quasi-market valuation (QMV)”. Then, he tried to show how Monte Carlo Simulation can be used to analyze cash flow uncertainty. Finally, he briefly discussed another valuation tool called “Real option analysis”, which can supplement discounted cash flow (DCF) analyzing for valuating large-scale projects.

Focusing their study on the implication for the lenders, *Gatti et al (2007, 2013)* estimated that the value-at-risk is required, in a project financing investment, to support the process of credit risk estimation, and to evaluate the value-at-risk the authors proposed a model based on Monte Carlo Simulation by using cash flows. The process includes (i) a definition of appropriate risk assessment model, (ii) a description of the project variables, (iii) an estimation of the input variable, their distributions and correlations, and (iv) a modeling of the project cash flows, calculating the outputs, and the valuation results.

Focusing on infrastructure project financing transactions that involve the private sector, *Dailami et al (1999)* introduced *INFRISK*, a computer-based risk-management approach, for analyzing the impact of certain risks on the project. The authors’ approach is able to generate probability distribution for a project’s net present value (NPV), internal rate of return (IRR) and many other key decisions variables. The main contribution of *INFRISK* is the using of a large set of probability distributions in conducting Monte Carlo Simulation.

Pietz (2010) focused his study on the valuation of capital investment through the capital cost and the cash flows of project financing. He considered that for the consideration of the future uncertainty in capital investment there are two solutions: a deterministic scenario-based modeling approach or the application of stochastic modeling. The author argued that the DCF analyzing is not appropriate to project financing because of the limited lifetimes and time-varying capital structures, and the solution consists on the assumption of a target capital structure that allows the calculation of a discount rate. He aimed to apply stochastic cash flow modeling to quantify both the default probability (for equity and debt providers) and the expected profitability of the capital investment (for equity providers).

From the above studies, we find that the common point of valuation was based on cash flows. Indeed, according to *Pietz (2010)*, in almost all modern valuation methods do not take into consideration accounting profits because it does not represent economic realities, at least in the short-term. Based on the different relevant studies on valuation of project financing’s

cash flows, *Pietz (2010)* found that the cash-flow determination and valuation could be done by using different methods, which are summarized below.

5.1. Cash flow modelling

Cash flow modelling aims to find a methodology that is suitable to forecast future cash flows and to use this method in such a way that the obtained results are meaningful. The most common approach used in cash flow modelling is the fundamental analysis, which consists on predicting future values based on historical data, and for that many methods are applicable such as a simple extrapolation of the last values, the use of a deterministic trend, or the application of an advanced time series model. Another possibility is estimating the future cash flow based on pro forma financial statements.

However, the fundamental analysis presents an important drawback, which consists on the obtained future cash flows are normally point estimates. To overcome this drawback the financial literature suggested three principle methods, namely:

- *Sensitivity analysis*: measures the effect of changes in one of the input parameters on the estimated future cash flows,
- *Scenario analysis*: allows the simultaneous manipulation of several of the input parameters and the quantification of the impact; each scenario results in one cash flow, and
- *Simulation analysis*: is based on a random manipulation of all input parameters. As a result, it yields a probability distribution of the future cash flows.

5.2. Stochastic cash flow modelling

Hess & Quigley (1963) were the first to apply stochastic modelling in finance, and stochastic cash flow modelling refers to the forecasting of future cash flows with the aim of obtaining probability distribution of the cash flows at some future point-in-time. Its main advantage is the calculation of probability distribution instead of point estimates, and it uses almost all-available information. Stochastic cash flow modelling is seen as consisting of three steps:

- The specification of the cash flow equation and the input factors,
- The simulation of future input factor values and cash flow values, and
- The aggregation of the results to a probability distribution.

Yet, this method has several drawbacks, presented as follow:

- It depends on accurate parameter forecasts and in particular on an accurate specification of the correlation structure between the inputs factors,
- The complexity of the accurate specification of all input parameters is high, in particular when the correlation structure must be specified,
- The necessary computing power to complete the stochastic modeling can be immense,
- Easy to handle software tools are still rarely available, and
- It should only be used when analytical solutions are not available.

Conclusion

We may conclude through this chapter despite the fact that project financing is a complex mode of financing projects with high costs; it will continue to be a strategic mean to finance long-term projects and the economy. To note that, regardless of the mode and the source of financing, the core elements in project financing are the distribution of risks among members and the valuation of a project, because any investor seeks a return on investment with a minimum of risk. Also, it is important in project financing that all parties and stakeholders have an understanding of how it works to avoid conflicts and misunderstood in order to carry out the project.

However, the nature of project financing presents many challenges and barriers, such as high costs, high risks, the uncertainty in generating cash-flows, generating social benefits that could be difficult to measure, heterogeneity, complexity and presence of a large number of parties, opaqueness and the absence of a clear benchmark for measuring investment performance. For this reason, to attract investors and capital providers in project financing, it is important to structure assets as attractive opportunities, providing risk-return profiles that match investor's return expectations and liability structures (*OECD, 2015*)

CHAPTER III

*PROJECT FINANCING SHARI'AH-
COMPLIANT*

Introduction

The important role of infrastructure, industry, mine, transportation, telecommunication, water and other sectors in any economy, and the peculiarity of their financing require a constant search for new means of fund-raising and their financing. This chapter aims to discuss the way in which the finance based on Islamic law (shari'ah) can be financial mechanism source to provide finance to large scale projects and thus be incorporated in project financing, which thereby refers to as shari'ah-compliant project financing or, commonly known as Islamic project financing.

Thus, it will be about understanding Islamic project financing, through its definition and comparison with its conventional counterpart, its modes of function, its risks and the way of its valuation, but also through presenting a case study, which consists on the Islamic Development Bank.

1. Understanding Islamic project financing

The understanding of shari'ah-compliant project financing needs to start by giving it meaning and highlight its similarities and divergence elements with conventional project financing.

1.1. The meaning of Islamic project financing

Islamic project financing is a financial technique that involves the financing of the entire or partial needed to fund a large-scales project. It requires that the purpose of the project involved and the financial schemes used are in accordance with Shari'ah (*Lee & Son, 2013*).

The logic of project financing is suitable to the Islamic perception of the principal of sharing profits and losses, and risk in business. *Mohammed Ayub (2007)* confirms that “*the assumption of business risk is a precondition for entitlement to any profit over the principal...the important Shari'a maxim “Al kharaj bi-al-daman” or “AlGhunum bil ghurm” is the criterion of legality of any return on capital, meaning that one has bear loss, if any, if he wants to get any profit over his investment. Profit has to be earned by sharing risk and reward of ownership through the pricing of goods, services or usufruct of goods.*”

A number of research studies on Islamic project financing were done in the late 1990s. *Khan (1997)* proposed an alternative Islamic structure for project finance deals in power plant

projects. He estimated that, following the Islamic financial principal, conventional project financing models can be modified with a view to develop an integrated Islamic project financing model, which can contribute with the conventional models in large-scales projects without compromising any religious principles.

Wilson (1998) also found that private sector enterprises were becoming involved in infrastructure projects because governments rarely financed major projects, and that within *istisna* scheme, it was proved that projects can be financed when the interest was diminished. Even *Zarqa (1997)* stated that *istisna* can be applied in both explicitly income-generating public infrastructure projects and non-income generating projects.

Ebrahim (1999) proposed an integrated model of Islamic and conventional project financing which was more focused on synthesizing *mudaraba* security, which is a combination of the *murabaha* facility and call option. In this approach, a methodology was proposed to derive the profit sharing ratio endogenously. Using mathematical derivation, the author synthesized the future value of a project opposed to incremental payoffs in the *mudaraba* scheme. However, the study only interpreted and modeled Islamic project financing instruments from the perspective of a conventional banker.

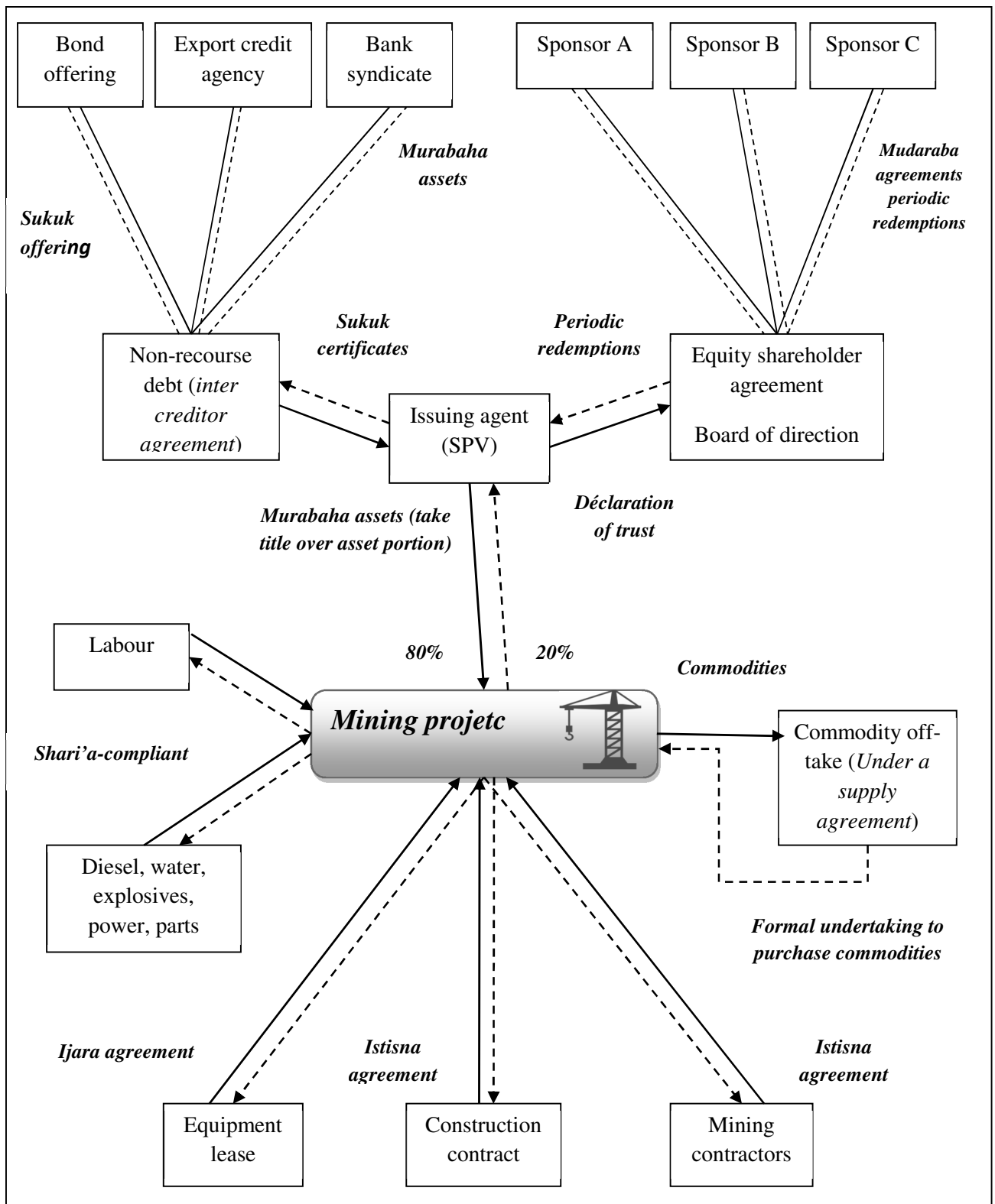
In the purpose to fund projects in different sectors, Islamic finance proposes several types of contracts and financial arrangements. According to *Wood (1995) & Lingnieres (2005)*, Islamic finance can be used to finance industrial sector (power generation, manufacturing, etc), development of natural resources (oil fields, gas or mining, etc) and construction and infrastructure development (ports, highways, telecommunication, etc).

In order to carry out operations related to Islamic financial structures, and to uphold the contractual relations with other entities of the projects, an ad hoc structure is used as well in Islamic project financing. An intermediary company works to manage operations related to the Islamic tranche, mitigates all the specific risks attached to Islamic financing and makes the connection between Islamic lenders and the project company. The intermediary company is often required in major projects co-financed by conventional and Islamic banks or financial institutions. (*McMillen Michael ; 2001*).

Thereby, to understand the Islamic financing project function, *West (2013)* illustrated (as shown in the figure 5) a Shari'a-compliant project financing structure for a resources project, in which each component of the project must be Shari'a-compliant including the sources (*sukuk*,

mudaraba and *murabaha*), commodity off-take (Shari'a-compliant formal undertaking), construction contracts (*istisna*) and lease (*ijara*).

Figure 5: Islamic project financing for a resource project



Source: West Jason, (Apr-Jun 2013), "Islamic finance and the resources sector: A natural fit for project finance", Journal of Islamic Economics, Banking and Finance, Vol. 10, N°. 2, p17. (9-26).

However, the Shari'a-compliant structure used in Islamic project financing depends on whether the project is new (Greenfield project) or whether it is an existing project that has already been constructed (*Global Islamic finance Report; 2010*). Thus, the relationships and contracts used among the different stakeholders in an infrastructure development financed in a Shari'a-compliant way will depend on the specific project type and financing modes used. (*Habib ; 2010*)

In studying Shari'a-compliant project financing a legitimate question can be asked, namely: “*what does Islamic finance have to offer to the project financing field?*” *Babai (1999)* estimates that there are several areas where Islamic project financing might be able to add value of a kind that would set it apart from conventional project finance:

- It might allow for a lowering of the overall costs of financing in a project, if it could demonstrated to investors that their current financing costs could be lowered if they refinanced a project through Islamic financial instruments;
- It might allow for the undertaking of sound projects that otherwise would not be get off the ground. In addition, Islamic funding could permit economically and technically viable projects that are unable to attract conventional financing on account of noncommercial;
- Islamic finance could play a critical role in many projects that are likely to remain beyond the vision of traditional investors. Among this, there are small independent power projects and small operations in process industries, that may not attract much interest from traditional lenders and investors; and
- In terms of adjusting the risk profile of projects, Islamic financial institutions may be able to bear certain types of risks that commercial lenders are either unwilling or unable to assume.

1.2. Conventional project financing vs Islamic project financing

According to *McMillen (2007)*, the primary distinguishing characteristic of Shari'ah-compliant project financing structures is, whether or not, they involve a conventional interest-bearing debt component. The most common transactions using interest-bearing debt are: (i) those involving a single Shari'ah-compliant tranche in an otherwise conventional financing, and (ii) those in which conventional debt is provided to a separate special purpose entity that is related to the Shari'ah-compliant investors solely through Shari'ah-compliant contractual arrangements.

The comparison between the Islamic and conventional project financing should, in principle be an uncontroversial issue since, in the conventional system exist a large number of projects that have been financed using profit-sharing principles, project and stand alone financing, or some other form of financing that ties the debt servicing to the payoffs of the project and spread the risks among the different parties involved in accordance with their comparative advantage in bearing such risks, as well as in Islamic system. Thus, several main issues, concerning the similarities and differences of project financing under both the Islamic and the conventional systems, will be exposed in the following points. (*El-Husseini; 1988*)

1.2.1. Project evaluation and feasibility study

This includes two elements, namely:

a. Bank's participation in project appraisal

Equity participation or PLS financing schemes induce greater participation from the part of the bank in the evaluation of the profitability and the feasibility of the project, as compared with the general obligation interest-based financing.

Not having the necessary power (for evaluate the projects), Islamic commercial banks will tend to specialize in certain types of projects where the requirements for projects evaluation fit the skills of their available personnel.

Conventional commercial banks can have a greater flexibility in choosing projects to be financed since their main criteria for selection is the credit worthiness of the borrower, and hence may have an advantage over Islamic banks in handing a wider range of investments opportunities.

b. Discount rate in project evaluation

The issue of discounting is not completely resolved since no agreed upon convention has been devised regarding cash flow discounting in project evaluation under Islamic financial system. It is still not, precisely, shown in the existing literature in Islamic economics and finance how the discount or capitalization rate should be determine in an economic system based solely on the PLS and equity participation.

1.2.2. Contractual arrangements

At first sight, the Islamic financial instruments seem to be a subset of the financial instruments used in conventional capital markets, with the restriction that no interest should be paid or demanded on borrower capital, and that the concept of interest should be replaced by the concept of PLS.

Because the non-uniformity of the allowed transactions, it should be an effort from economists and scholars to clarify the principles of Islamic finance and to codify them in a set of predefined contracts.

The two main contracts that have been devised in order to replace interest in transactions are the *mudaraba* (PLS based contract) and *musharaka* (equity participation).

1.2.3. Contractor's financing requirements

The main concern of Islamic economists lies in the relation between the supplier and the user of borrowed capital. Both of owner of the project and the contractor need financing, as in conventional finance.

a. Construction contracts

The relation between the contractor and the owner in a construction project should remain the same under the Islamic system. Several contracts are often used in construction projects, and some may fit more than others within the Islamic framework of economic justice and fair allocation of risks, and returns the terms of the construction contract may be negotiated between the concerned parties, and the Islamic principles on business transactions may be taken into considerations.

The most common contracts in construction project are: lump sum of fixed price contract, unit price contract, cost plus fee contract, target price plus profit contract, and guaranteed maximum price contract.

Under the conventional system, the supplier of capital gets a fixed return irrespective of the outcome of the project, and risk is only transferred to him through default. Under Islamic system, both supplier of capital, the contractor and the owner of the project share risk.

b. Working capital financing

Under the conventional system, most contractors, especially large international construction companies, have an arrangement with commercial bank providing lines of credit, with or without compensating balances, and at relatively low interest rate.

Under the Islamic system, such short-term financing cannot be easily accommodate by PLS contracts because of the difficulty at this early stage of the project to determine the relevant profits or losses of the contractor. To resolve this problem, Muslim scholars have proposed that such line of credit should be provided to the contractor on an interest-free basis, in conformance with the *qard-hassan* contract principles, for the short-term financing; or through the *mudaraba* or *musharaka*, for the medium-and-long-term financing.

Thus, when financing on a PLS basis is not feasible owing to difficulties in determining profits or the short-term maturity of funds required, Islamic institutions have used lending on the basis of markup (*murabaha*).

c. Plant and equipment financing

Construction firms usually buy most of their basic equipments new. However, a large portion of equipment needed is leased. Conventional banks have an active role in leasing operations. Operating lease is acceptable under the Islamic law. In fact, most Islamic financial institutions are active in leasing and lease purchase activities (*ijara*).

1.2.4. Risks involved in international financial operations

Both conventional and Islamic project financing, particularly in international one, face numerous risks, and that can be summarized as follows: (i) political, associated with government actions and turmoil affecting international economic factors; (ii) commercial or business related, associated with the operational side of the construction business; and (iii) financial, associated with interest rates fluctuations, exchange rates exposure and insurance.

The table 9 presents a synthesis of the main points that distinguish Islamic project financing from conventional project financing.

Table 9: Comparison between conventional project financing and Islamic project financing

	Conventional project financing	Islamic project financing
<i>Financing principle</i>	Interest-based financing	Profit loss sharing-based financing
<i>Transaction</i>	Financing can be established in one transaction without considering the purpose of the transaction	One <i>aqd</i> (contract) is only used for one transaction within a certain period of time
<i>Instrument category</i>	Equity provision Debt can be in the form of a loan or obligation with interest-based financing Guarantee	The instrument chosen depends on the share and management portion: - Mudaraba - Musharaka It depends on the purpose of the transaction: - Salam - Ijara - Sukuk - Murabaha/musawama kafala
<i>Asset ownership</i>	The asset belongs to the SPV although a party who provides debt has the priority privilege to get payment	The asset belongs to the party who provides the finance, based on the share portion; asset ownership can only be transferred when all transactions have been established
<i>Shari'ah board involvement</i>	There is no Shari'ah board involvement	Shari'ah board involvement is a compulsory

Source: Rarasati Ayomi Dita, (September 2014), “*Islamic project financing in Indonesian infrastructure development*”, Ph.D thesis, Queensland University of Technology, Australia, p 25.

1.3.Limits and challenges of Islamic project financing

Despite the fact that Islamic finance can be used in project financing, however, there are still some constraints that need to be addressed in order to a better implement Shari'ah-compliant project financing. Based on studies on this topic, a number of researches listed the most limits and challenges face the development of Islamic project financing, among them *Babai (1999)*, *McMillen (2001)*, *Camacho (2005)*, *Ahmed (2010)*, *Alexander (2011)*, and *Rarasati (2014)*. The major results are exposed in the following.

There is a variety of constraints faces any financier, Islamic or no-Islamic in Muslim countries, due to the legal and economic situation of these countries. Indeed, financiers are not operating in benign economic environment because investment codes are murky, legal remedies are problematic, regulations regimes are capricious, and capital market are thin. Such business environment does not make many private agents take a long-term financing project.

The other factor need to mention is characteristics of the Islamic financial industry as a whole is the problem of tradability and liquidity, which is a serious constraint against pursuing Islamic project financing. The disjunction between the short-term nature deposits of most Islamic financial institutions and the long term-term nature of investment in projects continues to plague the industry at large.

Also, the capabilities of Islamic financial institutions can be a real obstacle against Islamic project financing. Large-scales financing demands a skill set not possessed by many Islamic banks. It requires a variety of qualified analysts, financial modelers who can prepare complex cash flows projections, expertise in project appraisal and monitoring, and specialists in risk management-professionals, along with the attendant organizational systems, with the wherewithal to allocate and price different kinds of project risk.

One of limitations on the implementation of project financing techniques in transactions is when it is became difficult to obtain a collateral security interest under the Shari'ah and the constraints inherent in the nature of *rahn* (mortgage/pledge) under the Islamic law. Effectively, in Islamic finance there is a need for risk mitigation organizations and instruments that can be used to support infrastructure financing. Specifically, organizations that can provide guarantees and/or insurance using the appropriate Islamic instruments are needed, such as the Islamic Corporation for the Insurance of Investment and Export Credit (ICIEC) of the Islamic Development Bank (IDB) Group, in international level; or government, in national level.

The complexity of infrastructure projects involves many parties and contracts. Islamic financial contracts add another intricate contractual layer that can create additional challenges. There are a couple of issues related to using Islamic finance in infrastructure projects: the first relates to the disparity of laws relating to conventional and Islamic finance and the second relates to the divergence of opinions and fatwa within Islamic legal rulings.

Since infrastructure attracts international participations, there needs to be some standardization of Islamic financial contracts at the international level. What is at stake here is the absence of uniformity of Shari'ah rulings. Sources of the problem come from the lack of a cohesive regulatory body, which is a supreme *Shari'ah board*. However, in the local Shari'ah boards there is still uncertainty regarding their decisions which can sometimes appear to be unpredictable and subjective, because of le lack of expertise and the misinterpretation of Islamic finance sources.

2. The use of Islamic finance in project financing

Shari'ah-compliant finance presents a variety of ways and structures that can be used in large-scale project financing through different modes (private, public and PPP) and sources (banks, investment funds, capital markets...) as well as in its conventional counterpart.

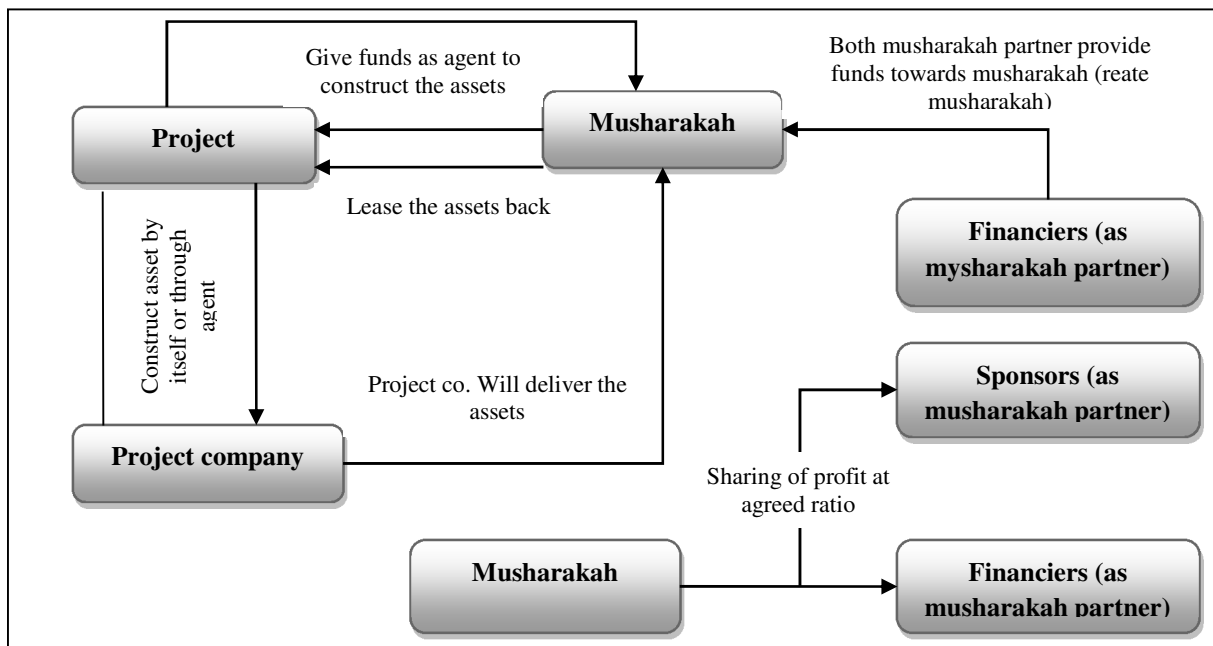
2.1. Islamic financing contracts

Various packages in project finance can be offered by the different Islamic finance structures and contracts. Basically, Islamic project financing structures are direct or indirect related to eight contracts (*mudarabah*, *musharakah*, *murabahah*, *ijara*, *istisna'a*, *salam*, *sukuk* and *wakalah*), some of which were already used in the period of the Prophet Muhamed (pbuh) and Caliphs, and others emerged recently to meet the financing needs in the contemporary economic environment.

2.1.1. Musharakah and mudarabah financing structures

Musharakah (in Arabic means "sharing" or "partnership") is a kind of equity participation agreement and works under the PLS principle, though profits can be shared in any equitable proportion, but losses must be shared in proportion to capital contributions, and also of the amounts of labour supplied. (*Visser; 2009*)

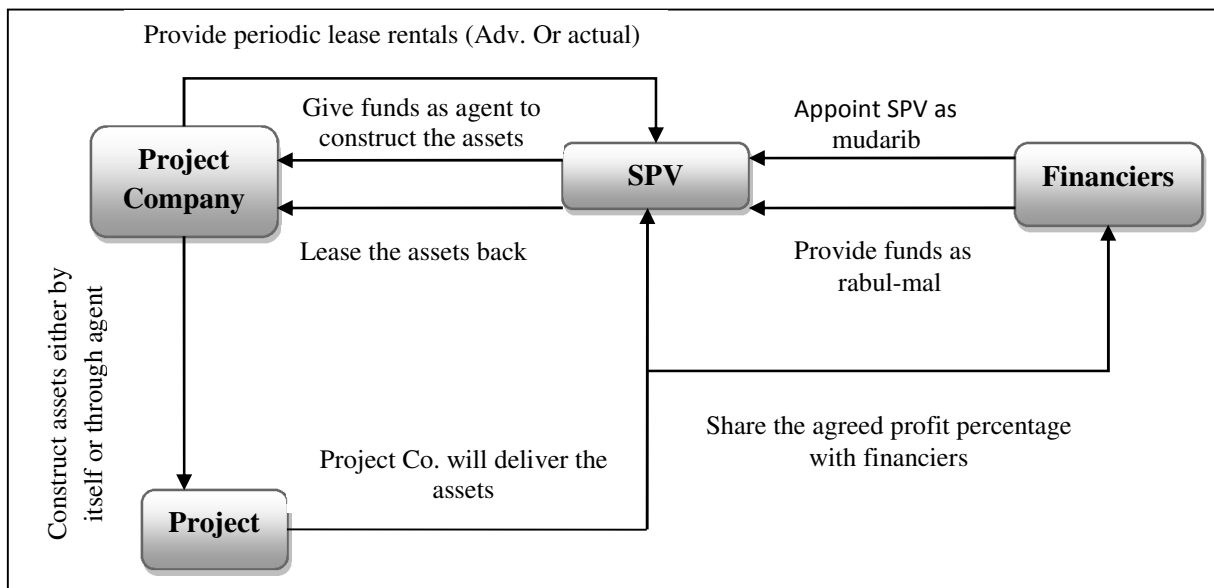
Figure 6: Musharakah financing structure



Source: Khan Urooj ul Hasan. (nd). *Islamic infrastructure project finance*. Meezan Bank Limited. Pakistan. P83

Mudarabah is the term used by Hanafi, Hanbali and Zaydi schools of Islamic thought, and *qirad* or *muqaradah* by the other schools (*El Hussein, 1986*), and it is analogue to a venture capital agreement or a trust financing agreement and works under the PLS principle. The banking or financial institution (or any other money provider) acts as *rab al-mal* or financier, capital owner, and provides the capital needed for financing a project, what is similar to a sleeping partner. The second party, the *mudarib* or agent, manages the venture and brings their labour and expertise in. (*Visser; 2009*)

Figure 7: Mudarabah financing structure



Source : Khan Urooj ul Hasan. (nd). *Islamic infrastructure project finance*. Meezan Bank Limited. Pakistan. P 82.

The main differences between *mudarabah* and *musharakah* financing structure are presented in the table 10.

Table 10: Differences between musharakah and mudarabah

Musharakah	Mudarabah
All partners invest.	Only <i>rab ul-mal</i> invests.
All partners participate in the management of the project and can work for it.	<i>Rab ul-mal</i> has no right to participate in the management, which is carried out by the <i>mudarib</i> only.
All partners share the loss to the extent of the ratio of their investment.	Only <i>rab ul-mal</i> suffers loss because the <i>mudarib</i> does not invest anything. However, this is subject to a condition that the <i>mudarib</i> has worked with due diligence.
The liability of the partners is normally unlimited. If the liabilities of business exceed its asset and the business goes in liquidation, all the exceeding liabilities shall be borne pro rata by all partners. But if the partners agree that no partners shall incur any debt during the course of business, then the exceeding liabilities shall borne by that partner alone who has incurred a debt on the business in violation of the aforesaid condition.	The liability of <i>rab ul-mal</i> is limited to his investment unless has permitted the <i>mudarib</i> to incur debts on his behalf.
As soon as the partners mix up their capital in a joint pool, all the assets become jointly owned by all of their respective investment. All partners benefit from the appreciation in the value of the assets even if profit has not accrued through sales.	The goods purchased by the <i>mudarib</i> are solely owned by <i>rab ul-mal</i> and the <i>madarib</i> can earn his share in the profit only in case he sells the goods profitably.

Source: Usmani Muhammad I.A, (2002), “*Meezan bank’s guide o Islamic banking*”, 1st edition, Edition Darul-Ishaat, Pakistan, p 99-100.

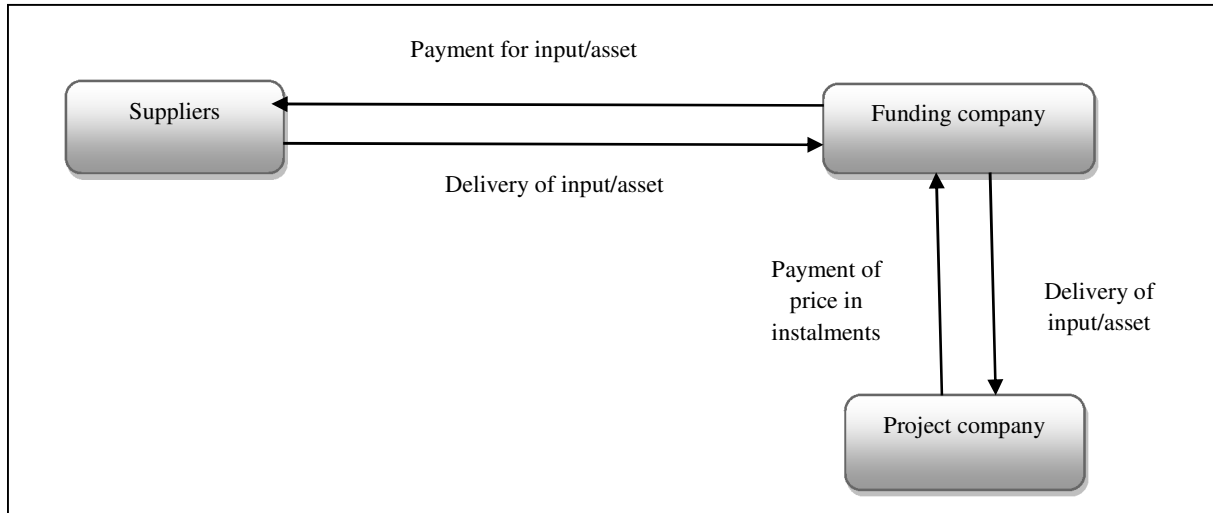
2.1.2. Murabahah financing structure

Murabahah consists on purchasing of a commodity by bank or financial institution, on behalf of a client, by mentioning the cost of it sold, and its resale to the latter on cost-plus-profit basis. However, *Murabahah* differs from a simple sale, called *Musawamah*, because in this latter there is no reference to the cost price. The payment may be cash, it is a simple *murabahah*, or deferred, it is a *murabahah muajjala*, *bai’ muajjal* or *bai’ bithaman ajil* (Usmani, 2002). In this kind of contract, the financier must bear the risks associated with owning goods, especially the risks related to the loss and damage, but also liability for hidden defects, until they are delivered to the client. (Visser; 2009)

Through *murabahah* structure, the funding company purchases assets/inputs, from a supplier based on a first contract, and sells them to the project company, based a second contract. Thus, it may be used in project financing in order to purchase, for example, raw

materials and expensive capital equipment. The benefit of *murabahah* is that it can fit cash flows associated with the different stages of a long-term project financing (*Sengupta, 2013*). The basic *murabahah* financing structure is presented in the figure 8.

Figure 8: Murabah financing structure



Source: Habib Ahmed, (2009), "Islamic finance for infrastructures projects", Working paper for Dubai International Financial Centre (DIFC), p 17.

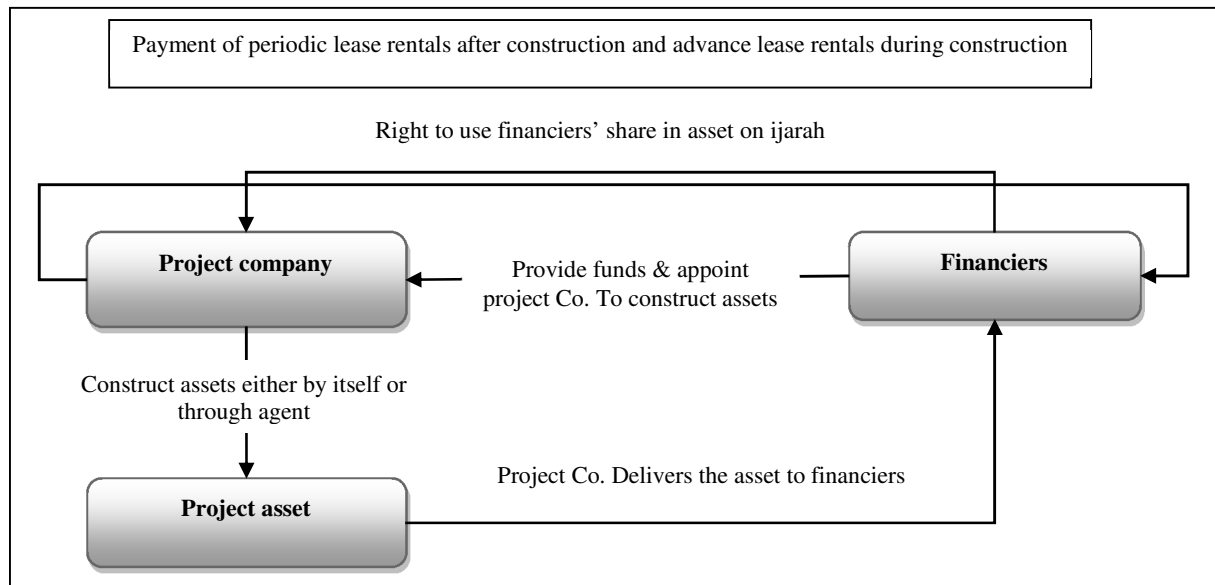
2.1.3. Ijara, istisna'a and salam financing structures

Technically, *ijara* refers to a contract of a known and proposed usufruct of specified assets for a specified time period against a specified and lawful return or consideration for the service, or return for the benefit proposed to be taken, or for the effort or work proposed to be expended *Ayub (2007)*. Originally, *ijara*, or lease, was considered like a simple trade transaction and not a mode of financing, but in nowadays, it is among the most used Islamic project financing structures such a mechanism for leveraged leased financing of large equipments in industrial projects, infrastructures projects, equity transactions, petrochemical projects and real estate projects.

Istisna'a is an agreement to manufacture a particular asset to an agreed specification, to be delivered at time for an agreed price (*Adelkan et.al, 2013*). It is common in project financing and is typically used between financial institutions and construction contractors who construct the project assets either for the SPV or the project sponsors (*Alexander; 2011*), or between construction contractors and government through a BOT agreement. (*Usmani; 2002*)

Basically, the *istisna'* structure is applied to the construction phase, while operations phase is under the *ijara* structure. However, *wakalah-ijarah* (see figure10) structure is considered as an alternative to *istisna'-ijarah* structure (see figure 9), and in which the design, engineering, construction, testing, commissioning and delivery of the asset specified are procured by the borrower in the capacity of an agent to the Islamic financier (*Adelkan et.al, 2013*).

Figure 9: Istisna-ijara financing structure



Source: Khan Urooj ul Hasan. (nd). *Islamic infrastructure project finance*. Meezan Bank Limited. Pakistan. P 55

Salam contract is a forward purchase agreement in which the parties agree to future delivery of a fungible good for a price paid in advance. Thereby, it is similar to *istisna'a*, except that a *salam* concerns fungible goods and the price must be paid in full in the beginning of the contract. (*Alexander; 2011*)

2.1.4. Sukuk financing structure

Sukuk (plural of the Arabic word “sak”, meaning “certificate”) are defined, by the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI), as certificates of equal value representing, after closing subscription, receipt of the values of certificates and putting it to use as planned, common title to shares and rights in tangible assets, usufructs and services, or equity of a given project or equity of a special investment activity. (*AAOIFI; 2003*)

Unlike conventional bond, which is the issuer's pure debt, *sukuk* represents an ownership in an underlying asset for defined period when the risk and return associated with cash flows

generated by underlying assets in a pool are passed to sukuk holders (investors) (*Iqbal & Mirakhor, 2007*).

Two forms of sukuk exist and used in project financing, namely asset-based and asset-backed (*Alexander; 2011*):

- *Asset-based sukuk*: an underlying asset should back sukuk, which must represent a beneficial interest in that asset (the case when a government guarantees the borrowed proceeds and uses them to purchase assets). This form of sukuk focuses on the purchasing entity as opposed to the assets purchased.
- *Asset-backed sukuk*: it is less common and issued by finance institutions. Holders hold a proportional or fractional undivided ownership interest in an asset or pool of assets. This form of sukuk concerns project financing that securitizes the project assets without a guarantee of repayment from the project's government sponsor, corporate sponsor, or other equity sponsor.

Moreover, the AAOIFI identifies various types and combinations of sukuk based on assets, equity, and services. The principle categories and types are shown in table 11.

Table 11: Principle categories types of sukuk

Categories	Types
Asset based	Ijarah (existing owned, existing leased and future assets)
Market-up based	Istisna, murabahah
Partnership based	Mudarabah, musharakah
Agency based	wakalah

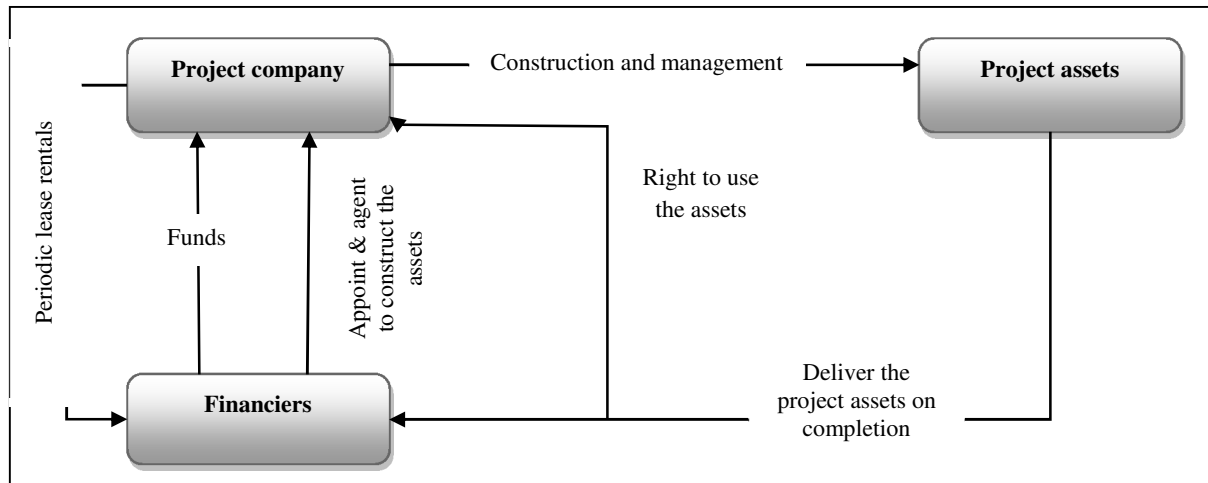
Source: Habib Ahmed, (2009), "Islamic finance for infrastructures projects", Working paper for Dubai International Financial Centre (DIFC), p19.

2.1.5. Wakalah financing structure

Wakalah is an agent contract by which a person/entity is represented by another person/entity. In the project financing, it refers to cases in which a funder delegates the responsibility of managing and overseeing a project's construction and operation to a *wakil* (agent) with sufficient experience and knowledge who receives commission in exchange. (*Habib; 2009*)

As mentioned above, in the project financing it is current the use of *wakalah-ijarah* structure. Thus, the funding company appoints the project company as an agent to construct the project. Upon completion, the project assets are leased to the project company and the funding company receives rental payments in return (*Habib, 2009*). The basic structure of *wakalah-ijarah* is showed in the figure 10.

Figure 10: Wakalah cum ijarah



Source: Khan Urooj ul Hasan. (nd). *Islamic infrastructure project finance*. Meezan Bank Limited, Pakistan. P64

2.2. The public-private partnership in Islamic project financing

While PPP projects face the problem of the availability of cheaper conventional financing instrument, which affects affordability and risk transfer, Islamic project financing seems to be a potential alternative through the PLS principle and shunning of interests. This is also explained by the fact that the aim of PPP is providing public services, which is compatible with Islam, by being community welfare-oriented and encouraging the social and economic development (*Umar et.al; 2012*). Indeed, public and joint ownership are allowed in Islam even when they are indivisible as long as ownership claims can be priced in the market so that, in the case of dissolving partnerships, equity holders can monetize their claims. (*Haque & Mirakhor; 1999*)

Nowadays, many large projects, in particular infrastructure, are carried out by a Build Operate Transfer (BOT) structure. The different advantages of this mode of project financing in the PPP structure make that there is a need to use Islamic finance. Despite the fact that the

BOT financing is new to Islamic law, the specific contracts used in the structure are in conform to Islamic principles of *muamalat* (Islamic transactions), like sale, partnership and lease contracts, and the current practices of the Islamic BOT, which principally refer to the *sukuk* structure, are presented in following (Markom et.al, 2012).

2.2.1. The sale-based financing

Both BOT projects and sale-based features of the Islamic securities share the same character of long-term financing, fixed return and staggered payment. For this, the syndicated financing show a preference for this kind of BOT structure.

The use of sale-based *sukuk* in the BOT projects is based, mostly, on *bai' bithaman ajil*, *murabahah* and *istisna*, due to the requirement of a sizeable funding and long concession periods. Some examples of Islamic BOT based on the *bai' bithaman ajil* structure, in Malaysia, are presented in the table 12.

Table 12: Bai' bithaman ajil financing of BOT project in Malaysia

Project	Amount
Kuala Lumpur International Airport (KLIA)	RM 2.2 Billion
Cheras-Kajang Highway	RM 210 Million
Shah Alam Expressway	RM 800 Million
KL-Putrajaya Highway	RM 380 Million
New Pantai Expressway	RM 740 Million
Western KL Traffic Dispersal Scheme	RM 510 Million

Source: Markom Ruzian et.al. (2012). "The current practices of Islamic Build Operate Transfer (BOT) financing contracts: A legal analysis". *Pertanika J. Soc. Sci. & Hum.* 20(S). Universiti Putra Malaysia Press. P77.

However, the fixed return feature of the sale-based *sukuk* influences the toll collection mechanism that will indirectly burden the end users. It is submitted that partnership structure is encouraged to overcome the said constraints.

2.2.2. The partnership based financing

Two main contracts are used in this type of the BOT projects, namely, the *mudarabah* and the *musharakah*. The *mudarabah sukuk* represents *sukuk* holder's proportionate rights over the *mudarabah* project and the revenue. In the case of *musharakah sukuk*, more than two investors may be included in the business venture. Yet, it is submitted that the *mudarabah* structure is

the most suitable for BOT projects. Accordingly, their PLS principle ensure the smooth running of a particular projects.

To illustrate the use of *sukuk musharakah* structure for BOT projects, the table 13 illustrates the Projek Lebuhraya Utara-Selatan Berhad (PLUS); the first single largest bond issuance in Malaysia, first single largest Ringgit-denominated *sukuk* issuance, and first single largest *sukuk* issuance globally in any currency.

Table13: Projek Lebuhraya Utara-Selatan Berhad (PLUS), in Malaysia

Issuer	Projek Lebuhraya Utara-Selatan Berhad
Issue size	MYR30.4bln
Sector	Transportation
Profit rate	3.9% - 5.75%
Tenure	5 – 25 years
Structure	Musharakah
Governing Law	Law of Malaysia
Purpose of issuance	The proceeds of the issuance are to finance the construction of highway

Source: Nik Musa N.M.D. (24th November 2015). "Role of Islamic finance in infrastructure financing: Financing sources for public-private partnership (PPP)". Bank Negara Malaysia. Kuala Lumpur-Malaysia. P5.

2.2.3. The lease based financing

The lease-based *sukuk*, based on the *ijara* structure, is essentially unique due to the nature of the lease that exploits the beneficial interest of an asset. Hence, even if the project is still under construction, the beneficial right is utilised through the forward lease principle. It is observed that the principle of forward lease/ *ijara mawsufah fi dimmah* (the periodic rental is paid to the lessors beginning from the construction stage) should be adopted in the BOT projects.

To illustrate the use of lease-based financing of BOT projects, we will present, in the table 14, the King Abdulaziz International Airport (Hajj Terminal) Financing; the first *ijara* financing of BOT project in the Middle East, in 2007.

Table 14: King Abdulaziz International Airport (Hajj Terminal) Financing

Project name	King Abdulaziz International Airport (Hajj Terminal) Financing
Location	Jeddah, Kingdom of Saudi Arabia
Description	The project is a BOT for building, maintaining and operating the Hajj Terminal Project in King Abdulaziz International Airport in Jeddah, Saudi Arabia
Concession company	Hajj and Umrah Terminals Construction and Development Company (HTDC)
Sponsor	Saudi Binladin Group
Concession duration (including construction)	20 years
Construction phases	-Interim phase; February 07-September 07 (completed) -Phase I; January 08-September 08
Asset hand back	Immediately upon completion of construction
Finance plan	-Senior debt – US\$ 203.9 million; -Subordinated sharholder loan-US\$ 37.3 million; -Shareholder equity-US\$ 13.3 million; -Pre-completion revenues-US\$ 60.5 million.
Total project value	\$315 million
Total commercial bank debt	\$205 million (all senior debt)
Debt type	Limited recourse Islamic (Ijara) project financing
Lending banks	-Islamic Development Bank -Bank Aljazira -Credit Suisse
Legal adviser to HTDC	-Trowers & Hamlins (London & Bahrain) -Law Office of Hassan Mahassni (Saudi Arabia)
Financial adviser to HTDC	Gulf One Investment Bank B.S.S. (c), (Bahrain)
Legal adviser to banks	-White & Case (London & Bahrain) -The Law office of Mohammed Al-Sheikh
HTDC external auditor	KPMG Al Fozan & Al Sadhan
Financial model auditor	Deloitte & Touche Bakr Abdulkhair & Co.
Technical & traffic adviser to HTDC	SH&E (London)
Date of signing	11 th December 2007

Source: [http://www.gulf1bank.com/news/HTDC - loan signing write-up.pdf](http://www.gulf1bank.com/news/HTDC_-_loan_signing_write-up.pdf) (18/08/2017)

3. Understanding key Islamic project financing risks

Conventional and Islamic project financing share many types of risks observed in the different phases of a project, that we might name “generic risks” (such as the case of political risks, social risks, liquidity risks...), and also the process of the risk management. However, due

to the nature of this finance, there are some risks and their management, which are specific to Islamic project financing; we present the main ones in the following.

3.1. The most common risks

The Islamic Financial Services Board (IFSB) highlighted a set of the most common risks in any investment or project based on Islamic financing, and which are (*IFSB; 2002*):

- **Credit risk:** refers to the failure of the counterpart to meet its obligation in accordance with agreed terms, the risk arising in the settlement and clearing transactions. It applicable to the financing exposures of receivables and leases (*murabahah*, diminishing *musharakah* and *ijara*) and working capital financing transactions/projects (*salam*, *istisna'a* or *mudarabah*).
- **Equity investment risk:** concerns the equity-based financing modes (*musharakah* and *mudarabah*) that are based on PLS principles and include consideration as to the quality of the partner, underlying business activities and ongoing operational matters. Investors and financiers are exposed to the risks attaching to a lack of reliable information on which to base their investment appraisals, moral hazard and opportunism.
- **Market risk:** is related to the current and future volatility of market values of specific assets (example: the commodity price of *salam* and *murabahah* assets, and the market value of *sukuk*) and of foreign exchange rates.
- **Liquidity risk:** refers to the potential loss to financiers arising from their inability either to meet their obligations or to fund increases in assets as they fall due without incurring unacceptable costs or losses.
- **Rate return risk:** rate of return risk differs from interest rate risk in that Islamic financiers are concerned with the result of their investment activities at the end of the investment-holding period. A consequence of rate of return risk may be displaced commercial risk. Thus, financiers may pay a return that exceeds the rate that has been earned on assets financed when the return on assets is under-performing as compared with competitors' rates in order attract and retain fund providers.
- **Operational risk:** includes the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events, the failure in the fiduciary

responsibilities, and the specific risk related to the Islamic finance is *shari'ah non-compliance*. Indeed, *shari'ah* compliance is considered as a higher priority category in relation to other identified risks; and if the operation/project does not comply with *shari'ah* law, it must be cancelled and income generated shall be considered as illegitimate.

3.2.Retention of title

Ensuring the Islamic financier retains title in the operating assets of the project is an important element for structuring shariah-compliant project financing. However, this can be a source of conflict, between conventional debt tranches and Islamic financing tranches, because the conventional lenders, instead of calling for retention of title to the SPV assets, they generally evaluate projected cash flows from the project to determine the likelihood of repayment and taking a security interest in the project assets to mitigate the risk of default (*West, 2013*). Nevertheless, Islamic law allows the use of *rahn-adl*, a type of mortgage arrangement, in which title to the asset is placed with a special type of agent who would owe fiduciary duties to both the Islamic financier and conventional lender; and in which the rights to the assets that each party will possess are specify, in the case of default (*Alexander, 2011*).

In addition, in retaining title to the SPV assets, the Islamic financiers support the risk of total loss and will often have primary recourse to the insurance policies in place for the project asset. This could force the conventional lenders to bear the risk of total loss because they have limited, or no recourse, to the insurance policies, and this may give rise to inter-creditor issues. In order to minimize interruption to both the Islamic and conventional financing packages, it is no prohibited to the Islamic financier to assign the insurance proceeds to the SPV, and to require the SPV to use them to replace all or some of the project assets in the event of a total loss (*Alexander, 2011*).

3.3.Risk management in Islamic finance

Islam recognises the existence of risks and encourages the precaution to prevent or minimise loss. However, there are some difficulties to mitigate and hedge against various risks facing Islamic project financing because of rigidities and deficiencies in the infrastructures and instruments, lack of standardization of contracts and norms, and the prohibition to use some

instruments that form the core of contemporary risks mitigation techniques, such as derivatives and sale of debt make (*Ahmed, 2011*).

The techniques of risk identification and management available in Islamic finance may be the standard traditional techniques, in line with *shari'ah* rules, such as GAP analysis and maturity matching, internal rating systems, risk reports, and RAROC; but there is also a need to develop new techniques more specific to the nature of this financial industry (*Kahn & Ahmed, 2001*). According to *Suweilam (2006)* the general principle of mutual gain and win-win payoff structure is sufficient to generate a variety of instrument *Shari'ah*-compliant for risk transfer and which integrate with real, value-adding activities, and may not be “neutral” with respect to gambling. As result, many risk management instrument based on *shari'ah* exist as a tool for hedging (“*Tahawwut*” in Arabic language), which is one of important instrument for this purpose. Several Islamic hedging instruments are widely used including Islamic FX forward, Islamic FX swap, Islamic cross-currency swap, Islamic profite-rate swap and Islamic option (*Asyraf, 2012*).

Techniques *shari'ah*-compliant to avoid risk exist including the standardization of all business-related activities and processes, construction of a diversified portfolio and implementation of an incentive-compatible scheme with accountability of actions (*Santomero, 1997*). In order to transfer risk, some Islamic derivatives were been developed, since almost all conventional ones are prohibited in Islam, such as *bay' el-arbun* for call-option, *el-khiyarat* (Islamic options), *istijrar* contract, Islamic swaps and, *tawaruq* (*Bouyahiaoui et.al, 2016*). However, sometimes it is difficult to eliminate or transfer some risks and they must be absorbed, and some issues related to managing risks in Islamic finance exist including collateral, guarantee and loan loss reserves (*Khan & Ahmed, 2007*).

It is also common the use of *takaful*, which is an Islamic insurance, based on the principle of *ta'awun* (mutual assistance) and *tabarru* (voluntary contribution,) and operates mostly under PLS structure. It is also operated based on sharing risk collectively, responsibility, brotherhood, solidarity and mutual cooperation or assistance against a defined risk (*Zahan & Kenett, 2012*).

4. Islamic project financing valuation

Bin Jalil (2003) explains that, several Islamic values may have relevance to the subject of project evaluation and which should not be ignored in project analysis and decision making in

an Islamic framework. The significant Islamic values to the project evaluation are: (i) preservation of future generation's welfare, (ii) Environmental balance, (iii) public interest is given priority over individual interest, (iv) balance between physical and spiritual development, (v) avoidance of both extravagance and niggardliness, and (vi) promotion of cooperation and partnership. The fact that interest be prohibited in Islam, alternatives should exist.

For the valuation of projects of different maturities, it is accepted that the *rate of return on capital* (or equivalent profit rate), based on the principle of opportunity, suits the Islamic framework, and which in projects of comparable risks may be taken as the *discount rate* to reflect the opportunity costs of project cash flow (*Khan, 1991; Bin Jalil, 2003*)

In Islamic system, the rate of return to the real sector of the economy determines the rate of return to financial assets, and such a reference rate may be estimated through calculating a cost of capital using Tobin' q against which expected rates of return to PPP can be measured (*Nadeem & Mirakhor, 1999*). Other methods of discount rate were proposed, early, in the Islamic finance context, mainly:

- using the average percentage of expected profits to the invested capital (*Shahata, 1978*); however, the author did not explain how the rate will be determined;
- using rate of return on short-term central deposits⁷, through discounting net expected income of capital to reach its current value (*El-Jarhi, 1981*);
- using rate of return on the best alternative investment characterized by the same specifications of the project under study, in terms of Islamic legitimacy and priority (necessities before luxuries) and the degree of risk (*El-Houari, 1982*); yet, this method is more compatible with public project than with private projects, because it cannot be legitimate in Islam to oblige persons to produce some necessities at low profitability rate;
- using average expected rate of relative weight of returns of similar investments characterized by the same degree of risk of the project under study (*El-Abji, 1985*).

⁷ Refer to the central bank's investment account in banks

5. Case study: Islamic Development Bank's project financing

The Islamic Development Bank (IDB)⁸ is an entity of the Islamic Development Bank Group, which is a South-South multilateral development finance institution established in pursuance of the Declaration of Intent issued by the Conference of Finance Ministers of Muslim Countries held in Jeddah (Saudi-Arabia) in Dhul Q'adah 1393H, corresponding to December 1973. The inaugural meeting of the board of governors took place in Rajab 1395H, corresponding to July 1975, and the Bank was formally opened on 15 Shawwal 1395H, corresponding to 20 October 1975. The Bank aims to foster the economic development and social progress of member countries and Muslim communities individually and collectively in accordance with the principles of *Shari'ah*. The IDB Group comprises five entities, namely

- Islamic Development Bank "IDB" (1395H/1975);
- Islamic Research and Training Institute "IRTI" (1401H/1981);
- Islamic Corporation for the Insurance of Investment and Export Credit "ICIEC" (1415H/1994);
- Islamic Corporation for the Development for the Private Sector "ICD" (1420H/1999); and
- International Islamic Trade Finance Corporation "ITFC" (1429H/2008).

IDB Group has a large range of activities, such as project financing in the public and private sectors, development assistance for poverty alleviation, technical assistance for capacity-building, economic and trade cooperation among member countries, and trade financing.

In Dhul Qadah 1393H (December 1973), in Jeddah, the IDB was established in pursuance of the Declaration of Intent issued at the Conference of Finance Ministers of Muslim Countries. There 57 member countries in the IDB, and the basic condition for membership is that the prospective member country should be a member of the Organization of the Islamic Cooperation (OIC), pay the first instalment of its minimum subscription to the Capital Stock of IDB, and accept terms and conditions of the Bank.

IDB works in collaboration with the Financial Product Development Centre (FPDC) to set up, develop and implement a Group-wide Financial Product Development Process in order to facilitate the emergence of new products and insure the leading role of the IDBG in Islamic

⁸ Islamic Development Bank Group. (May 2013). *Islamic Development Bank Group in brief*. Jeddah, Saudi-Arabia. PP 1-5.

financial industry. Thus, to support development projects (in the agriculture, industry, agro-industry, infrastructure and various other sectors) in its member countries, IDB offers diverse *shari'ah*-compliant financial products and modes of financing (grant loan *ijarah*, *istisna'a*, *murabahah*, *mudarabah*, *musharakah*, etc). (*Islamic Development Bank Group; 2014*)

5.1.IDB's project financing strategy

Project financing strategy is among the strategic framework of the IDB Group, and the fighting against poverty is the overriding objective of the institution, which requires a multi-pronged approach. Thus, a project or program is deemed pro-poor if it purposes to create a huge number of beneficiaries-cum consumers that will, in the long run, support and sustain the local economy. Judging that poverty is, mostly, a rural phenomenon, the bank has made financing this sector a priority. Human development is a major contributor to economic growth and well-being, for that other broad-based growth sectors are health and education.

As it is known, infrastructure plays a multi-purpose role in any economy as it has a direct bearing on the well-being of the population, hence, it positively contributes to poverty alleviation. For this reason, water supply, sanitation, transport and power supply fall under the thematic group of infrastructure. Nowadays, telecommunications has been playing an essential role in energizing several economic sectors and benefiting various social groups in the member countries.

Both the Ordinary Capital Resources (OCR) and those mobilized from the market are utilized to finance infrastructure as follows: projects in low-income countries and regional groupings are financed by a large share of the OCR; middle-income and high-income countries are financed through resources generated from the market. Private sector financing, including big-ticket leasing and large infrastructure projects has assumed great significance in the daily workload of the Operation Complex with the introduction of the market raised resources.

The Operation Complex carries out the above strategy, with taking into consideration the following concerns:

- To be country/client focused and service oriented;
- To achieve his development impact/effectiveness;
- To contribute to the income and financial soundness of the Bank;
- To harness a strategic partnerships, co-financing and other forms of cooperation; and
- To build capacity and enhance professionalism in the Operation Complex.

5.2. Project life cycle

Each project financed by IDB passes through a cycle that, with some variations, is common to all projects, and it covers the life of typical project from identification of needs and priorities until the completion of work and evaluation of results, and the Bank's role in each of them.⁹

5.2.1. Project identification

Identification of a project is based on the background of the country development plan and the Bank's priorities. It can come from several sources, including the Government, IDB missions and from contacts with other development institutions, UN agencies, or private sponsors. However, for any IDB financing, a project should have official Government endorsement and must meet a feasibility test that technical and institutional solutions are likely to be found at costs commensurate with expected benefits.

Once identified, a project might be incorporated into a rolling three-year work program for the country concerned, which will be a basis for the bank's future operations and be used for budgeting the Bank's operations and for assuring the availability of resources to support each the other phases of the project cycle. The three-year work program is basically prepared through a Country Assistance Strategy Study (CASS) undertaken every three years; and it is update according to requests that are received thereafter.

5.2.2. Preparation

A long preparation period of close collaboration between the Bank and the beneficiary/executing agency begins in order to transform the project idea into a detailed proposal covering the full range of technical, economic, financial, social institutional and environmental aspects. The main aspect in this phase is the project feasibility study, which aims to define the best method to achieve the project's objectives, by comparing alternatives based on their relative costs and benefits.

The project preparation process is the formal responsibility of the beneficiary. The bank ensures that the beneficiary has the capacity and resources to prepare the project and that he understands the Bank's requirements and standards, updating and filling gaps in projects that are inadequately prepared, etc. The Bank can extend financial and technical assistance for project preparation by providing financing for preparation of feasibility study, detailed design or preparation of tender documents.

⁹<https://www.isdb.org/irj/portal/anonymous?NavigationTarget=navurl://cedf6891cdd77ea5679e11f75eff274a>

5.2.3. Appraisal/Negotiation

After the preparation stage, the Bank undertakes a full-scale appraisal (covering the technical, economic, financial, social, institutional and environment aspects of the project) and lays the foundation for implementing the project and evaluating it when completed.

An appraisal mission such matters as the financing plan, components to be financed by IDB, terms and conditions of IDB financing, project procurement action plans, project implementation plans, and disbursement profiles. It also reviews the legal aspects of the project including the draft project financing agreement and conditions of effectiveness and concludes and understanding on these issues with the executing agency (and the government, if applicable).

The draft project financing agreement is negotiated and, at the end of the appraisal mission work, a Memorandum of Understanding (MOU) Minutes of Meeting reflecting the discussions and understanding reached by the appraisal mission and the beneficiary is signed. Appraisal of a project is the Bank's responsibility but is conducted in full co-ordination with the beneficiary.

5.2.4. Approval and signing

The appraisal mission prepares a Staff Appraisal Report (SAR) and Report and Recommendation of the President (RRP) that set forth its findings and recommends the level and terms and conditions of IDB financing. After that, the project is presented to the Board of Executive Directors for final approval, and then the decision is intimated to the beneficiary. Subsequently, the project agreement is finalised and signed. The beneficiary and the project executing agency receive the staff appraisal report. Some projects may be approved directly by the President

5.2.5. Implementation and follow-up

Implementation over the period of construction and subsequent operation is the principal phase in the project's life, and it is the responsibility of the beneficiary. The Bank follows-up the implementation and procurement processes. Follow-up is mainly related to that period when physical components are being constructed, equipment purchased and installed, services rendered and new institutions, programs, and policies put in place. Follow-up aims to ensure that the objectives are achieved, to identify and deal with problems that arise during implementation, and to collect problem solving.

5.2.6. Post-evaluation after completion

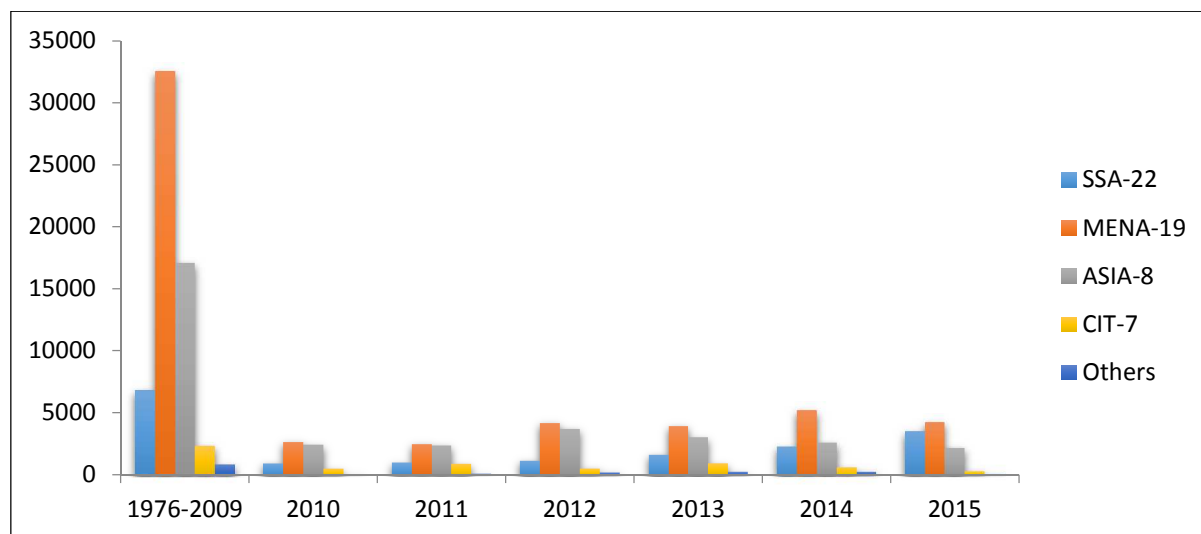
To ensure its independence and objectivity, the Bank submits projects to post-evaluation to the Operations Evaluation Office (OEO), which is entirely separate from the Bank's operations departments and reports directly to the President. An analysis of the evaluated projects in terms of their design, implementation, achievement of targets, performance assessment, and sustainability are provided by the OEO's evaluation reports. It also takes into account the importance of better project design, including a provision for costs recovery aspect and sound project follow-up and supervision.

The principle factors identified as contributing to the success of projects are:

- Sound feasibility studies available at appraisal time, complemented by appropriate project preparation and design;
- Detailed and comprehensive appraisal reports based on reliable data and achievable targets;
- Satisfactory performance of the executing agencies in terms of implementation arrangements;
- Alignment of the project objectives with the socio-economic development targets of the country concerned;
- Substantial socio-economic impact of the project, if compared to its objectives set at appraisal time; and
- Effective sustainability actions undertaken by the managing/executing agencies.

5.3. Some figures on IDB's project financing

Since its inception, the IDB has set goals in terms of project financing in order to contribute in financing the economy of its countries member and others in the respect of *shari'ah* law. Thereby, the figures 11 illustrate its contribution, from 1976 to 2015, in different regions and sectors, and by using different types of modes of financing.

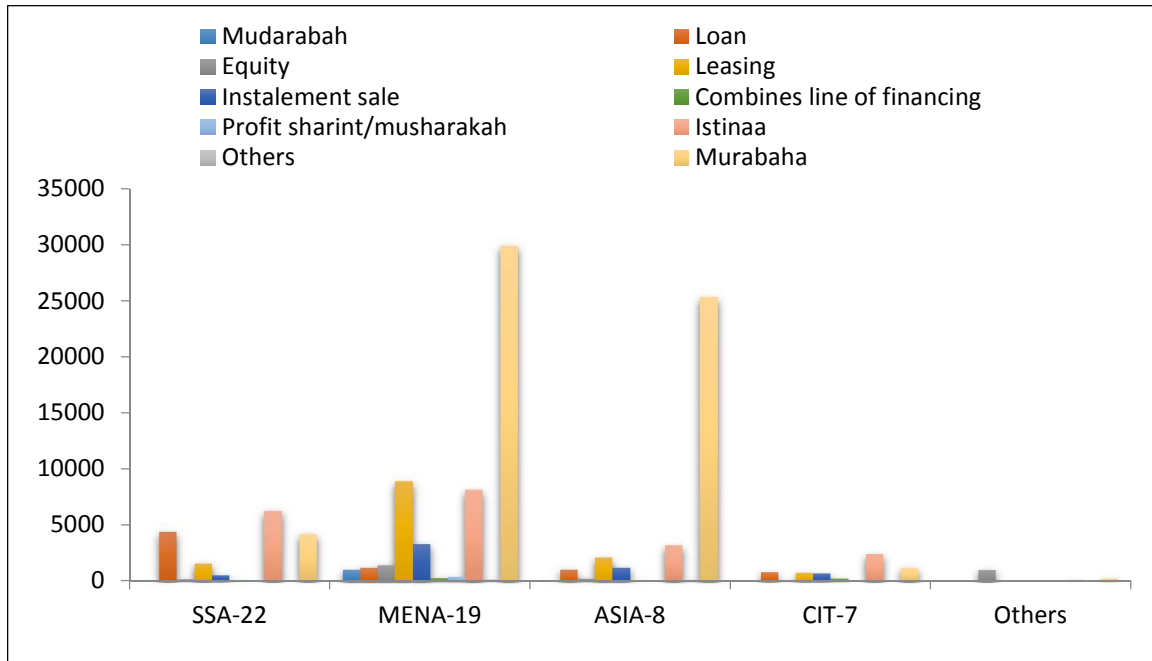
Figure 11: Net IDB Group financing by region and years (1976-2015) in \$millions

Source: Author from table of appendix 1

- **CIT:** Countries in Transition
- **MENA:** Middle East and North Africa
- **SSA:** Sub-Saharan Africa
- **Others:** comprise of Non-Member Countries, Regional Projects and Special Programme

From the figure 11 we note that the MENA region represents the most region concerns by the IDB's project financing, since its launch, with a total of \$55036.6 millions, followed by the ASIA region with a total of \$33283.2 millions, and then the SSA region with a total of \$17312.8 millions. This could be explain by the number of countries in each region, the need of each region and its members to the IDB's project financing, and the degree of openness of each region to Islamic finance. Indeed, as it was presented previously, the main Islamic financial places are located in the MENA and ASIA regions, and the GCC region represents the cradle of the Islamic finance.

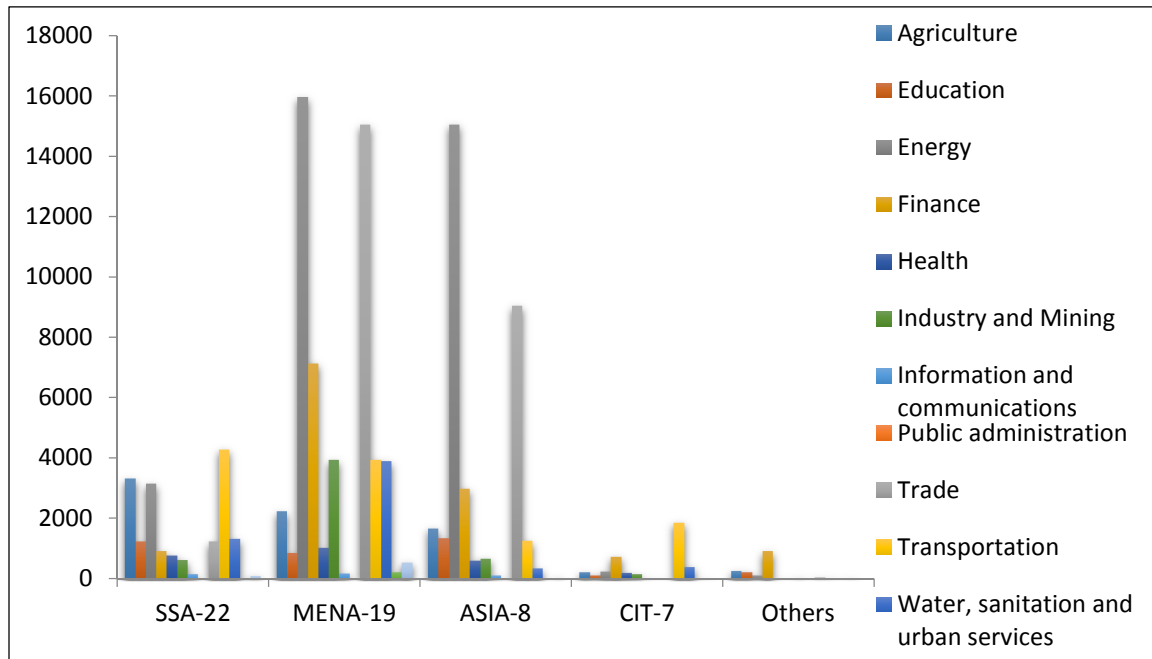
Figure 12: Net IDB Group financing by mode of financing and region (1976-2015) in \$millions



Source: Author from table of appendix 2

From the figure we note that in the SSA region the most modes used are *istisna'a* (\$6185 millions) followed by loan and *murabahah*. In the MENA region the most modes used are *murabahah* (\$29918.7 millions) followed by leasing (*ijarah*) and *istisna'a*. In the ASIA region it was *murabahah* (\$25263.7 millions), followed by *istisna'a* and leasing. In the CIT region it was *istina'a* (\$2392.6 millions) and in others regions it was equity (\$990.7 millions).

Thus, *murabahah* represents the most mode of project financing used by the IDB, with a total of \$60698.8 millions (1976-2015) followed by *istisna'a* (\$20008.2 millions) and *ijara* (\$13327.7 millions). This could be explained by the need and the demand of the countries, the fact that these modes are more appropriate to project financing, in relation to the types of risks (comparing to other modes) and to countries regulations vis-à-vis to the partnership. These modes are also more appropriate to the most sectors financed by the IDB (see the figure 13).

Figure 13: Net IDB Group financing by sector and region (1976-2015) in \$millions

Source: Author from table of appendix 3

From the figure 13 we note that the most sectors financed through the IDB's project financing in the SSA region were transportation (4293.4 \$millions) followed by energy and agriculture. In the MENA region they were energy (15936.9 \$millions) followed by trade, finance, industry and mining. In the ASIA region they were energy (15042.4 \$millions) followed by trade and finance. In the CIT region and others it was finance sector

Thus, the energy sector represents the most concerned by the IDB's project financing, with a total of 35522.4 \$millions, followed by trade (25380.3 \$millions) and finance (12753.9 \$millions). The financing of these sectors more than others could be made according to the IDB's objectives, the need and the socio-economic strategy of the countries (such as the case of energy in the MENA region, or transportation and agriculture in the SSA region). The sector of finance is also important and may be strategic because its implementation and development in a country reflects the country's ability to finance its economy.

Conclusion

Through this chapter, we may conclude that Islamic finance has proven its ability to insure access to capital resource to finance large-scale projects and then, it is well-suited for project financing and may be considered as an alternative to the conventional financing, not only in Islamic countries, but also outside the Islamic world. Indeed, many successful experiences have proven this ability of Islamic finance in many countries, such as: the Equate Petrochemical project in Kuwait, East Cameron Gas, the drilling and operating of oil wells project in the Gulf of Mexico, commercial real estate projects in the United States...

Nevertheless, it is not to exclude some limits and obstacles in the implementation of Islamic project financing. Indeed, the first is the lack of understanding of the Islamic finance paradigm and function and its differences with the conventional finance by investors and stakeholders of a project. In addition, investors may deal with the problem of the divergence of Islamic scholars' opinions and the lack of the standardization of contracts. The other point is related to the ability of Islamic finance be creative and innovative in order to attract and protect investors and capital providers in a continuous way.

CHAPTER IV

*EMPIRICAL STUDY ON PROJECT
FINANCING SHARI'AH-COMPLIANT:
CASE OF THE ISLAMIC DEVELOPMENT
BANK*

Introduction

After presenting, in the previous chapter, the role of Islamic Development Bank in financing economy through shari'ah-compliant project financing, we will try to analyse empirically its contribution. Thus, this chapter aims to search relevant economic indicators that would influence the shari'ah-compliant project financing by the Islamic Development Bank in the MENA region, during the period of 1997 to 2016, through a panel data estimation, which is often considered to be an efficient analytical method in handling econometric data.

For this, the first step will consist on the presentation of the empirical research methodology, by a descriptive approach based on a literature review, under two points: a presentation of the panel, then a presentation of the statistical and econometric tools used in such an analysis process. After that, it will be a matter of presenting the panel and the model of our empirical research. The final step will be the study panel data analysis, based on a set of econometric tests, and the interpretation of the results.

1. Research methodology

Generally, there are three types of available data for empirical analysis, namely: time series, cross section, and panel data. In time series data, the values of one or more variables are observed over a period of time (e.g. GDP for several quarters or years). In cross-section data, values of one or more variables are collected for several samples units, or entities, at the same point in time (e.g. crime rate for 50 states in the United States for a given year) (*Gujarati, 2003*). Panel data will be explained in the follows.

1.1.Introduction to panel data

Panel data represents a combination of regression and time-series analysis. A “panel” is a group of individuals (countries, firms, persons ...) surveyed repeatedly over time. They are widely used in the social science literature, where panel data are also known as pooled cross sectional time series, and in the natural sciences, they are referred to as longitudinal data (*Frees, 2004*). A balanced panel has the same number of observations for all individuals; an unbalanced panel is a panel with lack observations for some individuals (*Bourbonnais, 2015*).

Early, in order to analyse pooled cross-sectional data in studies, two strategies have been used (*Frees, 2004*):

- Estimate cross-sectional parameters using regression; and
- Use time-series methods to model the regression parameters estimators, treating estimators as known with certainty.

An important revival has marked panel data econometrics in recent years, which allowed a spectacular increase of academic works based on panel data. For instance, *Hsiao (2007)* showed that in 1986 only 29 empirical studies listed in the Social Sciences Citation Index corresponded to keywords “data panel”; less than a decade later nearly 733 empirical studies responded to these same keywords (*Fonquau, 2008*). This can be explained by the increased availability of databases, the profound renewal of methods and issues of panel data econometrics (*Fonquau, 2008*), the technological advancement, and the advancements of economic theory, which aim at an improved representation of the behaviour dynamics of the agents and the taking into account of their heterogeneity *Araujo et.al (2008)*.

Many advantages are linked to panel data compared to purely time-series or cross-sectional data. *Baltagi (1995)* listed the important factors in discussing the panel data advantages over pure cross-sectional data or pure time series data:

- The panel data estimation techniques take into account the heterogeneity of individual of variables (individuals, firms, states, countries, etc) by allowing for subject-specific variables;
- Through the combination between time series and cross-sectional observations, panel data gives more informative data, more variability, less collinearity among variables, more degree of freedom and more efficiency;
- Panel data is better suited to study the dynamics of change when it refers to a repeated cross-sectional of observations;
- Panel data can better detect and measure effects that cannot be observed in pure cross-sectional or time series data; and
- Panel data can be better study phenomena such as economics of scale and technological change rather than time series and cross-sectional.

However, there are some types of limits often found in data panel analysis that *Baltagi (2005) and Araujo et.al (2008)* emphasized:

- Design and data collection problems: these include problems of coverage (incomplete account of the population of interest), non-response (due to lack of cooperation of the respondent or because of interviewer error), recall (respondent not remembering correctly), frequency of interviewing, interview spacing, reference period, the use of bounding and time-in-sample bias.
- Selectivity problems and incomplete panel: when observations are not indicated, the panel is said to be “non-cylindrical” that is, to eliminate observations so that each individual has the same number of observations. In doing so, there is risk of creating a similar skew bias and then a distortion of measurement errors, while the elimination of observations may be due to economic reasons. The use of non-cylindrical sample may conduct to heteroscedasticity and/or autocorrelation of random deviations problems that will have to be adjusted.
- Short time-series dimensions: this increases the chance of attrition and increases the computational difficulty for limited dependent variable panel data models.
- Cross-section dependence: macro panel on countries or regions with long time series that do not account for cross-country dependence may lead to misleading inference. Alternative, tests of panel unit root are suggested that account for this dependence.

1.2.The linear panel data model and estimation

A panel data set is formulated by a sample that contains N cross-sectional units (e.g. countries) that are observed at different T time periods; where the variables Y and X have both i and t subscripts for i=1, 2,..., N sections and t= 1, 2,..., T time periods. Consider for example linear model with one explanatory variable as given by (*Bourbonnais, 2015*):

$$Y_{it} = \alpha_i + \beta_i X_{it} + u_{it}$$

Y_{it} : endogenous/dependent variable observed for individual i at time t .

X_{it} : exogenous (explanatory)/independent variable observed for the individual i at time t .

α_i : constant term for the individual i .

β_i : vector of k coefficients of k exogenous variables $\beta_i = (\beta_{1i}, \beta_{2i}, \dots, \beta_{ki})$.

u_{it} : error term.

Generally, there are three different methods used to estimate simple linear panel data models: with a common constant, allowing for fixed effects, and allowing for random effects (*Asteriou & Hall, 2007; Mudjahid, 2016*).

1.2.1. The common constant method

This method (also called the pooled OLS method) of estimation considers that there is a common constant α for all cross-section (common constant for individuals). In other words, the model estimates $\alpha_i = \alpha$, and then the linear model will be as:

$$Y_{it} = \alpha + \beta_i X_{it} + u_{it}$$

However, this case is quite restrictive and cases of more interest involve the inclusion of fixed and random effects in the method of estimation.

1.2.2. The fixed effects method

In this method, the constant is treated as group-specific. The model allows then different constants for each group (section or time) due to factors and effects not observed, which are in fact unobserved variables. It depends on the assumption that, effects are related to explanatory variables, or at least one of them: $\text{cov}(X_{it}, \alpha_i) \neq 0$. The fixed effects estimator is also known as the least-squares dummy variables (LSDV) estimator because in order to allow for different constants for each group, it includes a dummy variable for each group. To a better understanding, consider the following model:

$$y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \dots \dots + \beta_k X_{kit} + u_{it}$$

This can be rewritten in a matrix notation as:

$$Y = D\alpha + X\beta' + U$$

Where we have:

$$Y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{pmatrix}_{NT \times 1} \quad D = \begin{pmatrix} i_T & 0 & \dots & 0 \\ 0 & i_T & & \vdots \\ \vdots & & & \\ 0 & 0 & \dots & i_T \end{pmatrix}_{NT \times N} \quad X = \begin{pmatrix} x_{11} & x_{12} & \dots & x_{1k} \\ x_{21} & & x_{22} & x_{2k} \\ \vdots & & & \\ x_{N1} & x_{N2} & \dots & x_{Nk} \end{pmatrix}_{NT \times k} \quad \alpha = \begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \vdots \\ \alpha_N \end{pmatrix}_{N \times 1}$$

$$\beta' = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{pmatrix}_{k \times 1}$$

It is necessary to apply tests to check whether fixed effects (i.e. different constants for each group) should indeed be included in the model and this before assessing the validity of the fixed effects method. For this purpose, the standard **F-test** (Fisher test) can be used to check fixed effects against the simple common constant OLS method. The null hypothesis is that all constants are the same (homogeneity), and that therefore the common constant method is applicable:

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_N$$

The H_0 is tested by using the **F-statistic**, which is as:

$$F = \frac{(R_{FE}^2 - R_{CC}^2)/(N - 1)}{(1 - R_{FE}^2)/(NT - N - k)} \sim F(N - 1, NT - N - k)$$

R_{FE}^2 : coefficient of determination of the fixed effects model.

R_{CC}^2 : coefficient of determination of the common constant model.

If F-statistical is bigger than the **F-critical** then we reject the null hypothesis and then the fixed effects model will be adopted (F-statistical > F-critical: reject H_0).

1.2.3. The random effects method

The difference between the fixed effects and the random effects method is that in the latter the constants α_i for each section is not fixed, but as random parameters. It depends on the assumption that random effects are not related to explanatory variables $\text{cov}(X_{it}, \alpha_i) = 0$. Hence, the variability of the constant for each section comes from the fact that:

$$\alpha_i = \alpha + v_i$$

v_i : a zero mean standard random variable.

The random effects model therefore takes the following form:

$$y_{it} = (\alpha + v_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \dots \dots + \beta_k X_{kit} + u_{it}$$

$$y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \dots \dots + \beta_k X_{kit} + (v_i + u_{it})$$

Generally, the fixe effects model assumes that each individual differs in its intercept term, whereas the random effects model assumes that each individual differs in its error term. Also, usually the fixed effects model is used when the panel is balanced, the random effects model is more appropriate in the case of a sample with limited observations of the existing cross-sectional units.

2. Statistical and econometric tools

After determining the linear model of the panel data, it will be a question of carrying a set of tests necessary for the data analysis and the determination of results.

2.1.Hypothesis tests: homogeneity and heterogeneity

In order to characterize the chosen model, one of the first steps in panel data is that of identifying the source of the heterogeneity. To do so, it is assumed that the heterogeneity may be either at the level of the coefficients of the constants or at the level of the explanatory variables. Consider the following equation:

$$Y_{it} = \alpha_i + \beta_i X_{1it} + u_{it} \quad (i= 1, \dots, N \ \& \ t= 1, \dots, T)$$

Four possibilities are presented through this equation (*Mialocq, 2017*):

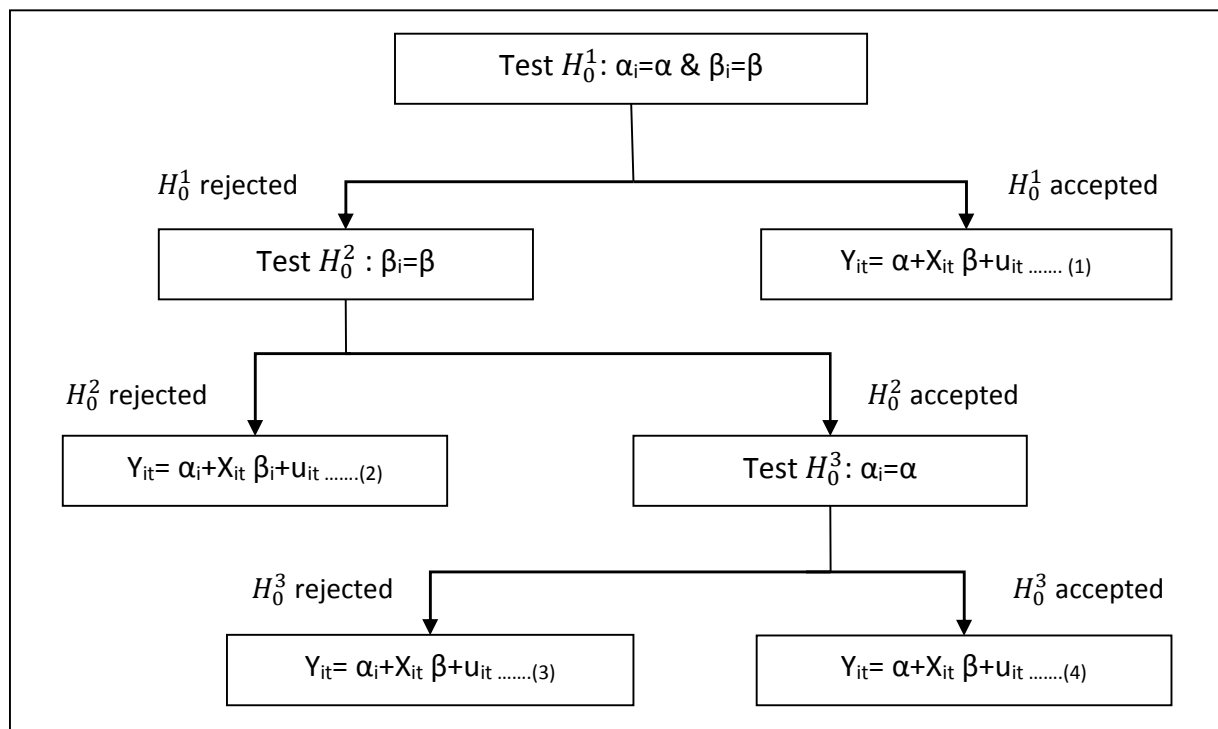
- The panel is homogeneous: if the coefficients of the constants are equal to the coefficients of the explanatory variables, i.e. $\alpha_i = \alpha$, and if $\beta_i = \beta$.
- The panel data structure is rejected: if all α and all β are different.
- The panel data structure is rejected: if all the coefficients of the constants (α_i) are equal, but the coefficients of the explanatory variables (β_i) are all unequal. In this case, there are as many models as there are individuals.

- In the fixed individual effects model: the coefficients β_i are identical, but the coefficients of the constants are distinct.

2.1.1. Sequential procedure of hypothesis testing

According to *Hsiao (2003)*, several statistics tests have been realised in the purpose to specify the existence of individual heterogeneity in fixed effects and random effects models. For that, a procedure of a nested homogeneity tests must to be adopted as presented in the figure 14.

Figure 14: Sequential procedure of hypothesis testing



Source: Bourbonnais Régis. (2015). *Econométrie*. 9^{ème} édition. Dunod. France. P331.

- (1) & (4): total homogeneity
- (2): total heterogeneity
- (3): individual effects model

Hypothesis tests are done in three times (*Pirotte, 2011*):

- First, the hypothesis of homogeneity of all parameters to estimate must be tested, such as:
 $H_0: \alpha_i = \alpha$ and $\beta_i = \beta$ versus $H_1: \alpha_i \neq \alpha$ and $\beta_i \neq \beta$. The corresponding statistic for this test is that of Fisher and taking the following form:

$$F_1 = \frac{SCR_{1,c} - SCR_1}{SCR_1} \times \frac{NT - N(k+1)}{(N-1)(k+1)} \sim F((N-1)(k+1), (NT - N(k+1)))$$

$SCR_{1,c}$: the sum of the squares of the model residues under the hypothesis H_0 .

SCR_1 : the sum of the squares of the model residues under the hypothesis H_1 .

$(N-1)(k+1), (NT-N(k+1))$: degree of freedom

If the theoretical Fisher value is less than the calculated value, the hypothesis H_0 will be rejected and H_1 will be accepted.

- Then, if the hypothesis H_0 is rejected, the second step must be started, which consists on homogeneity test of the β_i coefficients (the coefficients of the explanatory variables):
 $H_0: \beta_i = \beta$ vs $H_1: \beta_i \neq \beta$. The corresponding statistic for this test is that of Fisher and taking the following form:

$$F_2 = \frac{SCR_{2,c} - SCR_1}{SCR_1} \times \frac{NT - N(k+1)}{(N-1)k} \sim F((N-1)(k+1)k, (NT - N(k+1)))$$

$SCR_{2,c}$: the sum of the squares of the constrained model (individual fixed effects, under the hypothesis H_0).

$(N-1)(k+1)k, (NT-N(k+1))$: degree of freedom.

If the theoretical Fisher value is less than the calculated value, the hypothesis H_0 will be rejected and H_1 will be accepted.

- Finally, in the case where the hypothesis H_0 is accepted, a last hypothesis must be tested, which states that only the coefficients of the constants are homogeneous (α_i). The both hypothesis are: $H_0: \alpha_i = \alpha$ vs $H_1: \alpha_i \neq \alpha$. The corresponding statistic for this test is that of Fisher and taking the following form:

$$F_3 = \frac{SCR_{1,c} - SCR_1}{SCR_1} \times \frac{N(T-1) - k}{(N-1)} \sim F((N-1), (N(T-1) - k))$$

If the theoretical Fisher value is less than the calculated value, the hypothesis H_0 will be rejected and H_1 will be accepted.

2.1.2. The Breusch-Pagan test

Breusch & Pagan (1979) proposed a test to make a choice between homoscedastic disturbances and fixed coefficients, which can be computed by two least squares regression (OLS), and the approach is based on the Lagrangian multiplier (LM) test of Aitchison and Silvey (also known as Rao's efficient score test). The test follows a Chi-square (χ^2) distribution and the null hypothesis is such that the variance of individual heterogeneity is zero (i.e. H_0 : the OLS model is the appropriate model). The test uses the following statistics test:

$$LM = \frac{1}{2} \left[\frac{N}{n(N-n)} \right] \left[\sum_i^n \left(\frac{\hat{u}_i^2}{\hat{\sigma}^2} \right) - n \right]^2$$

If the value of χ^2 is less than of LM calculated, the H_0 will be rejected, and then the effects model is the appropriate model. It is also possible to use Mackinnon statistics, which assumes that the H_0 is rejected if the P-value is less than 5%.

2.1.3. The Hausman test

Hausman test is used to make a choice between fixed effects and random effects model. *Hausman (1978)* assumed that there are two estimators $\hat{\beta}_0$ and $\hat{\beta}_1$ of the parameter vector β and he added two hypothesis-testing procedures. Under H_0 , both estimators are consistent but $\hat{\beta}_0$ is inefficient, and under H_1 , $\hat{\beta}_0$ is consistent and efficient, but $\hat{\beta}_1$ is inconsistent. It is, actually, a matter of testing H_0 that, random effects are consistent and efficient, versus H_1 , that random effects are inconsistent (as the fixed effects will be always consistent). (*Asteriou & Hall; 2007*)

Table 15: Properties of the random and fixed effects model estimators

Model	Random effects model used	Fixed effects model used
Correct hypothesis		
$H_0: cov(X_{it}, \alpha_i) = 0$ Exogeneity	Consistent Efficient	Consistent Inefficient
$H_1: cov(X_{it}, \alpha_i) \neq 0$ Endogeneity	Inconsistent	Consistent Possibly efficient

Source: <http://oru.diva-portal.org/smash/get/diva2:805823/FULLTEXT01.pdf>

The both hypothesis are:

H_0 : random effects model is the appropriate model

H_1 : fixed effects model is the appropriate model

The Hausman test uses the following test statistic:

$$H = (\hat{\beta}^{\text{FE}} - \hat{\beta}^{\text{RE}})' [\text{Var}(\hat{\beta}^{\text{FE}}) - \text{Var}(\hat{\beta}^{\text{RE}})]^{-1} (\hat{\beta}^{\text{FE}} - \hat{\beta}^{\text{RE}}) \sim \chi^2(k)$$

If the value of the statistic is large, then the difference between the estimates is significant, so the null hypothesis that the random effects model is consistent will be rejected and the fixed effects estimators will be used. Thus, a small value of the Hausman statistic implies that the random effects estimator is more appropriate.

2.2. Panel unit root and stasionarity tests

Testing for unit roots and stasionarity tests have become an integral part of econometric studies, which allows determining the stationarity of the time series of the study and determining the degree of integration. In panel data, there are two generations of unit root test (see table 16). The first generation (*Levin & Lin, 1992, 1993; Levin, Lin & Chu, 2002; etc*) focuses on individual effects and takes into consideration only the heterogeneity of the average level, but which preserves the hypothesis of homogeneity of the other parameters of the model (the hypothesis of inter-individual independence of residues) and in particular of the autoregressive root. The second generation (*Bai & Ng, 2001; Moon & Perron, 2004; etc*) tends to lift hypothesis of independence and then takes into account the individuals dependence. (*Hurlin & Mignon, 2005*).

Table 16: Panel unite root tests

First generation	Cross-sectional independence
1.Nonstationary tests	Levin & Lin (1992, 1993); Levin, Lin & Chu (2002); Im, Pesaran & Shin (1997, 1998); Maddala & Wu (1999); and Coi (1999, 2001)
2.Stationarity tests	Choi's (2001) extension; Hadri (2000)
Second generation	Cross-sectional dependence
1.Factor structure	Pesaran (2003); Moon & Perron (2004); Bain & Ng (2002, 2004); Choi (2002).
2.Other approaches	O'Connel (1998); Chang (2002, 2004)

Source: Barbieri Laura. (2006). *Panel unit root tests: A review*. Serie Rossa: Economia. No. 43. P 3.

Among the main used tests, especially in the case of independence individuals are Levin, Lin & Chu (LLC) test, and Im, Pesaram & Sin (IPS) test to detect the properties of time series of panel; variables and the both tests are based on the Augmented Dickey-Fuller (ADF) test (Al-Abdali, 2010). The LLC test takes the following form:

$$\Delta Y_{i,t} = \alpha_i + \rho Y_{i,t-1} + \sum_k \phi_k \Delta Y_{i,t-k} + \delta_i t + \theta_i + \mu_{it}$$

It takes into consideration two-way fixed effects through the two parameters (α_i) and (θ_i), and the test hypothesis is about the existing of common unit root process and then following: $H_0: \rho = 0$ against $H_1: \rho < 0$. However, LLC test restricts (ρ) to be homogenous across individuals. Therefore, IPS test extend the LLC test to allow variable parameter variance ($Y_{i,t}$) across individuals, and the test takes the following form:

$$\Delta Y_{i,t} = \alpha_i + \rho Y_{i,t-1} + \sum_{k=1}^n \phi_k \Delta Y_{i,t-k} + \delta_i t + \mu_{it}$$

Separate slopes (ADF) are made for each individual variables (i) allowing the variance of the parameter values, variance of the residues and length of the slower periods; and the null hypothesis becomes that all variables are not static ($H_0: \rho_i = 0$ for all i) against hypothesis where there is at least one static variable ($H_1: \rho < 0$). IBS test assumes that the number of time views

is equal for all individuals, and the average statistic (\bar{t}) is obtained from individual slopes (ADF) of each individual's variation according to the formula:

$$(\bar{t} = \frac{1}{N} \sum_{i=1}^N t_{\rho i})$$

2.3. Cointegration test

Cointegration test allows detecting the long-term relationship between two or more time series when they are non-stationary. Many tests of the absence of cointegration with panel data have been proposed. *Pedroni (1995, 1997, 1999, 2003)*, *Kao (1999)* and *Bai & Ng (2001)* are residual tests similar to the tests proposed by *Engle & Granger (1987)* in the case of time series. *Larsson et.al (1998)* and *Groen & Kleibergen (2003)* were inspired by the work of Johanson (1991, 1995) in order to propose tests based on the likelihood ratio. (*Hurlin & Mignon, 2006*).

Pedroni test is considered as the most popular test in panel cointegration. *Pedroni (1995, 1997)* proposed several tests aiming the understanding the null hypothesis of the absence of cointegration for both homogenous and heterogeneous panels. His started with cointegration test with the presence of only one regression, and then he proposed (1999, 2003) an extension to cointegration relationships include more than two variables like the IPS (2003) unit root test, Pedroni's tests takes heterogeneity into account through parameters that may differ between individuals. Thus under the alternative hypothesis, there is a relationship of cointegration for each individual, and this relationship of integration is not necessary the same for each individual of the panel.

Pedroni derives seven panel cointegration statistics. The implementation of the tests requires first to estimate the long-term relationship:

$$y_{it} = \alpha_i + \delta_i t + \beta_{1i} x_{1,it} + \beta_{2i} x_{2,it} + \dots + \beta_{Mi} x_{M,it} + u_{it}$$

Of the seven tests proposed by Pedroni, four are based on the dimension within (intra) and three on the dimension between (inter). Both categories of tests are based on the null hypothesis of no cointegration: $p_i = 1$, p_i denotes the autoregressive term of the estimated residuals under the alternative hypothesis ($\hat{u}_{it} = p_i \hat{u}_{it-1} + \varepsilon_{it}$). The distinction between the two categories of tests is at the level of the specification of the alternative hypothesis:

- For tests based on the intra dimension, the alternative hypothesis is written: $p_i = p < 1$
- For tests based on the inter dimension, the alternative hypothesis is written: $p_i < 1$

2.4.Causality test

The existence of cointegration implies the existence of causality at least in one direction that can be verified by the Granger (1969) test, which, later, have been relied on the error-correction vector model (VECM) of Engle & Granger (1987) that prevents the variables from moving too far from their long-term equilibrium. The coefficient of the error term is relevant only when it is significant and between -1 and 0. (*Ayekoe, 2014*)

It is a matter of determining whether a variable X causes a variable Y by first observing to what extent past values are able to explain the present value of Y and to see later the improvement of the estimate by taking into account delayed values of the variable X . Y can be considered as "caused" if the variable X is determinant in the estimate of Y or, in an equivalent way, if the coefficients of the delayed values of the variable X are significantly different from zero. (*Lambelet, 2001*)

In a more rigorous way, the following regression (bi-varied autoregressive) represents the starting point of the test:

$$Y = c + \sum_{i=1}^n \mu_i Y_{t-i} + \sum_{j=1}^n \pi_j X_{t-j} + \varepsilon_t$$

If the coefficients π_j are significantly different from zero, it can be said that taking into account the delayed values of variable X in equation gives a better estimate of the future values of Y. it goes without saying that the same regression by inverting the variables can be repeated. The complete two-way model becomes matrix:

$$\begin{pmatrix} y_t \\ x_t \end{pmatrix} = \begin{pmatrix} c_y \\ c_x \end{pmatrix} + \begin{pmatrix} \mu_{y1} & \pi_{y1} \\ \mu_{x1} & \pi_{x1} \end{pmatrix} \begin{pmatrix} y_{t-1} \\ x_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_y \\ \varepsilon_x \end{pmatrix}$$

We suppose that $\beta_t = \begin{pmatrix} \mu_{yt} & \pi_{yt} \\ \mu_{xt} & \pi_{xt} \end{pmatrix}$, $1 = 1, \dots, n$, and the model for n lags is written:

$$\begin{pmatrix} y_t \\ x_t \end{pmatrix} = \begin{pmatrix} c_y \\ c_x \end{pmatrix} + \beta_1 \begin{pmatrix} y_{t-1} \\ x_{t-1} \end{pmatrix} + \beta_2 \begin{pmatrix} y_{t-2} \\ x_{t-2} \end{pmatrix} + \dots + \beta_n \begin{pmatrix} y_{t-n} \\ x_{t-n} \end{pmatrix} + \begin{pmatrix} \varepsilon_y \\ \varepsilon_x \end{pmatrix}$$

If the series are not stationary, it is necessary to transform them into stationary series suitable for being subjected to the causality test.

3. Presentation of the study model

The research methodology is to use the standard approach to test the validity of the hypothesis of the study that the Islamic Development Bank's project financing is depending on the economic health of the Middle East & North Africa (MENA) countries during the period of 1997-2016.

3.1. The model used

The equation that will be estimated has the following form:

$$Y = f(GDP, RGDP, GDPperC, Inf, Exp, Imp)$$

$$Y_{it} = \alpha_i + \beta X_{it} + u_{it},$$

$$t = 1, 2, \dots, T \quad (t = 1, \dots, 20) \quad ; \quad i = 1, 2, \dots, N \quad (i = 1, \dots, 17)$$

- **Y_{it}**: the number of IDB's project financing in country i at time t
- **α_i**: constant term for the country i, which can be fixed or random to determine through Hausman test
- **β**: vector (K*1) of K coefficient of K exogenous variable
- **X_{it}**: the matrix (Tn*K) of the number of independent variables may affecting Y_{it}
- **u_{it}**: error term for the country i at time t

To apply this model, the study will use a panel data with n=17 of i units representing the MENA countries determined by the IDB (except Syria and Palestine. Each unit contains a time series of t=20, it covers the annual period t of 1997 to 2016. Thus, the number of observations used in the analysis is (t*n) is 340.

According to the sample used in this analysis, the model will take the following from:

$$Y_{it} = \alpha_i + \beta_1 GDP + \beta_2 RGDP + \beta_3 GDPperC + \beta_4 Inf + \beta_5 Exp + \beta_6 Imp + u_{it}$$

or

$$IDBPF_{it} = \alpha_i + \beta_1 GDP + \beta_2 RGDP + \beta_3 GDPperC + \beta_4 Inf + \beta_5 Exp + \beta_6 Imp + u_{it}$$

The study is based on a set of variables representing the main economic indicators¹⁰ to which the IDB refers and that may determine the contribution of the Bank in financing the economy through project financing in the MENA countries, which includes a dependent variable represented by “IDBPF” and six independent variables represented by “GDP, RGDP, GDPperC, Inf, Exp and Imp”.

3.2. The variables used in the study

The variables used in this study and that may reflect the economic health of countries are¹¹:

- **Project financing of the IDB “IDBPF”**: Represents the number of project financing of the IDB in the MENA countries selected, during the period of the study.
- **Gross Domestic Product growth (annual percent) “GDP”**: Represents the sum of gross value added by all resident producers in the economy plus any product taxes, and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
- **Real Gross Domestic Product (annual percent) “RGDP”**: Known as “inflation-adjusted GDP”. Changes in GDP linked to price changes (inflation or lower prices) are

¹⁰ Economic indicators are statistical measures of the economic conditions of a specific market or sector of the economy. They are produced to support economic analysis as snapshots of economic performance at a specific sector at a specific point in time (Baumohl, 2008)

¹¹ Author from the data sources: <https://www.isdb-pilot.org/> , <http://www.worldbank.org/> , <http://www.imf.org/external/index.htm>

thus neutralized, which allow a measure of economic growth. It is calculated with the use of nominal GDP and the GDP deflator.

- ***Gross Domestic Product per capita (annual percent) “GDPperC”***: Represents gross domestic product divided by midyear population. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
- ***Inflation, average consumer prices (annual percent) “Inf”***: As measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.
- ***Exports goods and services (annual percent growth) “Exp”***: Represents the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees, investment income (formerly called factor services) and transfer payments.
- ***Imports goods and services (annual percent growth) “Imp”***: Represents the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees, investment income (formerly called factor services) and transfer payments.

The sources of the variables used in this study varied from three reliable sources: the Islamic Development Bank (IDB), the International Monetary Fund (IMF), and the World Bank (WB).

3.3. Presentation of the study sample

The study concerns the case of the Islamic Development Bank and its contribution in financing the economy using *shari'ah*-compliant project financing in the MENA countries. This choice is based on the main following criteria:

- Absence of works on the contribution of IDB in the *Shari'ah*-compliant project financing, except those made by the bank itself,
- The availability of data and information about project financing of the bank,
- The importance of the IDB in the Islamic finance development, and
- The diversification of its intervention in space, and in terms of type of financing contracts and sectors.

The sample of the study consists of 17 countries of the MENA region as selected by the IDB (we eliminated Palestine and Syria due to the unavailability of data because of the war), and all are member of the Organization of Islamic Cooperation (OIC) (the main condition to be a member of IDB). The countries are: Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, Turkey, United Arab Emirates (UAE) and Yemen. It is an economic region with more than 350 million inhabitants and several countries with vast reserves of oil and natural gas. Except Iran and Turkey, all MENA countries are Arab countries with historical and cultural similarities. The choice of this region was based on the fact that, it represents the most region concerns by the IDB's project financing (as presented in the chapter 03).

4. Estimating the model and presenting the results

The first step is to verify the homogeneous or heterogeneous specification of the data. On the economic side, specification tests aim to determine whether the theoretical model studied is identical for all countries or whether there are specificities for each country. The second step consists on testing the stationarity of the variables through the unit root tests on the panel. The third and last step is studying the relationship of the integration of variables in the long term and determining whether they explain or not the dependent variable. However, before this, it will be a question of descriptive statistics and correlation between explanatory variables, which have priority to validate the model of the study.

4.1.Descriptive statistics

A series of statistical tests should be conducted on the variables represented in the study model and for a sample composed of 17 MENA countries as presented in the table 17.

Table 17: Descriptive statistics of the variables

Variables	Observations	Mean	Median	Std.Dev	Maximum	Minimum
IDBPF	340	5.235294	3.000000	5.835801	33.00000	0.000000
GDP	340	4.232370	4.047112	6.913911	54.15777	-62.07592
RGDP	340	4.474238	3.900000	11.01741	124.7000	-66.70000
GDPperC	340	1.061336	1.2292752	6.721638	50.12184	-62.22509
Inf	340	6.559412	3.400000	10.70722	85.70000	-9.900000
Exp	340	46.37987	45.13815	19.99205	104.8070	3.286459
Imp	340	39.58238	35.94521	16.88651	101.4398	13.72309

Source: Author using Eviews.9

4.2.Correlation between explanatory variables

The test of the correlation matrix between the explanatory variables allows identifying the possible link/correlation of pairs of these variables, thus insure that the model is free from one of the most important problems that can occur when evaluating the data model. The multiple correlation coefficients associated with the regressions of each explanatory variable on all the others is calculated by the econometric software (Stata, in our case), as presented in the table 18 for this study.

Table 18: *Correlation matrix of variables*

	<i>IDBPF</i>	<i>GDP</i>	<i>RGDP</i>	<i>GDPperC</i>	<i>Inf</i>	<i>Exp</i>	<i>Imp</i>
<i>IDBPF</i>	1.000000 -----						
<i>GDP</i>	-0.018683 (0.7314)	1.000000 -----					
<i>RGDP</i>	-0.011111 (0.8383)	0.426395 (0.0000)*	1.000000 -----				
<i>GDPperC</i>	0.080347 (0.1393)	0.920902 (0.0000)*	0.378482 (0.0000)*	1.000000 -----			
<i>Inf</i>	0.359460 (0.0000)*	-0.032337 (0.5524)	-0.003834 (0.9438)	-0.001305 (0.9809)	1.000000 -----		
<i>Exp</i>	-0.166768 (0.0020)*	0.142824 (0.0084)*	0.120937 (0.0258)*	-0.004218 (0.9382)	-0.056064 (0.3027)	1.000000 -----	
<i>Imp</i>	-0.283649 (0.0000)*	0.035765 (0.5110)	0.081906 (0.1317)	-0.015921 (0.7699)	-0.178083 (0.0010)*	0.466862 (0.0000)*	1.000000 -----

Source: Author using Eviews.9

From the table we note that the correlation matrix between these variables shows the following results, according to the p-value at the level of 0.05 of significance:

There is a significant correlation between **IDBPF** and **Inf** (0.0000), **IDBPF** and **Exp** (0.0020), **IDBPF** and **Imp** (0.0000), **GDP** and **RGDP** (0.0000), **GDP** and **GDPperC** (0.0000), **GDP** and **Exp** (0.0084), **RGDP** and **GDPperC** (0.0000), **RGDP** and **Exp** (0.0258), **Inf** and **Imp** (0.0010); and **Exp** and **Imp** (0.0000).

There is no correlation between **IDBPF** and **GDP**, **IDBPF** and **RGDP**, **IDBPF** and **GDPperC**, **GDP** and **Inf**, **GDP** and **Imp**, **RGDP** and **Inf**, **RGDP** and **Imp**, **GDPperC** and **Inf**, and **GDPperC** and **Exp**, **GDPperC** and **Imp**; and **Inf** and **Exp**.

4.3. Regression, results and interpretations

The following tests will allow us to estimate the model regression and from the results, it will be able to analyse the hypothesis previously presented.

4.3.1. The homogeneity test of the data generating process

On the economic side, the specification tests (Fisher tests) consist of determining whether the theoretical model is identical for all countries, or on the contrary, there are specificities for each country.

- ❖ First we test the hypothesis of a total homogeneity structure (constants and coefficients are identical), represented as follows:

$$H_0^1: \alpha_i = \alpha \text{ et } \beta_i = \beta. \forall i \in [1, N]$$

$$\text{versus } H_a^1: \exists (i, j) \in [1, N] / \alpha_i \neq \alpha_j \text{ ou } \beta_i \neq \beta_j$$

We then use a Fisher statistic to test these $(K + 1) (N - 1)$ linear restrictions. The Fisher F-statistic associated with the total homogeneity test is written in the following form:

$$F_1 = \frac{(SCR_{1,c} - SCR_1) / [(N - 1)(K + 1)]}{SCR_1 / [NT - N(K + 1)]}$$

- $SCR_{1,c}$: the sum of the squares of the residues of the following model:

$$Y_{i,t} = \alpha + \beta X_{i,t} + u_{it} \dots \dots \dots (1)$$

- SCR_1 : the sum of the squares of the residues of the following model:

$$Y_{i,t} = \alpha + \beta'_i X_{i,t} + u_{it} \dots \dots \dots (2)$$

This statistic follows a Fisher distribution with $(K + 1) (N - 1)$ and $NT - N (K + 1)$ degrees of freedom. The conclusions of this test are as follows: if we accept the null hypothesis H_0^1 of homogeneity, we then get a very homogeneous pooled model; but if we reject the null hypothesis, we move on to a second stage, which consists of determining whether the heterogeneity comes from the coefficients β_i .

The result of estimation of a constrained model (1) shows that: $SCR_{1,c} = 9007.3823$ To identify the common parameters α and β of this relation, we apply the Least Ordinary Squares on the stacked data (pooled model).

For the unconstrained model (model (2)) $SCR_1=2298.6554$ for $F(112,221) = 1.30187280$ and $F_1= 5.7589126$: $F_1 > F(112,221) \rightarrow$ we **reject H_0^1** .

- ❖ The second step consists on testing the equality for all the individuals of the K components of the vectors:

$$H_0^2: \beta_i = \beta. \forall_i \in [1, N]$$

$$\text{versus } H_a^2: \exists(i, j) \in [1, N] / \beta_i \neq \beta_j$$

The Fisher F-statistic associated is written in the following form:

$$F_2 = \frac{(SCR_{1,c} - SCR_1) / [(N-1)K]}{SCR_1 / [NT - N(K+1)]}$$

- SCR_1 : the sum of the squares of the residues of the model (2)
- $SCR_{1,c}$: the sum of the squares of the residuals of the constrained model under the hypothesis H_0^2 (individual effects model)

$$Y_{i,t} = \alpha + \beta_i X_{i,t} + u_{it}$$

With $SCR_1= 2298.6554$ and $SCR_{1,c}=5024.4052$ for $F(96,221)=1.31808686$ and $F_2=2.7298146$: $F_2 > F(96,221) \rightarrow$ we **reject H_0^2** .

- ❖ The third step is to test the homogeneity of the coefficient α_i :

$$H_0^3: \alpha_i = \alpha. \forall_i \in [1, N]$$

$$\text{Versus } H_a^3: \exists(i, j) \in [1, N] / \alpha_i \neq \alpha_j$$

The Fisher F-statistic associated is written in the following form:

$$F_3 = \frac{(SCR_{1,c} - SCR_{1,c'}) / (N-1)}{SCR_{1,c'} / [N(T-1) - K]}$$

- $SCR_{1,c}$: the sum of the squares of the residues of the model (2) under the hypothesis H_0^3 (individual effects model)

- $SCR_{1,c}$: the sum of the squares of the residuals of the constrained model (pooled model)

$$Y_{i,t} = \alpha + \beta X_{i,t} + u_{it}$$

With $SCR_{1,c} = 9007.3823$ and $SCR_{1,c} = 5024.4052$ for $F(19,317) = 1.67549127$ and $F_3 = 15.705885$: $F_3 > F(16,317) \rightarrow$ we **reject H_0^3** .

Table 19: Results of specification tests

Test	Calculated statistics	Tabulated statistics	Result
F₁	5.7589126	1.30187280	H₀¹ rejected
F₂	2.27298146	1.31808686	H₀² rejected
F₃	15.705885	1.67549127	H₀³ rejected

Source: Author using Stata 13.0

On this basis, the final version of the model that will be used in this study takes the individual effects model, as the following form:

$$Y_{i,t} = \alpha_i + \beta_i X_{i,t} + u_{it}$$

4.3.2. Study of stationarity and cointegration on panel data

In order to estimate the models of the data, the methodology used requires first to study the stationarity of the time series of the various variables of the model, we then move on to the study of long-term relationships and simultaneous cointegration tests of variables with the same degree of differentiation. This is done by using a number of tests to analyse and examine the unit root of the data.

4.3.2.1. Stationarity test

The table 20 presents the results of the LLC, IPS, ADF-Fisher Chi-square and PP-Fisher-Chi-square tests for the variables studied, where we can read the statistical result and the p-value (between brackets).

Table 20: Stationarity test results

	IDBPF	GDP	RGDP	GDPperC	Inf	Exp	Imp
LLC Test	-3.07946 (0.0010)	-2.54263 (0.0055)	-3.06405 (0.0011)	-1.79772 (0.0361)	-2.94542 (0.0016)	-0.96800 (0.1665)	-0.63263 (0.2635)
	/	/	/	/	/	-7.11154 (0.0000)	-7.94770 (0.0000)
IPS Test	-4.20189 (0.0000)	-3.50995 (0.0002)	-4.40065 (0.0000)	-3.45125 (0.0003)	-2.53160 (0.0057)	-0.88802 (0.1873)	-1.09993 (0.1357)
	/	/	/	/	/	-6.55611 (0.0000)	-7.90129 (0.0000)
ADF Test	75.1267 (0.0001)	65.0813 (0.0010)	77.5114 (0.0000)	64.1948 (0.0013)	53.0227 (0.0199)	43.9760 (0.1175)	42.1855 (0.1582)
	/	/	/	/	/	105.775 (0.0000)	125.022 (0.0000)
PP-Fisher Test	123.663 (0.0000)	142.331 (0.0000)	171.883 (0.0000)	145.205 (0.0000)	89.5484 (0.0000)	23.8346 (0.9031)	32.8704 (0.5229)
	/	/	/	/	/	252.319 (0.0000)	196.633 (0.0000)

Source: Author using Eviews.9

It can be seen from the table 20 that the tests results match. Thus, we conclude that they clearly indicate the absence of the unit root at the level of the following variables studied: Islamic Development Bank project financing, gross domestic product, real gross domestic product, gross domestic product per capita and inflation; it reveals the stationarity of these variables and this indicates the rejection of the null hypothesis of having unit root. While the results of the tests show the no-stationarity of each variable: export goods and services (Exp) and import goods and services (Imp), which requires a first difference value (shown in bold on the table) to make these variables stationary and integrated.

4.3.2.2. Cointegration test

After testing the stationarity of variables and founding that there are some non-stationary variables, this allows us to study the cointegration relation. The results of Pedroni

tests (1999) of cointegration (unit root tests applied to the residuals), under the null hypothesis of the absence of a cointegration relation between the variables, are presented in the table 21.

Table 21: Pedroni cointegration tests results

Common AR coefs. (within-dimension)	Statistic	Weighted statistic	Prob.
Panel v-Statistic	0.847065	0.1985	0.7796
Panel rho-Statistic	-3.347808	0.0004	0.0251
Panel PP-Statistic	-2.957556	0.0016	0.0286
Panel ADF-Statistic	-4.315573	0.0000	0.0014
Individual AR coefs. (between-dimension)	Statistic		Prob.
Group rho-Statistic	-0.14432		0.4426
Group PP-Statistic	-2.680922		0.0037
Group ADF-Statistic	-3.901175		0.0000

Source: Author using Eviews.9

The table 21 summarises the results of the seven statistics of Pedroni cointegration tests (see appendix 4). They were done by Eviews, which has an appropriate program to deal with a heterogenous panel. The cointegration of variables depends on the probability value (p-value) associated with each statistic. From the results of tests, we can note that among the eleven statistics, eight present p-value less than 5%. It is mainly 'Panel rho-Statistic', 'Panel PP-Statistic' and 'panel ADF-Statistic' for "within-dimension" tests (Pedroni, 1999; Pedroni, 2004 "weighted statistic"); and 'Group PP-Statistic' and 'Group ADF-Statistic' for "between-dimension" tests (Pedroni, 1999). We conclude that there is a cointegration relation between both non-stationary variables studied.

4.3.3. Causality test

The next step after studying the cointegration relation aims to test the causal relations between stationary variables at first difference, by using the Panel Granger Causality test. A

causal analysis is used in order to determine if there is potential for predictability from an indicator to another. The test results for all individuals are presented in the appendix 5. The test aims to determine whether there is a causality relation between the different variables or not.

According to the results presented in the table above (p-values), we can deduce the inexistence of bidirectional or unidirectional causality relation between the variables.

4.3.4. Fixed effects model or random effects model

To estimate the model and thus reach the results by which the nature of the relation between the number of IDB's project financing and the selected economic indicators is explained, three models have been applied (see appendices 6, 7 & 8): pooled regression model, fixed-effects model and random-effects model; the results are presented in the table 22.

Table 22: Estimated parameters of the study model using the three models

Dependant variable "IDBPF": number of IDB's project financing			
Period: 1997-2016; T=20; N=17; Total panel observations: 20*17=340 obs			
Independent variables	Pooled regression model	Fixed-effects model	Random-effects model
Constant	5.537739 (0.0000)	4.869343 (0.0000)	4.961224 (0.0000)
GDP	-0.453108 (0.0001)	-0.061131 (0.5981)	-0.110549 (0.3268)
RGDP	-0.001488 (0.9601)	0.010590 (0.6331)	0.009838 (0.6572)
GDPperC	0.503150 (0.0000)	0.078061 (0.5086)	0.130970 (0.2533)
Inf	0.168668 (0.0000)	0.073631 (0.0110)	0.083998 (0.0031)
Exp	0.072554 (0.1480)	0.058842 (0.1167)	0.059347 (0.1134)
Imp	0.040270 (0.4511)	0.021481 (0.5922)	0.023282 (0.5612)
Number of observations	340	340	340
R-squared	0.149757	0.558814	0.037483
Adjusted R-squared	0.133613	0.526460	0.019208
Prob (F-statistic)	0.000000	0.000000	0.058738

Source: Author using Eviews.9

After confirming the presence of individual effects, it should be determined how these effects will be modelled, i.e: fixed effects model (LSDV) or random effects model. For this purpose, we proceed to a specification analysis of the individual effects by the use of the Hausman test. The hypothesis tested concerns the correlation between the individual effects and the explanatory variables:

- $H_0: E(\alpha_i/X_i) = 0$: the random-effects is the appropriate model,.
- $H_1: E(\alpha_i/X_i) \neq 0$; the fixed-effects is the appropriate model

The table 23 summarizes the Hausman test results of specification of the individual effects (see appendix 9).

Table 23: Hausman test results

P-value	Chi-square. statistic
0.2561	7.761831

Source: Author using Eviwes.9

The Hausman test results present an $X^2 = 7.761831$, and after comparing it with the tabular value at six (06) degree of freedom at the significance level of 95%, which is valued at 12.59, and the p-value is greater than 5%, we accept the null hypothesis and we conclude that the **random effects** is the appropriate model to our study.

4.3.5. Estimating the parameters using the random-effects model

In accordance with the Hausman specification tests results, the regressions were performed by the random-effects methods that takes the following form:

$$y_{it} = (\alpha + v_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \dots \dots + \beta_k X_{kit} + u_{it}$$

$$y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \dots \dots + \beta_k X_{kit} + (v_i + u_{it})$$

The table 24 shows the regressions results (the values in parentheses represent t-statistics).

Table 24: Estimated parameters of the study model using random-effects

Dependant variable "IDBPF": number of IDB's project financing		
Period: 1998-2016; T=20; N=17; Total panel observations: 323 Obs		
Independent variables	Random-effects model	
Constant	4.961224 (4.897393)	
GDP	-0.110549 (-0.982129)	
RGDP	0.009838 (0.444238)	
GDPperC	0.130970 (1.144486)	
Inf	0.083998 (2.976420)	
Exp	0.059347 (1.587685)	
Imp	0.023282 (0.581743)	
Number of observations	323	
R-squared	0.037483	
Adjusted R-squared	0.019208	
Prob (F-statistic)	0.058738	
	Algeria	-3.095964
	Bahrain	-0.622356
	Egypt	3.345832
	Iran	6.047296
	Iraq	-4.494388
	Jordan	-1.642547
	Kuwait	-1.101398
	Lebanon	-1.160151
	Libya	-3.844487
	Morocco	0.540577
	Oman	-3.148813
	Qatar	-3.292903
	Saudi-Arabia	8.245324
	Tunisia	0.742053
	Turkey	6.287320
	UAE	-1.407621
	Yemen	-1.397774

Source: Author using Eviews.9

After estimating the random-effects regression, the final model of the study is written as following:

$$\text{IDBPF}_{it} = (\alpha + v_i) + \beta_1 \text{GDP} + \beta_2 \text{RGDP} + \beta_3 \text{GDPperC} + \beta_4 \text{Inf} + \beta_5 \text{Exp} + \beta_6 \text{Imp} + (v_i + u_i)$$

Then:

$$\text{IDBPF}_{it} = 4.961224 - (0.110549) \text{GDP} + (0.009838) \text{RGDP} + (0.130970) \text{GDPperC} + (0.083998) \text{Inf} + (0.059347) \text{Exp} + (0.023282) \text{Imp} + (v_i + u_i)$$

The analysis of the results, presented in the table 24, shows that there is a weak relation between the dependant variable and the independent variables. Indeed, the value of the F-statistic is 2.051005, with a probability of 0.058738, means that the model is no significant. The value of the R_squared (R^2) is 3.7483%, which means that the explained variance represents about 3.75% of the total variance. The econometric adjustment is therefore of low quality.

The model estimation shows the following results:

- The **constant** is no significant at the level of 5% and has a positive impact on the number of the Islamic Development Bank's project financing. Its value differs from a country to another due to the specification of each country, which is confined between Iraq, with a value of (-4.494388), and Saudi Arabia, with a value of (8.245324).
- At the level of 5%, the gross domestic product (**GDP**) variable is significant and has a negative effect on the IDBPF, which means that there is an inverse relation between the two variables. 1% increase in GDP leads, all thing being equal, to a 0.110549% decline in the number of IDBPF.
- The real gross domestic product (**RGDP**) variable is no significant, at the level of 5%, and has a positive effect on the IDBPF, which means that there is a direct relation between the two variables. 1% increase in RGDP leads, all thing being equal, to a 0.009838% increase in the number of IDBPF.

- The gross domestic product per capita (**GDPperC**) variable is, at the level of 5%, no significant and has a positive on the IDBPF, which means that there is a direct relation between the two variables. 1% increase in GDPperC leads, all thing being equal, to a 0.130970% increase in the number of IDBPF.
- At the level of 5%, the inflation (**Inf**) variable is no significant and has a positive effect on the IDBPF, which means that there is a direct relation between the two variables. 1% increase in Inf leads, all thing being equal, to a 0.083998% increase in the number of IDBPF.
- The exports goods and services (**Exp**) variable is, at the level of 5% and at the first difference, no significant and has a positive effects on the IDBPF, which means that there is a direct relation between the two variables. 1% increase in Exp leads, all thing being equal, to a 0.059347% increase in the number of IDBPF.
- The imports goods and services (**Imp**) variable is, at the level of 5% and at the first difference, no significant and has a positive effects on the IDBPF, which means that there is a direct relation between the two variables. 1% increase in Imp leads, all thing being equal, to a 0.023282% increase in the number of IDBPF.

❖ Essay of economic analysis of the results

Despite the fact that the dependent variables explain only 3.75% the variation of the dependet variable and that, the model is no econometrically significant, there would be some economic significance. Thus, for illustration, the decline of the IDBPF, due to the increase of the GDP, might seem logical, because the GDP is often synonymous with wealth (the production of a country / region during a period). Thereby, as a result, the Bank would reduce its contribution to financing the economy through project financing when the GDP increases.

Unlike GDP, inflation reflects, in principle, a fragile and unstable economic situation; this could explain the fact that, its increase generates an increase in the IDBPF. That is to say that the Bank contributes in the financing of the economies in difficulty through the project financing. The case also of exports, which are not always synonymous with wealth, especially

in several countries of the MENA region, whose economy is based on the export of hydrocarbons, with, not only, low non-hydrocarbon exports, but a significant importations, very often for consumption purposes (e.g: Algeria). This could explains the increase of the IDBPF in parallel with the increase of the Exp. Also the case of the RGDP (production volume), whose increase generates an increase of the IDBPF that could be explained by the contribution of the IDB in financing of production and construction equipments and raw materials, mainly through the murabahah and/or ijara.

The model clearly shows a heterogeneity between the MENA countries selected in this study, hence the existence of a specific constant for each country, which could be explained by an economic environment diversified in the region. This is reflected through economic indicators used (although this is only 3.75%), but also through other factors that represent the variables not observed in the study and that explain to 96.25% the variation of the dependent variable (IDBPF). Indeed, the MENA region presents many diversities; thus, in addition to a disparity in the evolution of each of the indicators studied, there is also for instance:

- A great economic diversity that includes both rich Gulf oil economies and resource-poor countries relative to their people, such as Egypt, Morocco, and Yemen;
- Disparities characterizing financial systems: underdeveloped systems, such as in Algeria, Lybia and Yemen, and the most developed systems in the region, such as in Jordan and Lebanon (*Ghanem & Achouche; 2016*);
- Inequalities in terms of human development, measured by the Human Development Index (HDI) and that ranks countries such as Bahrain, Kuwait, Qatar and UAE under “very high human development”, and countries such as Egypt, Irak and Morocco under “medium human development”, or under “low human development” as the cas of Yemen (*IDB; 2017*);
- GCC countries dominate the private project financing market of the region, and the Energy sector (oil, gas and power) accounts for the largest share of transactions. However, there is still a restriction in the PPP in some countries, like Algeria, but more

used in others (Saudi Arabia, Bahrain, Oman, UAE, Jordan, Iraq and Egypt) (*Maghub; 2011*); and

- Inequality in terms of the development and the use of the Islamic financial system: strong in GCC countries, where regional and international financial centers compete (Bahrain and Dubai); and weak (see almost non-existence) in the rest of the countries (the case of Algeria)

Thereby, several factors can influence the number of projects financed by the Bank. Factors that can be economic or other, especially social ones, because the IDB gives great importance to the social aspect of its member countries and thus, makes socio-economic development one of its top priorities. However, since we were not able to consider all the factors in our analysis, the choice was made on the economic side and we took, as previously explained, the common economic indicators. Thus, among the main indicators that could be explanatory variables, in addition of those used, to the variation of the dependent variable “IDBPF”, the following¹²:

- ***Demographic and human development indicators***, such as:
 - Total population;
 - Total health expenditure;
 - Poverty headcount ratio at national poverty line;
 - GINI index
 - Human development index
 - Employment; and
 - Education.

- ***Macroeconomic indicators*** (off those used), such as:
 - Structure of GDP;
 - National income (GNI);
 - Structure of demand;
 - Official exchange rate (to \$);
 - Deposit interest rate;

¹² www.isdb.org

- Lending interest rate;
 - Money supply; and
 - Financial depth and efficiency.
- *External sector economic indicators* (off those used), such as:
- Trade openness;
 - Structure of merchandise exports;
 - Structure of merchandise imports;
 - Tariff;
 - Balance of payments;
 - Total external debt;
 - International reserves; and
 - Business environment.

It is understandable that despite all the factors that could influence the IDB in its contribution to the financing of the economy of the MENA countries through the project financing, the Bank works, mainly, in collaboration with the governments and because of this, the Bank's contribution depends, above all, on the needs and the demand of these countries.

Conclusion

This chapter presented an empirical study based on an econometric approach of panel data. The study focused on analysing the influence of the main economic indicators (represented by six explanatory variables) on the number of shari'ah-compliant project financing of the Islamic Development Bank (IDB) in the MENA region. The panel represented 17 of the 19 MENA countries (except of Syria and Palestine, as previously explained), according to the classification of the IDB, for a period from 1997 to 2016.

According to the different tests used and the results obtained, we can conclude that only Gross Domestic Product (GDP) is considered a relevant indicator that may explain the dependent variable IDBPF, unlike the other variables considered no-significant; for that reason, the model is , econometrically, no significant. Several other indicators no observed (error term that represent 96.25% of the total variation) that we presented could influence the contribution of the IDB in financing the economy, by the project financing. However, this contribution depends, above all, on the need and the demand of governments.

CONCLUSION OF THE RESEARCH

Conclusion of the research

The importance of heavy projects in economic growth, as well as socio-economic development, requires significant resource mobilization, for a long time assumed by the public and conventional sector. As a result, a search for alternatives has been more than necessary to meet the growing need for project financing. Thus, through this thesis, we have been able to highlight the possibility of a project financing compatible with the laws and principles of *shari'ah*. Indeed, the growing and diversified rise of Islamic finance makes this industry a potential for not just individuals and businesses, but also for governments, in various fields and sectors, like project financing. Islamic finance presents a variety of contracts and structures that can be used in project financing, through the public sector (such as, sovereign wealth funds), private sector or public-private partnership (PPP) (which is increasingly being used by governments). These contracts are based mainly on sales, leasing or partnership transactions. Fundamentally, Islamic project financing structures are directly or indirectly linked to seven contracts (*mudarabah*, *musharakah*, *murabahah*, *ijara*, *istisna'a*, *salam*, *sukuk* and *wakalah*).

Islamic financial and banking institutions are an engine for growth and socio-economic development; like the case of the Islamic Development Bank (IDB). The IDB aims to contribute to the improvement of the quality of life of its member countries through an assistant and a financing of economic growth and socio-economic development. The objective of the IDB is to maximize its support for poverty reduction by learning from successful experiences while preserving the purely Islamic character of its approach. It also promotes South-South cooperation through the exchange of experiences among Organization of Islamic Cooperation (OIC) member countries and institutions as well as other non-member countries. (*IBD; 2007*)

Indeed, In addition to its contribution to the development of human capital (education, training, health, etc.), the IDB has already developed projects that should promote qualitative growth in its less developed member countries by developing rural and urban infrastructures, increasing the value added of productive sectors and financing income-generating activities. It will focus on key aspects of pro-poor growth activities, including rural and agricultural development, rural and secondary infrastructure, microfinance, guarantee programs, and selective development of the private sector. Thus, in the project financing context, we tried to highlight the contribution of the Bank through two approaches. Firstly, by a descriptive-analytical approach (in the chapter 4), presenting its strategies, the countries in which it

operates, the instruments used and the sectors financed. Then, by a quantitative approach (in the chapter 5), we try to determine among the main economic indicators, those to which the bank refers to contribute to the project financing, in the MENA region, during the period 1997-2016.

This thesis is a contribution to the literature that deals with Islamic finance, as a whole, and especially its contribution to the financing of the economy, in our case through “*project financing*”. The purpose of this work was therefore to demonstrate the potential of the Islamic financial industry in an economy. To do this, we treated the subject in two parts. On the one hand, it was a theoretical census, through which we presented a literature review of the subject, Islamic finance, project financing and project financing *shari’ah*-compliant. Indeed, Economic growth, increased wealth, and socio-economic development are perfectly compatible with Islam, which encourages work, effort, mobilization of resources, growth, wealth creation, enrichment and development, to meet the needs of the human being. For this, a financial and banking system based on the principles and values of Islam has been created.

On the other hand, we conducted a quantitative study based on panel data analysis in order to determine the main common economic indicators that may influence the contribution of the Islamic Development Bank in project financing in the MENA countries, during the period of 1997 to 2016. The results of the econometric analysis showed that the random-effects model is, econometrically, no significant, and only the GDP explains the variation of the dependent variable, unlike the other variables. In addition, there is a heterogeneity between the MENA countries selected, hence the existence of a specific constant for each country. We conclude that the explanatory variables selected influence only 3.75% the variation of the number of the IDB’s project financing and the remaining 96.25% represents the variables not observed (error term). However, it should be noted that the IDB works in collaboration with governments and its contribution depends on their needs and demands.

At this stage of our research, we can conclude that Islamic finance cannot be seen as just a fad phenomenon. In fact, although it is a recent finance (under its current aspect), it shows a growth and a development in continuous progression, and it has shown itself able to contribute to the financing of the economy, such as the case of the project financing, not only in Muslim countries, but also in other countries. Thus, Islamic finance can be considered as an alternative finance that can meet the financing needs of the economy. The potential of this industry presents it, also, as a solution to the dysfunctions of conventional finance, especially since the 2007

financial crisis, where a call for ethical, participatory and socially responsible finance has been launched several times.

In this context, H. Simon had found that the main cause of depression, in the 1930s, was the crisis of confidence in the credit system, which could have been avoided if investment financing was based on a participatory system. H. Minsky had joined Simon in his idea of the need for a crowdfunding system, not a credit system (*El-Ghazali; 1994*). According to Keynes (1998), a better use of the currency and financial stability will be seen when the loans will be granted at a zero rate. For Maurice Allais, financial stability will have its place when the interest rate will be zero and the tax on capital will be 2% (*Grandmont; 1989*). We can note that these principles of finance are compatible with *shari'ah*, namely, the prohibition of *riba*, the application of the profit-loss sharing principal and the establishment of *zakat*.

Vincent Beaufils, the managing editor of "Challenge", wrote (in terms of meaning): *"In reality, and Benedict XVI will forgive us, as we are going through a financial crisis that sweeps away all the signs of growth in its path, it is rather the Koran that we must re-read that the papal texts. Because if our bankers, eager for profitability on own funds, had respected the shari'ah a little bit, we would not be there."* In an article published, on March 4, 2013, under the title "Dalla finanza islamica proposte e idee per l'Occidente in crisi" (Ideas and proposals of Islamic finance for the West in crisis), the Vatican daily official praises the advantages of a system based on the principles of the Muslim religion: *"We believe that Islamic finance can help refound new rules for Western finance, because we are facing a crisis that is essentially a crisis of confidence in the system."*¹³

Nevertheless, the major constraints encountered during this research, on the one hand, were the reliability of the data collected from the selected countries in which there is, until now, a statistical data problem. Moreover, we wanted to extend the study by considering socio-economic factors, but the lack of statistics led us to limit the analysis to the common economic indicators. On the other hand, there is an absence of quantitative studies on this topic, what would otherwise have been a reference in our analysis and would have allowed us, in a certain way, to verify our results.

The presentation of the contribution of Islamic finance in the financing of the economy, in general, and of project financing, in particular, shows that, indeed, this industry has proved itself able to meet the needs of financing of countries. Although, Islamic finance is in an

¹³ https://www.xibar.net/Ecovision-La-finance-islamique-solution-de-sortie-de-crise_a16971.html

environment that is increasingly favourable to its development and is experiencing a steady rise, it should be remembered that it faces many challenges (which we have already presented) that could slow down its alternative financing approach. In this regard, a number of recommendations can be suggested and presented as follows:

- Strengthen the regulation and regulation of products, institutions and professions related to Islamic financing;
- Improve supply, in terms of service quality and innovation of Islamic finance products;
- Development of human resources and information echnology of Islamic Financing;
- Promotion and training in Islamic financing;
- Coordination with government and related regulators to create synergistic policies for Islamic finance development;
- Establishment of unified Islamic standards and opinions of Islamic financing;
- Development of financial markets for all Islamic financial products and instruments so that they can be traded and generate cash; and
- Reciprocal cooperation between conventional and Islamic financing.

The results of this thesis confirm the place of Islamic finance in the financing of the economy, especially in the project financing. Yet the question that usually arises after each study is to know whether conclusions can be applied elsewhere. It would therefore be appropriate to conduct, in the future, the same study in other regions, to take into account other factors (the case of social indicators), sectors and Islamic financial products / services.

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APPENDICES

Appendix 1: Glossary of the Arabic words used

Aqd	A contract represents an undertaking, by mutual consent, between two or more parties, in a mandatory manner, which involves a transaction of goods and / or services or a partnership operation.
Bay bithaman ajil	(Also: bai muajjal): Sale at fixed price and deferred payment.
Fatwa	Opinion of a jurisconsult.
Fiqh	Means understand / educate. It translates as "Muslim law" or "Islamic jurisprudence".
Gharar	Refers to any probable transaction whose existence or characteristics are not certain, due to lack of information or ignorance of the essential elements of the transaction to one of the parties, or the uncertainty of a contracting party to honour the contract.
Hadith	Oral communication of the Prophet Mohammed and by extension a collection that includes all the traditions relating to his actions and his words.
Ijara	Contract by which a good and / or a service is rented in the form of leasing with a possibility of purchase at the end of the contract.
Ijmâ	Resulting from the understanding, interpretation and application of the Quran and the Sunnah.
Istihsan	Preferential judgment.
Istislah	Public and people interest.

Istisnaâ	Futures contract, in which the buyer pays a property, whose end of construction / manufacture and delivery are subsequent.
Maisir	(Gambling) practice in a contract whereby the right of the contracting parties depends on a random event.
Musharakah	Contract creating a joint venture in which both parties provide investment capital and entrepreneurial skills and work.
Mudarabah	Contract creating a joint venture in which one party provides financial capital and the other provides entrepreneurial capital and labor.
Mudarib	Contributor of capital work in a mudaraba contract.
Murabahah	Deferred payment sales contract whose cost and profit margin are known in advance between the buyer and the seller.
Muamalat	Means “treatment” and “transaction”.
Nissab	Minimum fortune beyond which the payment of zakat becomes obligatory.
Qiyas	(Analogy) Reasoning used to determine the solution of a problem of law not provided for by the texts of the Qur'an and the Sunnah.
Rab el-mal	Apporteur de capital financier dans un contrat moudaraba.
Riba	Refers to any type of surplus (monetary or otherwise) required by a lender to its borrower.
Salam	Forward contract, in which the buyer pays for a merchandise whose delivery is later.

Shari'ah	Islamic law based mainly on the Quran and the Sunnah.
Sukuk	(Singular: sak) Equivalent of bonds, they confer a right of ownership on the assets of the issuer and their holder receives a portion of the profit attached to the return on the underlying asset. Thus, the interest is replaced by a profit prevented in advance.
Takaful	Insurance agreement between a group of people who agree to compensate for the loss (or damage) it could inflict on one of them, on the fund they donate collectively.
Urf	Means "custom".
Wakalah	Contract by which a person (physical or moral) is responsible for making investments on behalf of a client who pays in return a remuneration indexed on the results.
Waqf	Life-giving for works of public utility, pious and charitable, which can not be sold, offered or inherited, and whose usufruct reverts to these works.
Zakat	It is an alms obligation that every Muslim, who has the value of the Nissab for a lunar year, must pay 2.5% of the total amount of his property according to the rules of solidarity established by Islam.

Appendix 2: Net IDB Group financing by region and years (1976-2015)

Region	Unit	1976-2009	2010	2011	2012	2013	2014	2015	Total
SSA-22	Number	1371	91	78	123	82	97	100	1942
	US\$million	6849,3	935,6	965,4	1148,3	1616,1	2265,1	3503,1	17312,8
MENA-19	Number	2523	86	80	84	87	67	49	2976
	US\$million	32546,1	2641	2445,4	4139,4	3899,1	5148,3	4217,3	55036,6
ASIA-8	Number	875	47	37	41	34	31	33	1098
	US\$million	17098,3	2412,3	2340,7	3674,5	2987,2	2581,4	2188,8	33283,2
CIT-7	Number	237	21	23	34	29	21	10	375
	US\$million	2359,7	508	865,2	544	921,1	598,8	312,8	6109,5
Others	Number	1102	90	85	71	69	61	38	1516
	US\$million	876,5	68,7	101,6	226,7	245,1	285,9	75,5	1880
Net IDB Group operations	Number	6108	335	303	353	301	277	230	7907
	US\$million	59729,8	6565,5	6718,3	9732,8	9668,6	10909,5	10297,5	113622

Source: Islamic Development Bank Group. (April 2016). *Key Development Indicators for the IDB Member Countries*. Statistical Yearbook N°. 36. Saudi-Arabia. P35.

- **CIT:** Countries in Transition
- **MENA:** Middle East and North Africa
- **SSA:** Sub-Saharan Africa
- **Others:** comprise of Non-Member Countries, Regional Projects and Special Programme

Appendix 3: Net IDB Group financing by mode of financing and region (1976-2015)

Mode of financing	Unit	SSA-22	MENA-19	ASIA-8	CIT-7	Others	Total
Mudarabah	Number	1	5	-	-	-	6
	US\$million	30	1010	-	-	-	1040
Loan	Number	625	172	124	93	1	1042
	US\$million	4328	1225,6	1004,1	778,7	7	7343,4
Equity	Number	42	168	52	16	46	324
	US\$million	171,6	1438	238,9	78,8	990,7	2918
Leasing	Number	70	269	61	19	4	423
	US\$million	1558,8	8906,4	2102,4	725,9	34,3	13327,7
Instalement Sale	Number	51	134	62	35	-	282
	US\$million	520,4	3327,2	1212,7	681,9	-	5742,2
Combines Line of Financing	Number	3	17	7	9	1	37
	US\$million	60,6	290,6	62,1	249,7	10	673
Profit Sharing/ Musharaka	Number	1	12	-	-	-	13
	US\$million	4,4	372,2	-	-	-	376,5
Istisnaa	Number	163	140	62	27	10	402
	US\$million	6185	8149,8	3174,7	2392,6	106,1	20008,2
Others	Number	-	23	5	-	1	29
	US\$million	-	154	117	-	50	321
Murabaha	Number	244	1594	597	59	12	2506
	US\$million	4121,8	29918,7	25263,7	1169,6	215	60698,8
Technical Assistance	Number	499	299	70	79	379	1326
	US\$million	170,6	103,3	27,6	21	107,4	429,9
Special Assistance Operations	Number	216	143	58	38	1062	1517
	US\$million	151,7	140,9	80	11,4	359,4	743,4
Net IDB Group operations	Number	1942	2976	1098	375	1516	7907
	US\$million	17312,8	55036,6	33283,2	6109,5	1880	113622

Source: Islamic Development Bank Group. (April 2016). *Key Development Indicators for the IDB Member Countries*. Statistical Yearbook N°. 36. Saudi-Arabia. P33.

Appendix 4: Net IDB Group financing by sector and region (1976-2015)

Sector	Unit	SSA-22	MENA-19	ASIA-8	CIT-7	Others	Total
Agriculture	Number	445	141	91	54	62	793
	US\$million	3329,6	2247,7	1680,6	232,4	270,2	8760,5
Education	Number	285	175	113	38	896	1507
	US\$million	1248,9	875,5	1354,1	138,3	239,1	3855,9
Energy	Number	146	178	112	32	11	479
	US\$million	3159,6	15936,9	15042,4	259,7	123,9	35522,4
Finance	Number	126	573	199	95	160	1153
	US\$million	930,1	7140,4	3003,2	752,2	927,9	12753,9
Health	Number	179	119	42	31	69	440
	US\$million	787,5	1035,8	624,2	207,5	27,3	2682,4
Industry and Mining	Number	75	224	40	25	20	384
	US\$million	631,8	3943,2	680,3	162,4	1,4	5419
Information and communications	Number	17	27	8	7	31	90
	US\$million	175,2	196,1	125,9	34,3	51	582,5
Public administration	Number	23	24	3	12	9	71
	US\$million	13,4	6	33,9	3,1	3,5	60
Trade	Number	119	1167	370	5	29	1690
	US\$million	1249,3	15027,9	9040,9	1,2	61,1	25380,3
Transportation	Number	267	88	51	48	9	463
	US\$million	4293,4	3947,7	1265,5	1874,2	22,1	11403
Water, Sanitation & Urban Services	Number	119	136	23	13	22	313
	US\$million	1328,7	3901	361	406	1,3	5998
Real Estate	Number	6	16	1	3	1	27
	US\$million	52	224,9	20	33,3	30	360,2
Other Social Services	Number	135	108	45	12	197	497
	US\$million	113,3	553,6	51,2	4,8	121	843,9
Net IDB Group operations	Number	1942	2976	1098	375	1516	7907
	US\$million	17312,8	55036,6	33283,2	6109,5	1880	113622

Source: Islamic Development Bank Group. (April 2016). *Key Development Indicators for the IDB Member Countries*. Statistical Yearbook N°. 36. Saudi-Arabia. P34.

Appendix 5: Pedroni test of cointegration results

Pedroni Residual Cointegration Test

Series: EXP01 IMP

Date: 05/01/18 Time: 22:27

Sample: 1997 2016

Included observations: 340

Cross-sections included: 17

Null Hypothesis: No cointegration

Trend assumption: No deterministic intercept or trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	<u>Statistic</u>	<u>Prob.</u>	Weighted	<u>Statistic</u>	<u>Prob.</u>
Panel v-Statistic	0.847065	0.1985		-0.770722	0.7796
Panel rho-Statistic	-3.347808	0.0004		-1.958274	0.0251
Panel PP-Statistic	-2.957556	0.0016		-1.901052	0.0286
Panel ADF-Statistic	-4.315573	0.0000		-2.994246	0.0014

Alternative hypothesis: individual AR coefs. (between-dimension)

	<u>Statistic</u>	<u>Prob.</u>
Group rho-Statistic	-0.144321	0.4426
Group PP-Statistic	-2.680922	0.0037
Group ADF-Statistic	-3.901175	0.0000

Appendix 6: Causality test results

Pairwise Dumitrescu Hurlin Panel Causality Tests

Date: 05/09/18 Time: 11:25

Sample: 1997 2016

Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
GDP does not homogeneously cause IDBPF	1.93383	-0.62384	0.5327
IDBPF does not homogeneously cause GDP	3.21345	1.23343	0.2174
RGDP does not homogeneously cause IDBPF	3.31661	1.38316	0.1666
IDBPF does not homogeneously cause RGDP	3.50433	1.65562	0.0978
GDPPERC does not homogeneously cause IDBPF	2.38186	0.02645	0.9789
IDBPF does not homogeneously cause GDPPERC	2.60766	0.35418	0.7232
INF does not homogeneously cause IDBPF	1.42296	-1.36532	0.1722
IDBPF does not homogeneously cause INF	2.90105	0.78001	0.4354
D(EXP01) does not homogeneously cause IDBPF	1.76004	-0.89767	0.3694
IDBPF does not homogeneously cause D(EXP01)	2.44721	0.06622	0.9472
D(IMP) does not homogeneously cause IDBPF	1.80895	-0.82908	0.4071
IDBPF does not homogeneously cause D(IMP)	2.57925	0.25144	0.8015
RGDP does not homogeneously cause GDP	2.56333	0.28984	0.7719
GDP does not homogeneously cause RGDP	3.69598	1.93378	0.0531
GDPPERC does not homogeneously cause GDP	6.65803	6.23298	5.E-10
GDP does not homogeneously cause GDPPERC	7.98682	8.16161	2.E-16
INF does not homogeneously cause GDP	2.88263	0.75328	0.4513
GDP does not homogeneously cause INF	2.40985	0.06708	0.9465
D(EXP01) does not homogeneously cause GDP	2.39288	-0.00999	0.9920
GDP does not homogeneously cause D(EXP01)	1.61295	-1.10401	0.2696
D(IMP) does not homogeneously cause GDP	2.97301	0.80377	0.4215
GDP does not homogeneously cause D(IMP)	1.65023	-1.05171	0.2929
GDPPERC does not homogeneously cause RGDP	7.21846	7.04640	2.E-12
RGDP does not homogeneously cause GDPPERC	7.91925	8.06354	7.E-16
INF does not homogeneously cause RGDP	3.43575	1.55609	0.1197
RGDP does not homogeneously cause INF	2.44583	0.11930	0.9050
D(EXP01) does not homogeneously cause RGDP	2.98859	0.82562	0.4090
RGDP does not homogeneously cause D(EXP01)	1.91703	-0.67746	0.4981
D(IMP) does not homogeneously cause RGDP	2.41434	0.02012	0.9839
RGDP does not homogeneously cause D(IMP)	1.64245	-1.06263	0.2880
INF does not homogeneously cause GDPPERC	4.18604	2.64508	0.0082
GDPPERC does not homogeneously cause INF	2.15199	-0.30719	0.7587
D(EXP01) does not homogeneously cause GDPPERC	2.54810	0.20775	0.8354
GDPPERC does not homogeneously cause D(EXP01)	2.72969	0.46246	0.6437

D(IMP) does not homogeneously cause GDPPERC	2.95743	0.78191	0.4343
GDPPERC does not homogeneously cause D(IMP)	1.99971	-0.56150	0.5745
D(EXP01) does not homogeneously cause INF	1.78401	-0.86405	0.3876
INF does not homogeneously cause D(EXP01)	5.50578	4.35650	1.E-05
D(IMP) does not homogeneously cause INF	3.09417	0.97372	0.3302
INF does not homogeneously cause D(IMP)	3.57328	1.64577	0.0998
D(IMP) does not homogeneously cause D(EXP01)	1.52750	-1.22386	0.2210
D(EXP01) does not homogeneously cause D(IMP)	2.01032	-0.54661	0.5846

Appendix 7: Pooled regression model results

Dependent Variable: IDBPF
 Method: Panel Least Squares
 Date: 05/17/18 Time: 13:04
 Sample (adjusted): 1998 2016
 Periods included: 19
 Cross-sections included: 17
 Total panel (balanced) observations: 323

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.537739	0.518146	10.68760	0.0000
GDP	-0.453108	0.111885	-4.049769	0.0001
RGDP	-0.001488	0.029706	-0.050082	0.9601
GDPPER	0.503150	0.111883	4.497119	0.0000
INF	0.168668	0.030425	5.543721	0.0000
D(EXP01)	0.072554	0.050027	1.450297	0.1480
D(IMP)	0.040270	0.053372	0.754514	0.4511
R-squared	0.149757	Mean dependent var		5.207430
Adjusted R-squared	0.133613	S.D. dependent var		5.738370
S.E. of regression	5.341270	Akaike info criterion		6.210237
Sum squared resid	9015.215	Schwarz criterion		6.292106
Log likelihood	-995.9533	Hannan-Quinn criter.		6.242918
F-statistic	9.276399	Durbin-Watson stat		0.582129
Prob(F-statistic)	0.000000			

Appendix 8: Fixed-effects regression model results

Dependent Variable: IDBPF
 Method: Panel Least Squares
 Date: 05/17/18 Time: 13:08
 Sample (adjusted): 1998 2016
 Periods included: 19
 Cross-sections included: 17
 Total panel (balanced) observations: 323

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.869343	0.456710	10.66179	0.0000
GDP	-0.061131	0.115852	-0.527669	0.5981
RGDP	0.010590	0.022158	0.477914	0.6331
GDPPER	0.078061	0.117947	0.661830	0.5086
INF	0.073631	0.028770	2.559293	0.0110
D(EXP01)	0.058842	0.037404	1.573136	0.1167
D(IMP)	0.021481	0.040060	0.536232	0.5922

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.558814	Mean dependent var	5.207430
Adjusted R-squared	0.526460	S.D. dependent var	5.738370
S.E. of regression	3.948815	Akaike info criterion	5.653253
Sum squared resid	4677.942	Schwarz criterion	5.922250
Log likelihood	-890.0004	Hannan-Quinn criter.	5.760634
F-statistic	17.27205	Durbin-Watson stat	1.067777
Prob(F-statistic)	0.000000		

Appendix 9: Random-effects regression model results

Dependent Variable: IDBPF
 Method: Panel EGLS (Cross-section random effects)
 Date: 05/17/18 Time: 13:13
 Sample (adjusted): 1998 2016
 Periods included: 19
 Cross-sections included: 17
 Total panel (balanced) observations: 323
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.961224	1.013034	4.897393	0.0000
GDP	-0.110549	0.112560	-0.982129	0.3268
RGDP	0.009838	0.022146	0.444238	0.6572
GDPPEREC	0.130970	0.114436	1.144486	0.2533
INF	0.083998	0.028221	2.976420	0.0031
D(EXP01)	0.059347	0.037380	1.587685	0.1134
D(IMP)	0.023282	0.040020	0.581743	0.5612

Effects Specification		S.D.	Rho
Cross-section random		3.741840	0.4731
Idiosyncratic random		3.948815	0.5269

Weighted Statistics			
R-squared	0.037483	Mean dependent var	1.225347
Adjusted R-squared	0.019208	S.D. dependent var	3.998394
S.E. of regression	3.959808	Sum squared resid	4954.905
F-statistic	2.051005	Durbin-Watson stat	1.010852
Prob(F-statistic)	0.058738		

Unweighted Statistics			
R-squared	0.094447	Mean dependent var	5.207430
Sum squared resid	9601.676	Durbin-Watson stat	0.521646

Appendix 10: Hausman test of specifications results

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.761831	6	0.2561

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
GDP	-0.061131	-0.110549	0.000752	0.0715
RGDP	0.010590	0.009838	0.000001	0.3042
GDPPEREC	0.078061	0.130970	0.000816	0.0640
INF	0.073631	0.083998	0.000031	0.0638
D(EXP01)	0.058842	0.059347	0.000002	0.7104
D(IMP)	0.021481	0.023282	0.000003	0.3097

Cross-section random effects test equation:

Dependent Variable: IDBPF

Method: Panel Least Squares

Date: 05/17/18 Time: 13:18

Sample (adjusted): 1998 2016

Periods included: 19

Cross-sections included: 17

Total panel (balanced) observations: 323

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.869343	0.456710	10.66179	0.0000
GDP	-0.061131	0.115852	-0.527669	0.5981
RGDP	0.010590	0.022158	0.477914	0.6331
GDPPEREC	0.078061	0.117947	0.661830	0.5086
INF	0.073631	0.028770	2.559293	0.0110
D(EXP01)	0.058842	0.037404	1.573136	0.1167
D(IMP)	0.021481	0.040060	0.536232	0.5922

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.558814	Mean dependent var	5.207430
Adjusted R-squared	0.526460	S.D. dependent var	5.738370
S.E. of regression	3.948815	Akaike info criterion	5.653253
Sum squared resid	4677.942	Schwarz criterion	5.922250
Log likelihood	-890.0004	Hannan-Quinn criter.	5.760634
F-statistic	17.27205	Durbin-Watson stat	1.067777
Prob(F-statistic)	0.000000		

Appendix 11: Random-effects estimation model

Dependent Variable: IDBPF
 Method: Panel EGLS (Cross-section random effects)
 Date: 06/05/18 Time: 23:25
 Sample (adjusted): 1998 2016
 Periods included: 19
 Cross-sections included: 17
 Total panel (balanced) observations: 323
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.961224	1.013034	4.897393	0.0000
GDP	-0.110549	0.112560	-0.982129	0.3268
RGDP	0.009838	0.022146	0.444238	0.6572
GDPPERC	0.130970	0.114436	1.144486	0.2533
INF	0.083998	0.028221	2.976420	0.0031
D(EXP01)	0.059347	0.037380	1.587685	0.1134
D(IMP)	0.023282	0.040020	0.581743	0.5612

Effects Specification		S.D.	Rho
Cross-section random		3.741840	0.4731
Idiosyncratic random		3.948815	0.5269

Weighted Statistics			
R-squared	0.037483	Mean dependent var	1.225347
Adjusted R-squared	0.019208	S.D. dependent var	3.998394
S.E. of regression	3.959808	Sum squared resid	4954.905
F-statistic	2.051005	Durbin-Watson stat	1.010852
Prob(F-statistic)	0.058738		

Unweighted Statistics			
R-squared	0.094447	Mean dependent var	5.207430
Sum squared resid	9601.676	Durbin-Watson stat	0.521646