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The Impact of a Renewable Energies Cluster in Southern Countries: Viability and Economic Impact in Morocco

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THE IMPACT OF A RENEWABLE ENERGIES CLUSTER IN SOUTHERN COUNTRIES: VIABILITY AND ECONOMIC IMPACT IN MOROCCO

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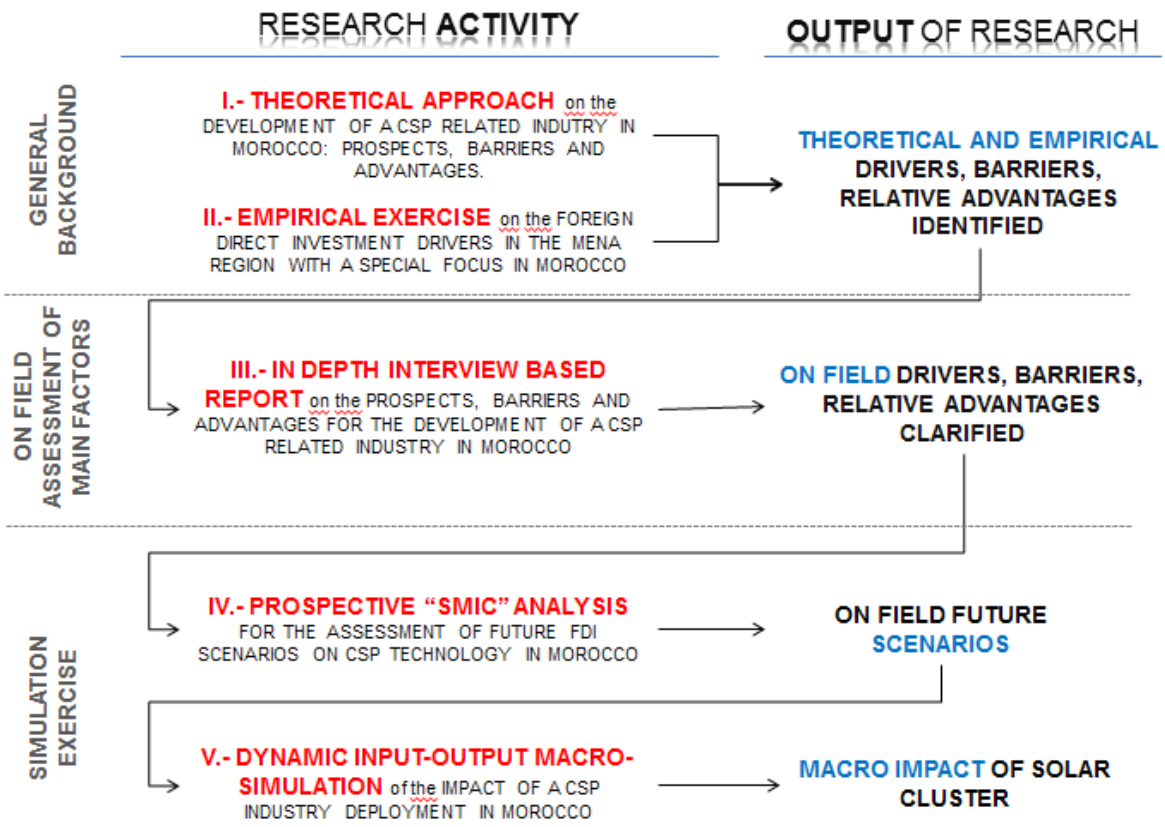
GENERAL STRUCTURE OF THE RESEARCH PROJECT

The present document attempts to summarize the basic outcomes obtained in a FEMISE research project focused on the evaluation of impacts of an eventual Renewable Energy cluster in Morocco.

This project is a natural extension of a previous one that clearly identified the RES demand scenarios for Morocco, the needs of RES installed capacity according to that scenarios, the detailed investment plans needed to attend this installed capacity supply and the quantification of the macroeconomic impacts derived of the foreign investment inflows needed to make available these. In the project that we summarize here, we have tried to evaluate the feasibility, needs and macroeconomic impact of a gradual development of a national industrial CLUSTER for producing the CSP technology. The scope of this project is therefore more ambitious and attractive, in the sense that the study of an eventual development of RES manufacturing industry CLUSTER in Morocco goes beyond energy policy needs, connecting to broader and more significant economy policy issues, especially those related with the structural transformation of southern economies.

The structure of the project and the ordered sequence of its different tasks could be illustrated with the following chart:

Project Structure and Tasks



A first background analysis covers the theoretical fundamentals of a cluster approach adding a basic empirical exercise about determinants FDI into the region (with special focus on Morocco). In a second main stage, a in depth interview based survey is carried with the aim of assessing in quantitative terms prospects, barriers and advantages of a CSP related cluster industry in Morocco. Finally, taking into account the outcomes of that previous survey, two simulation exercises are completed, a prospective SMIC exercise and a dynamic Input – Output simulation.

The structure of this document is arranged according to the project narrative adding an executive summary.

EXECUTIVE SUMMARY

The European Renewable Energies (RES) industry has positioned itself on the technological frontier; European utilities and grid operators are among the most experienced in integrating renewable sources in the energy system, and Member

States' regulatory frameworks usually serve as international benchmarks. With this in mind, the Union for the Mediterranean (UfM) has launched a well-known Mediterranean Solar Plan intended to deploy renewable energies in the southern shore of the Mediterranean with EU support. Morocco has shown its interest in participating in this initiative, which would enable the country to exploit their important solar and wind potential, increase energy supply, reduce energy dependency and diversify its energy mix.

More than 40 enterprises are grouped in AMISOLE [1] but basically oriented to commercialization and service, so with the exception of some solar panels locally produce in very limited quantities, the vast majority of the equipment is imported from USA, France, Spain and Germany and just a couple of enterprises (Atlas solaire, Electro Contact, Sococharbo, Copsolair…) are specifically devoted to the manufacturing of RES equipment. Wind turbines or solar modules would be completely manufactured abroad and then simply transported and installed in Moroccan soil (or eventually sea).

This RES technology import dependency does not necessary affect the achievement of RES long term objectives, but obviously reduces the economic impact of this structural energy supply transformation. **A more ambitious alternative scenario is now taken into account in this new project: the promotion of an industrial cluster for the RES manufacturing process providing, as final output, the solar modules and wind turbines needed in the solar and wind farms.**

The installation and operation of RES plants can produce meaningful economic implications in terms of induced production and employment creation, but for obvious reasons, those effects are transitory and only relevant during the phase of the wind or solar plants construction and become just marginal in the 25-30 following years of operation. On the contrary, the implementation of RES manufacturing facilities inland may:

- extensively and everlasting promote several inter related economic activities,
- foster knowledge and North – South technology transfer
- help the setting up of a local industry
- induce a more soundness development in the selected regions

[1] Association Marocaine des Industries SOLaires et Eoliennes

Moreover, and in that sense, the study of an eventual development of RES manufacturing industries in Morocco not only brings out energy policy matters with an eventual short or medium term impact, but **appeals to more significant economy policy issues connected with the structural transformation of Moroccan economy towards a more innovative industry web and an integral strategy for their sustainable development**.

In addition, the promotion and maturity of a RES manufacturing industry in Morocco may also be of importance as a part of the medium and long term strategies of European RES companies, setting the means for promoting EU competitiveness trough an eventual relocation or off shoring strategy for part of the manufacturing processes inducing a variety of win-win North-South initiatives that can materialise even in the short term, promoting collaboration and mutual progress.

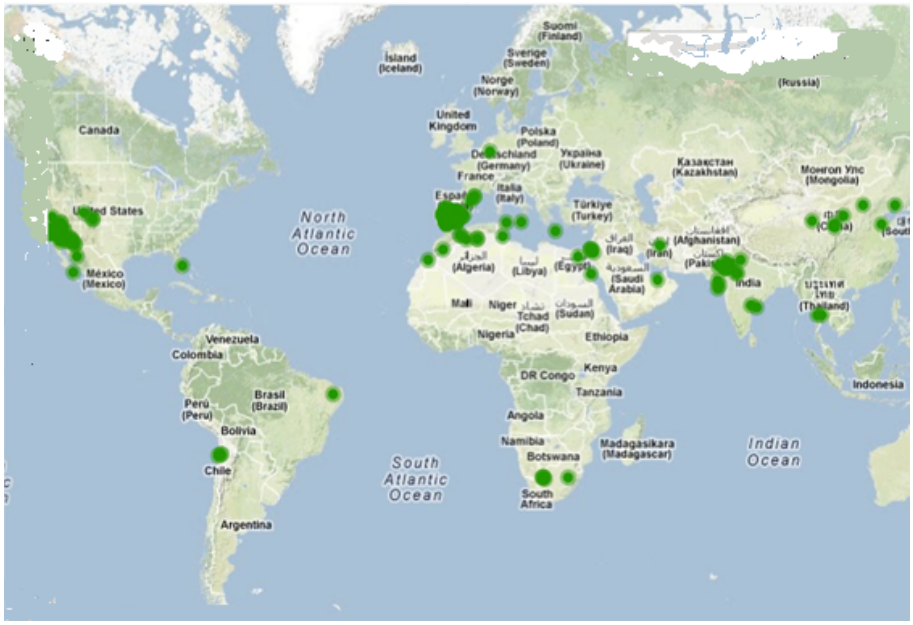
This research project deals with the very basic conceptual framework of technology transfer, as a way of promoting long – lasting development of countries. The study aims to understand the needs and the potential benefits of RES technology manufacturing transfer to Morocco.

The interest of Moroccan authorities for promoting local R&D, knowledge transfers and manufacturing industries in the field of clean energies is beyond doubt. The Moroccan Agency for Solar Energy (MASEN) is officially required to develop research and development in solar technology and its mission explicitly reckons the "will for an industrial approach" for the achievement of its objectives, including "the development of applied research and to the promotion of the technological innovations (..)". In 2009, the Technopolis Park in Oujda started its construction and the first phase should be almost completed at the end of 2011. This Technopolis Project includes four main areas, and the "CleanTech" industrial and logistical park is one of them.

Natural resources/conditions (density of normal irradiation, geo-morphological characteristics, normal wind…) **is a "sine-qua-non" requirement to establish these plants, but more strategic decisions must be taken into account by entrepreneurs** in the following years in order to increase the yield of these investments.

A **clear strip in the Tropic of Cancer draws the area where the Concentrated Solar Power (CSP)** is - or is going to be - installed. In spite of the California area and Spain, North Africa countries, Arabic peninsula, India and China mostly concentrate the operating and planned projects of CSP deployment in the XXI century. As such, decisions about optimal location of CSP components producers will be crucial in the next few years. A detailed examination of the FDI determinants in these countries may help to make these decisions.

CSP Plants around the world (operating and planned)



Source: data from CSP Today, July 2012.

In this framework, we have carried out an investigation focused in the following aspects:

A) Macroeconomic Approach to FDI drivers in the MENA Region and CSP potential competitors: conclusions from a Panel Data model using socioeconomic indicators for selected countries[2].
B) Microeconomic Approach to investment in Morocco from the CSP perspective: conclusions from a survey to experts.
C) Economic Impact of a potential CSP Cluster Industry on Morocco: a dynamic Input Output model.

[2] Algeria, Bangladesh, China, Egypt, India, Iran , Kuwait, Morocco, Nepal, Oman Pakistan, Sri Lanka, Syrian , Tunisia, Turkey, United Arab Emirates

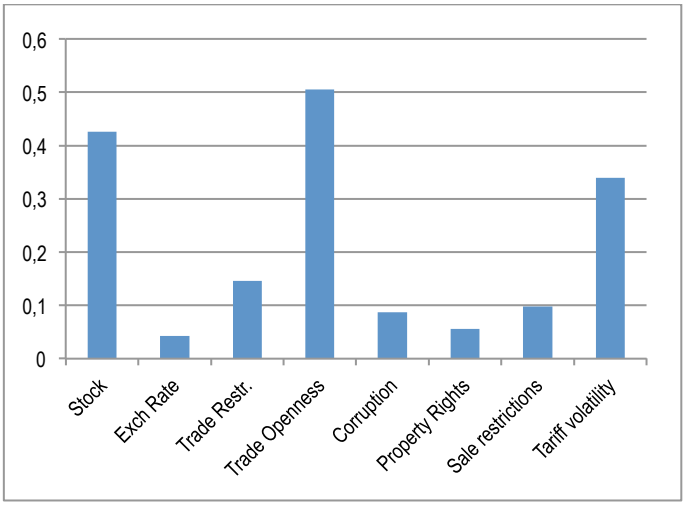
A) Macroeconomic Approach to FDI drivers in the MENA Region and CSP potential competitors (Results of a Panel Data Model using macroeconomic data for MENA, Arabic Peninsula and Asia).

1. After a carefully revisiting of the state of the art and as a result of our own model, the following aspects could summarize the most relevant determinants in FDI location decisions:

   - Macroeconomic conditions (like market size, public expenditure, external stability, wealth growth, inflation and exchange rate volatility among others)
   - Governance and institutional performance (in the sense of rule of law, level of corruption and/or bureaucracy, etc.) and privatization policies.
   - Infrastructure and ITC (for example human capital, education level, physical infrastructure, internet accessibility).
   - Openness of the market (entry barriers for foreign companies, regional integration …).

2. Empirical results for the MENA Region and main CSP potential competitors show that **trade openness, stock of previous FDI and tariff volatility are the more relevant drivers of FDI in MENA countries**:

Order of relevance of variables as FDI drivers



Source: own calculations with standardized coefficients

3. Reviewing the **exchange rate volatility** evolution, **Morocco and Tunisia show a very good performance** in terms of stability. During the last ten years, they have got a very good performance, without huge changes in its exchanges rates with the

dollar. In the opposite sense, Egypt or Algeria showed very volatile indicators in this issue. In the case of the Arab countries considered, all of them showed a worse behavior compared with Morocco and Tunisia. Especially, Iran showed a huge volatility. The rest of the countries showed more than two times the volatility observed in the two better among the North Africa countries.

4. About "**International trade barriers" indicators, Asian countries (included China and India) shows better ranking than the North African countries**. The worst position in this indicator is occupied by the selected Arabian countries.

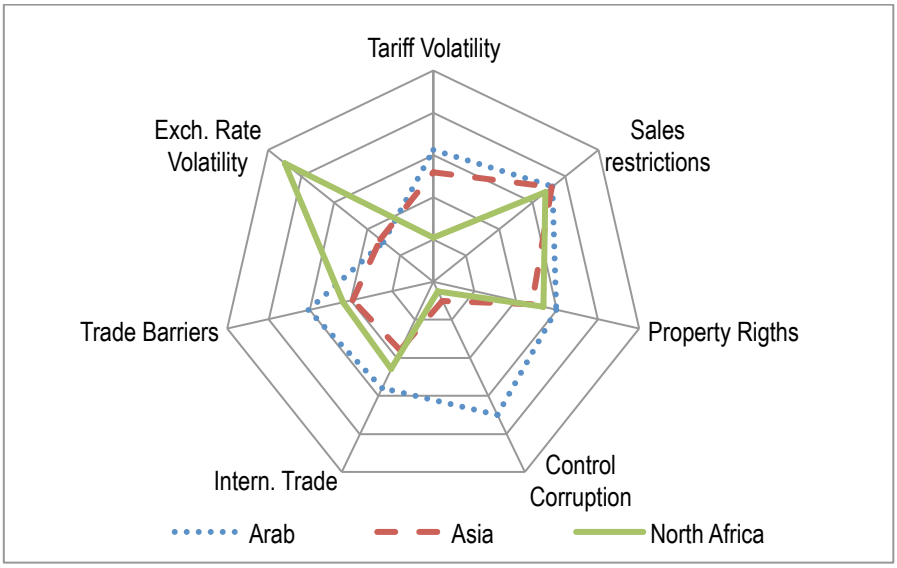
5. The indicator of **"International current Trade performance", North Africa countries show a relative advantage against the Arabian Peninsula ones, but they are in a disadvantageous situation compared with South-Asia** countries. However, in this variable the distances are not very large.

6. North-African and South Asia countries show a **similar skill in control of corruption**. Here, there is a very large distance with the Arabian countries selected in our sample.

7. As a whole, there are not significant differences between the three zones about the "legal system & property rights" variable. Just to point out the weak situation of Algeria in these variables, in similar values with Pakistan or Bangladesh.

8. In the case of the regulatory restrictions on the sale of real property, the situation is pretty similar for the three zones. Just Syrian Republic shows a relative weakness in this indicator.

Relative position in significance variables by areas



Source: own calculations (upper value, better performance)

B) Microeconomic Approach to FDI in Morocco conducting to a Cluster Creation (results of the FEMISE Survey directed to Stakeholders of CSP in Europe and in Morocco).

9. A **local CSP industry in Morocco presents a likelihood of 7.15 out of 15** (47.7%) but, if we look at the future and given certain "environment" adjustments during the next decade, the same experts agree that **this likelihood increase to an average 10 over 15 (70%)**, (or 11/15 (73%) in median terms).

10. It is extremely interesting that a CSP industry in Morocco, both now and in the next decade, assessing opportunities is best assessed by those who have experienced recent activity in Morocco than those who have not had any previous business in the area. In this sense, **the possibilities of establishing a CSP industry in the country rise to around 12.5 (over 15) in the view of those entrepreneurs operating in Morocco,** and a valuation of only 10 from those who, for the moment, has no business experience in the area.

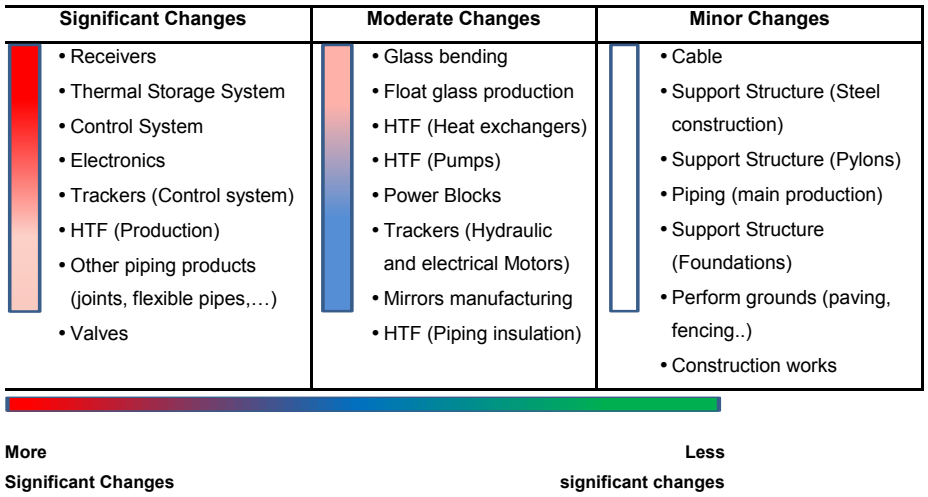
11. About the CSP Value Chain, **three major activities look suitable now for local manufacturing: building up factories, construction of solar structures and manufacturing of minor complementary components such as piping and cable**. AS expected, all this activities are clearly those of lower technological requirements and could easily match the actual potential of Moroccan industry.

12. On the other side, none or a clear minority of the interviewed experts think that the most technological production stages could be locally assumed in the current situation: glass, mirrors, receivers, trackers, High Transfer Fluid, power blocks or system controls.

13. Every CSP manufacturing process could be locally implemented in the next decade given the appropriate changes. Besides, under a feasible scenario of minor or moderate changes, 15 out of the 23 stages could be locally implemented.

Changes needed to implement different production stages during the next decade

(Each stage is assigned to the modal category according to experts criteria)



14. Every expert was asked to score the importance of a set of 14 specific entrepreneurial barriers that potentially could be hindering the high potential of Morocco as a future CSP manufacturing location.

15. The greatest concern seems to be about the **uncertainty about the regional or country level RES (CSP) market development and prospects**. Although a significant number of CSP projects have already been successfully developed in the area, it is crucial to understand that, for the interviewed experts, a steady CSP market growth in Morocco and the MENA region as a whole is crucial to assess a future increasing potential for local manufacturing of CSP components and related services. Even if other weakness or restrictions tend to vanish gradually, no

successful future scenario of local manufacturing in Morocco could be envisaged if the volume of the installed CSP capacity within the country and the region doesn't achieve a critical level of market development.

16. Well above the mean, it also appears a group of three cost related barriers. As stated by experts, there is a deadly combination of a high risk premium in the area and **lack of international or regional/local financial resources**. CSP is a relative young industry and everywhere around the world there exist high initial capital costs for the adoption of CSP manufacturing technology. The most important manufacturing stages are high capital-intensive (glass production, mirror flat, automation for mounting structures,…) and that means that and although some relevant international financing initiatives have been launched (for example the MENA CSP IP, supported by the World Bank and the African Development Bank), access to financing appears to be a major barrier.

17. Slightly above the group mean we find the **low level of specialization of Moroccan industry in CSP (or RES) technology**, insufficiently developed infrastructures and low level of automatization / modernization of local industries.

18. Moving into policy related barriers, one major concern appears well above the group mean ranking the first in order of importance of the entire list of 37 obstacles of different type: the **absence or the instability of the fiscal and legislative framework for CSP development**.

19. **Improvement of the institutional framework at the country level looks absolutely crucial** for the instigation of new potential CSP market players and service providers and, for that, it looks quite important to provide an administrative and legislative support, especially for further new entrance companies and foreign investments, and to promote relevant institutions to support long term security planning.

20. It is also interesting to notice that the **"Low level of Multilateral or European institutions commitment/support in order to promote regional initiatives"** was also pointed out by experts as an important barrier. It is obvious that, for Europe and other areas, the benefits of a successful CSP industry development in the MENA region would be quite important, but it seems that, in spite of this, business experts don't really feel a significant commitment of Multilateral or European

institution. Given that CSP industry still being in a "take off" stage in the area, a greater institutional support from abroad would be apparently necessary.

21. Moving finally to a set of 6 market barriers, the first one is related to **"volatility of CSP market".** The expert opinion is that CSP market is somehow unstable, and that obviously complicates mid and long term planning. In effect, in the opinion of experts, "the market for CSP systems looks somehow paused at the moment and the sector has been marked by volatility since the technology began to experience a revival in 2004. That up-and-down movement is likely to persist through the remainder of the decade as the price of rival photovoltaic modules continues its dramatic decline".

22. The markets instability and the risk of a "low level of regional demand for RES (CSP)". This issue is a very important one in the sense that every expert agrees that, using a well-known World Bank report[3]: "It is assumed that the volume of the installed CSP capacity within the MENA region (home market volume) is a main precondition for the emergence of local manufacturing, thus the scenarios represent critical levels of market development for local manufacturing. The home market volume and the potential amount of export (external market volume) are regarded as indicators for the development of a successful policy scheme".

STRENGHTS	**OPPORTUNITIES**
High solar potential (irradiation) Low costs of un-skilled labor employees Improvement of the institutional framework Emergent local industry Political stability	For Europe and other areas, the benefits of a successful CSP industry development in the MENA region would be quite important Fast expansion of CSP market in North Africa and Asia
WEAKNESS	**THREATS**
Low level of regional demand for RES (CSP). Low level of specialization of Moroccan industry in CSP (or RES) technology insufficiently developed infrastructures and low level of automatization / modernization of local industries Absence or the instability of the fiscal and legislative framework for CSP development	Volatility of CSP market High level of competition with other RES technologies". High risk premium in the area and lack of international or regional/local financial resources Increase the level of Multilateral or European institutions commitment/support in order to promote regional initiatives

[3] *The World Bank. Middle East and North Africa Region. Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects. January 2011.*

23. The CSP sector development should be supported on knowledge, experience and technology of leading international companies in the sector. However, despite progress made in recent years to encourage investment in the energy sector in Morocco, there are still many barriers that hinder the entry of foreign companies. Identifying the barriers inhibit to foreign companies' investment in the sector should facilitate the design of a strategic policy action by the government of Morocco to promote CSP investment.

C) Economic Impact of a potential CSP Cluster Industry on Morocco: a dynamic Input Output model.

24. Taking into account a consensus up to 65% in the case of "minor or modest changes" and up to 80% adding "significant progress" for the previous scales, we can draw the following alternative **scenarios of import dependency** for the main groups of CSP components:

Percent of import components: More likelihood scenario (with modest or minor changes)

	2020	2030	2040	2050
Solar Field	43.6%	30.6%	30.6%	30.6%
Power block	89.2%	89.2%	89.2%	89.2%
Terrain	0.0%	0.0%	0.0%	0.0%
Storage	84.7%	84.7%	84.7%	84.7%
Construction	22.0%	22.0%	22.0%	22.0%
Engineering	100.0%	100.0%	100.0%	100.0%
Contingencies	0.0%	0.0%	0.0%	0.0%

Percent of import components: More favorable scenario (with significant changes)

	2020	2030	2040	2050
Solar Field	29.7%	2.8%	2.8%	2.8%
Power block	44.6%	0.0%	0.0%	0.0%
Terrain	0.0%	0.0%	0.0%	0.0%
Storage	42.3%	0.0%	0.0%	0.0%
Construction	11.0%	0.0%	0.0%	0.0%
Engineering	100.0%	100.0%	100.0%	100.0%
Contingencies	0.0%	0.0%	0.0%	0.0%

25. Essentially for each decade we have a **progressive amount of investment required to reach the targets in the production mix** fixed in the previous stage of this simulation. The total share of Moroccan industries in this project is related with

the “import dependency scenario” chosen. So, at the end of the simulating horizon, 98% of the investment could be directly applied by Moroccan industries in the most favorable scenario, from a 45% in the “more realistic scenario” and 36% in the “BAU Scenario”.

26. The first output that we can highlight as a result of our simulation scenarios is the **investment amount required to install the electricity power** implied by the previous information, taking into account the part that is going to be directly produced by Moroccan industries and the part that is imported.

TOTAL INVESTMENT IN MSP IN MOROCCO (,000 EUROS)

	2010	2020	2030	2040	2050
TOTAL	**106,335**	**669,053**	**2,567,373**	**4,339,444**	**4,923,042**
SC. 1: B.A.U.	16,254	250,274	945,000	1,592,965	1,805,271
SC. 2 : MORE LIKELIHOOD	16,254	281,635	1,173,936	1,966,920	2,219,633
SC. 3: SIGNIFICANT CHANGES	16,254	441,157	2,500,364	4,261,331	4,857,347

(The total row is determined by the demand supply with CSP technologies derived from the Electricity Mix schema defined by MASEN)

27. Taking into account the three chosen import scenarios, we have found a **total effect on Moroccan GDP that moves from 1.27% to 1.77% for 2050.** The differences between scenarios are very small in terms of GDP between BAU and “More likelihood” (around 0.15%). Comparing BAU with “significant changes Scenario”, these differences can be around 0.5.

28. In all the three scenarios, there are **huge differences in terms of number of employees**. In the third scenario, the creation of a semi-complete industry of CSP components in Morocco is related with an increase in the number of employments, around 85,000 (average for the entire simulation horizon). In the case of the second scenario, with just a partial installation of this kind of industry in the country, the employment average could be around 40,954 people.

29. Several previous plants (for example, Ain-Beni-Mathar) have been financed by the World Bank and by the African Bank for Development. In the last “summary of discussion” of this institution regarding the Ouarzazate Plant of CSP projected in Morocco (November, 15th 2011), the executive directors have approved to fund this

project. However, *"directors acknowledged the various risks associated with the project, given the novelty of the technology and uncertainty of demand. Finally, Executive Directors encouraged close donor collaboration between co-financiers of the project"*. (World Bank, 2011).

30. Of course, an important debate about the way to finance this investment is crucial, but this issue is clearly out of the scope of this investigation given that we focus on the macroeconomic effects of the CSP deployment in Morocco.

THEORETICAL FUNDMENTALS ABOUT A CLUSTER APPROACH

Dr. Antonio Roldán-Ponce. Technische Universität Dresden

INTRODUCTION

Extensive trade liberalization and globalization processes significantly increase customer expectations and competition between companies. At the same time, global markets offer an abundance of opportunities for entrepreneurial ventures (Gradzol et al., 2005). In order to adapt to global demands and benefit from global market opportunities, firms have to continuously renovate themselves in order to improve their individual competitiveness (Fassoula, 2006). These phenomena coincide with a growing awareness of the synergetic effects created by entering into cooperative relations with other business partners and related partner institutions, enhancing revenues and reducing costs (Beamish and Banks, 1987).

At the same time, governmental policy is attempting to improve the competitiveness of national economies through creating favourable framework conditions for economic activity and promoting various instruments and measures for business development. According to the literature based on experiences in industrialized countries, the cluster concept has been shown to be an efficient instrument for strengthening regional and national economies, but its use for enhancing the competitiveness of firms has still to be completely considered (Ketels, 2007).

Policies use mainly incentives such as modernised infrastructure, tax reductions or some form of public expenditure to attract companies to specific places. Public institutions spend massive resources on arbitrary chosen locations nurturing specific sectors until some size is reached. However, this option involves some dangers. First, researchers or policy-makers might postulate the existence of clusters lacking of systematic empirical observation. Second, competitiveness might not be a direct

consequence of agglomerations. As mentioned, the main driver of competitiveness is productivity that result of specialisation, which it is an *outcome* of the location of specific activities. However, it can be possible that because of policies promoting specific sectors, specialisation would be the *output* resulting of limited processes. In other words, a region would not specialise in the sector in which excel among all the possible sectors available, but the region specialisation would be in the only sector available. Therefore, it is necessary to determine the patters of location of specific sectors and to describe the main sectors of specialisation of specific location.

GEOGRAPHY AND COMPETITIVENESS

There is an increasing influence of geographical aspects on competitiveness in regional development policies persuading that region's standard of living in the long term depends on its ability to attain a high and rising level of productivity in the industries in which its firms compete (Potter, 2009). Such understanding have encouraged cluster-based solutions that have been applied in advance and developing countries and the empirical evidence about cluster policies confirms that firms based on dissimilar economic environments can benefit from locating close to others whilst engaged in related activities (Ketels *et alia*, 2006). The explanation rests on the capacity of firms to achieve improved quality and greater efficiency when they come together in the same location.

This ability to do well in their market results of the better and more efficient use of production factors, the characteristics of their product in relation to those of competitors and, therefore, the acquisition of a broader segment of the demand because of the better relation between prize, quality and product differentiation. Competitiveness is not strictly linked to certain industries but to firms of any industrial sector that show a better capability to compete.

This factor depends on the efficiency with which the available resources are employed: productivity. Moreover, such productivity gains were boosted by specialisation. Indeed, according to the OECD, the key competitive determinant for the economic growth of the 20 fastest-growing regions was productivity, followed by industrial specialisation, employment rates, participation rates, age activity rates and population (OECD, 2006).

From a different perspective and considering again all those reasons, the relative decrease in GDP per capita between 1998 and 2003 was due to a relative decline in productivity in 80% of OECD regions (OECD, 2006). Then, the productivity across sectors determines the standard of living a country or region can sustain. Cluster policies allow competition to move to a higher and non-restrictive level of productivity and specialisation.

AGGLOMERATION AND COMPETITIVENESS

It is possible to assume that economic development may not be a sequential process affecting a country as a whole. Instead, economic growth would be a gradual phenomenon with a fragmentary shape: some *regional* agglomerations perform relatively better than others, increasing collective wealth, attracting more people and activities, and eventually spreading their economic influence. Such uneven development (Coe *et alia*, 2007; MacKinnon & Cumbers, 2007; World Bank, 2009) has been explained appealing to the capacity of such agglomerations to improve competitiveness as *the ability of their firms to consistently and profitably produce products that meet the requirements of an open market in terms of price or quality* (Porter, 1990; Martin, 2003). Then, competitiveness would be associated to productivity (Porter, 1998). Such capabilities could be related to the access to natural resources like water or mineral deposits. However, there are other sources related to a regional

agglomeration such as factor endowments, economies of scale, technology access, demand conditions or infrastructures (Marshall, 1920; Bergstrand, 1990; Porter, 1990).

Consequently, agglomeration as organizational foundation and competitiveness as growth force are related to economic development. The resulting *spatial unevenness of the real economy* (Fujita *et alia*, 1999) is one of the basic concerns of the New Economic Geography (NEG) and there are many academic contributions analyzing their interaction. NEG applies models with increasing returns and mobile factors to explain the emergence of regions with different density of economic activity (Krugman, 1991; Fujita *et alia*, 1999). The cluster approach considers regional agglomerations of interconnected companies, government agencies, academic and research institutions, or other associated institutions (OECD, 1999; Porter, 2008; Roldán-Ponce, 2008). Other methods use the concept once quoted by Alfred Marshall (Marshall, 1920) to study how specialisation arises from specific *industrial districts* (Becattini *et alia*, 2009; Porter & Ketels, 2009). Moreover, authors related to regional innovation systems have focused on those structures that allow geographical diffusion of knowledge (Braczyk *et alia*, 2004). A different perspective suggests the diffusion of knowledge via institutionalized networks, addressing the importance of social capital, coordination and cooperation on innovation processes. The *Groupe de Recerche Européen sur les Milieux Innovateurs* (GREMI) defined such networks as *innovative milieus* (Maillat, 1998; Bramanti, 1999).

DEFINING CLUSTERS

Clusters seem to be the rational outcome of the intellectual attempt to define an economic development policy. Indeed, it becomes a major process instrument for designing and implementing policies with competitiveness due productivity and specialization as fundamental goal.

Conventionally, literature refers to the description provided by Michael Porter that considers *geographical concentrations of competitive firms in related industries* that do business with each other, sharing common needs for talent, technology, and infrastructure (Porter, 1990). Despite its fresh and shiny glance, the idea of clusters follow a long path of theoretical contributions from the early works of Marshall (1890) and the "industrial district" or Schumpeter (1939) referring to the "swarming" or clustering of industry. More recently, the contributions of Porter (1990) or Krugman (1991) have great influence.

Alfred Marshall described the way people sharing a common profession tend to concentrate on relatively narrow areas (Marshall, 1938). He mentioned the advantages of localized industries. At first, Marshall mentioned physical conditions as the proximity to resources or channels of distributions, the support of political institutions or the existence of a psychologically motivated and knowledgeable entrepreneurship. As internal conditions, Marshall mentioned the individual resources, organization and efficiency of management. Based on Alfred Marshall's concepts, Giacomo Becattini retook the concept of "industrial districts" for regional policy and territorial development. Furthermore, he suggested that localised industries were the result of pathways of industrial specialisation (Becattini *et alia*, 2009).

Becattini raised the issue of the importance of place-based economic development with the notions of external economies that changed the approach to industrial policy. He also stressed the importance of social capital geography, sociology, politics and history in the delineation of innovation policies (EC, 2008b).

From a similar perspective, a group of regional economists developed the concept of "innovative milieu". They were all members of the Groupe de Recherche Européen sur les milieux Innovateurs (GREMI). The innovative milieu would be defined as a regional cluster of innovative enterprises in conjunction with research and transfer institutions.

The innovative milieu was able to integrate the socio-economic conditions of geographical specialization with the creation of a culture of joint cooperative learning at a regional level (Roldan-Ponce, 2008). The concept originated from the idea of the endogenous nature of integration process after the interaction of economic, social, cultural and environmental factors, with a somewhat historical tendency (Callegati and Grandi, 2005).

All these works explain in a way the interaction between the specialization of production and the concentration of activity. Again, there is a recurrent concern about geographical aspects of development considering the location of economic activity and the resulting different interactions. A cluster is, in this sense, a concentration of economic activity with a thick local labour market, especially for specialized skills (Krugman, 1998).

As part of a development policy, a cluster is a concept which core feature would be the concentration of one or more sectors within a given region as well as the emphasis on networking and cooperation between companies and institutions (EC, 2008b).

A cluster could be understood as a key factor to improve the business environment in an area. Its main contributions are based on the capability to improve productivity: the concentration of firms in the same place allows a pooled labour market for skilled workers and facilitate the match between demand and supply of skills; concentration allows a variety of non-traded inputs at a lower cost; and the proximity between economic actors facilitates information flows and generates knowledge spillovers (OECD, 2005).

BENEFITS OF CLUSTERING

All in all, clusters develop and are important because of they create great economic benefits (Ketels, 2003; EC, 2008b). In such and environment, firms could be more efficient, drawing on more specialized assets and suppliers with shorter reaction times than they could in isolation. In addition, companies and support institutions such as research centres can increase innovation as knowledge spillovers and the interaction with customers and other companies generate new ideas and pressure to innovate while the cluster environment decrease the cost of experimenting (Ketels, 2003). Furthermore, the level of business formation tends to be higher in clusters as start- ups are more reliant on external suppliers and partners and clusters also reduce the cost of failure, as entrepreneurs can fall back on local employment opportunities in the many other companies in the same field (Roldán-Ponce, 2008). Also, firms can benefit from general and technology-related agglomeration effects in form of economies of scale and scope that improve their efficiency (Ketels, 2003). In addition, clusters serve a functional purpose to provide a range of specialised and customised services to a specific group of firms, such as the provision of advanced and specialised infrastructure, specific business support services or training and coaching of staff (EC, 2008b). Finally, there are some other elements derived from the tendency of clusters to develop a set of norms, institutions, personal networks, and trust (EC, 2008b).

A cluster combines the operating practices and strategies of firms as well as the business inputs, infrastructure, institutions, and policies that constitute the environment in which regional firms compete (Porter, 1990). The set-up of cluster organisations or networks is often supported by a *clear mandate* and public funding from authorities at regional level or more spontaneously initiated within the triangle of universities, incubators and finance, in view to overcome obstacles to cooperation and allow trust building between partners (EC, 2008b).

Innovative activity requires human capital, infrastructure and funding that are not available everywhere. Their formation is slow and they can be used more efficiently when they are gathered in the same location (OECD, 2005). Clusters arise because of they increase the productivity with which companies can compete, and then the ability of a region for building a cluster will establish the capacity of its settled firms to compete with other companies. Such competitive features are related to some analytical tools developed by Michael Porter (Porter, 1990; Porter, 1991; Porter, 1998)

CLUSTER, PORTER'S DIAMOND AND FIVE FORCES

Indeed, Michael Porter suggested a model (Porter, 1990) to identify and analyse regional competitive factors. Such model, known as the "Porter's Diamond" considers four different, but interrelated notions covering an analysis on resources available, market, suppliers or related industries, and competition.

The first element describes the situation of a specific region according to the factors available: factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry. Companies in a given region could use these helpful conditions as a basis and then switch to more advanced factors of competition. Some examples of factor conditions are related to labour force (skills and abilities such as expertise or languages), the access to specific raw materials or workforce availability.

The second element considers the situation of a specific region according to local market. For example, if the local demand for a product is larger and exigent than this of foreign markets, local firms may tend to consider upgrading production more than foreign companies. As a consequence, local companies could boost their global competitiveness. Therefore, a more demanding domestic market could result in growth, innovation or quality improvements.

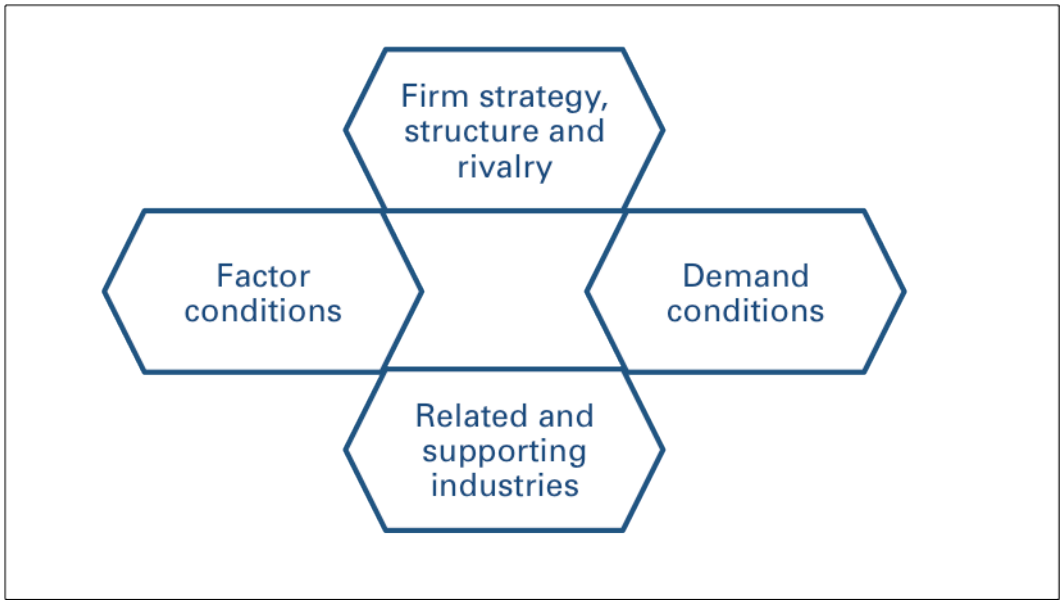


Diagram 1: Porter's diamond

The third element considers the related and supporting industries available within the region. The assumption is that if local supporting industries and suppliers are competitive, linked companies might be more cost efficient due to the accessibility to supplies or extra innovative equipment.

The fourth element considers some points directly related to firm's management strategy, its functioning structure and the existing rivalry among competitors. This point analyse how specific structure and management systems result in sector specialisation. For example, a linear organization strategy may enhance those activities based in sequential procedures such as manufacturing and engineering. In addition, an intense local rivalry may improve some capabilities, such as innovation and product development, which determine global competitive advantages.

In addition, Porter suggests a framework for diagnosing the industry structure in an area (Porter, 1991). Such framework is based on five different drivers or "forces" that have an influence in the maintenance of long lasting competitiveness and average profitability. Such outline can be applied at different levels from the firm to the industrial sector. The five factors suggested by Porter are: threat of entry to the market from

other organisations; supplier power; buyer power; availability of substitute products; and existing competitors (Porter, 1991).

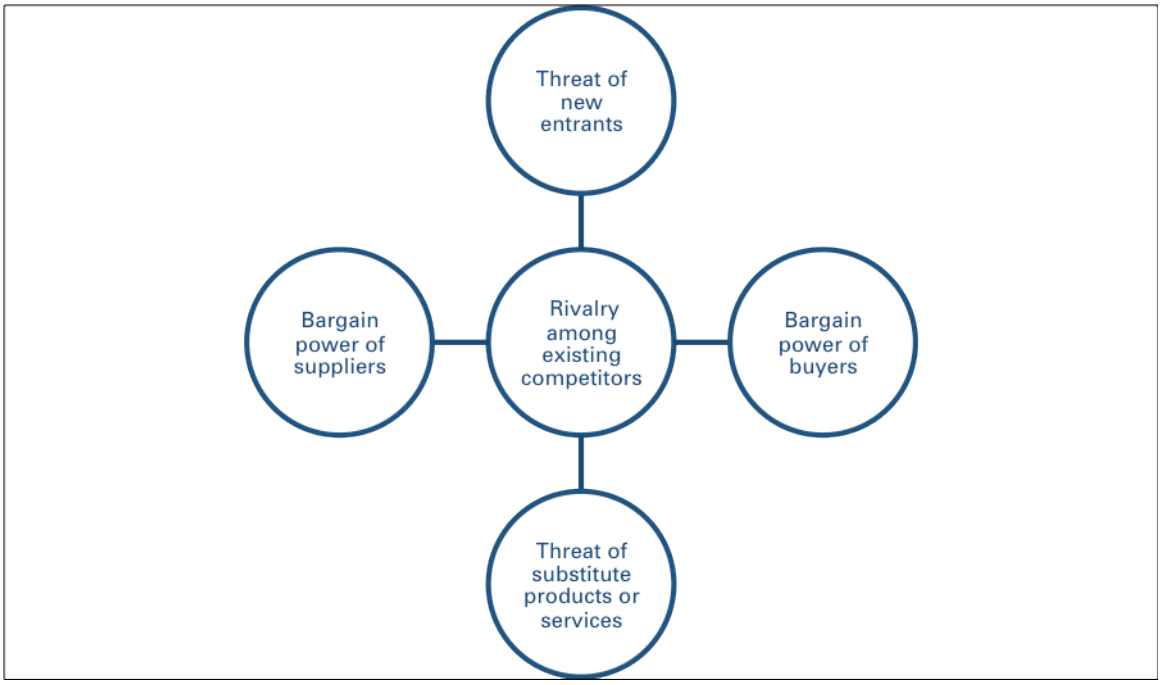


Diagram 2: Porter's Five Forces.

The supplier power considers the capacity of suppliers to modify price. This power is related to the number of suppliers of a specific item, but also to the features of the product or service they provide.

The buyer power refers to the ability of buyers to reduce product prices. Similarly to the previous point, such capacity is related to the number of participants and the existence of similar products or services.

The competitive rivalry force refers to the number and capability of existing competitors and the ability to maintain monopolistic gains.

The threat of substitution force is affected by the capacity of customers to discover new ways to suit their needs. An uncomplicated and viable substitution induces a constant pressure for companies that are compelled to maintain quality standards and competitive prices for their products or services.

The threat of a new entry refers to the openness of a sector to new participants. This factor depends on the cost of establish a business (both in monetary or time terms), the existence of certain procedures or legal barriers, the protection of intellectual property rights or patents, and so on.

THE SOURCES OF COMPARATIVE ADVANTAGE

It is possible to consider also some other points that determine the geographical location of certain sectors. Such elements are related to the concept of comparative advantage or the aptitude to produce a good at a lower opportunity cost than a competitor. This feature explains that regions would tend to specialise their production in order to keep a beneficial exchange. Prosperity would be then connected with this positive switch of goods. Then, a certain region would need only to identify which is its actual comparative advantage and specialise on it. But, which are the sources of comparative advantage?

The first answer would be that a region would have comparative advantage when it enjoys the abundance of a certain natural resource that consequently makes cheaper the production of a certain good based on it.

The second source of comparative advantage would be greater factor intensity as production is intensive in the factors that are abundantly available (Bergstrand, 1990). If a region is relatively well endowed with capital it will tend to produce capital-intensive goods. The same if the factor available is labour (Krugman and Wells, 2009). In this sense, if the intensively available factor were education and knowledge (human capital), the resulting production would tend to use it.

The third source of comparative advantage would be economies of scale. Then, by specialising in the massed production of a certain good, the region would decrease the production cost of such a good.

Finally, technological development can also provide a distinctive trade advantage based both on accumulated knowledge and innovation although its swift life represents a challenge for a region.

ELEMENTS OF CLUSTERING

As it was shown above, clusters are indebted to a myriad of conceptual legacies. In order to integrate them, a cluster policy needs a strong institutional structure based on project partnerships, task harmonization and assistance, which establish the necessary economic capability as a long-term feature. Yet, public institutions might be interested to intensify actively targeted policy actions rather than promote a general business environment. For that reason, successful policy interventions tend to focus on instruments such as innovation policy, regional policy, and enterprise policy, enabling the collaboration among different agents rather than intervening directly through the establishment of public enterprises or arbitrary chosen social programmes (Andersson et alia, 2004). Cluster creation through industrial targeting could be very hazardous as it might lead policy makers to an arbitrary discrimination of sectors viewed as strategically important for economic development. As a consequence, there is a coincidence in a limited list of industries for many areas without considering the relevant and locally specific competitive advantages. At the end, various locations will fight for attracting a restricted group of participants using predominantly financial incentives. Such kind of measures transform governments in the central agent of the economic development and they could be especially expensive for public budgets, limiting or distorting the effects of market competition and undermining the very

competitiveness they attempt to generate because the misrepresentation of local dynamic characteristics (Ketels, 2003)

Any selection is driven by the specific local circumstances, not by some generic view on which clusters are more valuable. They are supplemented by actions that specifically establish sector networks as platforms for business support and competitiveness in order to generate and maintain those special skills and innovations for sustaining clusters in the production and marketing of high-value-added products and services. At this point, it is important to underline that there is a huge variety of clusters and not only traded or high-tech sectors are important (Ketels, 2003).

Cluster efforts are directed at improving the underlying conditions for higher levels of productivity and innovation, not the outcomes in terms of market-share or employment directly (Ketels, 2003). The cluster creates some synergies between the local economy and the local community, establishing a common cultural imprint and a strong sense of belonging shared among all participants (Becattini *et alia*, 2009).

The phenomenon of regional integration has a positive effect on the relocation of specialized activities. But, the emphasis lies on the intensified use of knowledge and on developing positive synergies between different network members. The motivation for clustering is that every single participant will gain in competitiveness when they cooperate and the total gain of the cluster will be higher than the aggregate gain of uncooperative parts as innovation is generated in such a dynamic environment where organisations and skilled labour interact to assimilate existing knowledge and generate new ideas and products. Cluster is an innovative environment.

Innovation results from increasingly complex interactions at the local, national and world levels among individuals, firms and other knowledge institutions. In this sense, continuous technological change and innovation are among the main determinants of

productivity growth and as such are necessary conditions for the welfare of nations and regions (OECD, 2001).

The competitiveness of any system of innovation relies on the capacity to transfer and exploit the available knowledge in the system (OECD, 1999).

The phenomenon of cluster as an agglomeration is more the result of the creation of communication and cooperation networks between companies in an area rather than the product of corporative decisions to locate. This interconnection could be between buyers and suppliers, or among different individuals sharing factors. However, the network includes not only firms but also “associated institutions” what makes of the cluster more than the concentration of activity in space.

A cluster policy considers an interaction between agglomeration and competiveness. But, so far, cluster policies promoted agglomeration as the essential guiding principle. *There are an increasing number of cases where forward-looking public policies, business initiatives or top-class universities and research institutes have been instrumental in the emergence of strong clusters by acting as a catalyst and helping to unleash the economic and scientific potential of particular regions* (EC, 2008).

IDENTIFYING POTENTIAL CLUSTERS

A cluster policy has to be tailored to specific circumstances such as economic environment, resources available and objectives. Identifying these elements facilitates the organisation of the process and leads to a better performance.

There are basically two different approaches on how to identify clusters, each with its particular advantages and disadvantages. The first and most popular approach would be case studies providing qualitative information available through desk research and interviews with local experts. The second method considers quantitative techniques

and economic modelling and are based on statistical methods that aim to identify clusters indirectly by measuring the revealed effects assumed to be observable when a cluster is present (EC, 2008b).

Additional methods could be based on the identification of the local comparative advantages. Since it was first published (Balassa, 1965) the Revealed Comparative Advantage (RCA) has been used to identify the areas of expertise of a certain location based on trade. The RCA provides an index used that can be used for calculating the relative advantage or disadvantage of a certain region in a certain class of goods or services. A basic equation for calculating the index would be:

$$RCA_{ij} = \frac{\frac{x_{ij}}{X_i}}{\frac{x_{\omega j}}{X_\omega}}$$

Where x_{ij} refers to exports of product j from country i, X_i is total exports from country i, X_{wj} is total exports of product j from the reference area (e.g. the world) and X_w is total exports from reference area.

On the basis of this index, a region is defined as being specialized in exports of a certain product if its market share in that product is higher than the average or, equivalently, if the weight of the product of the region's exports is higher than its weight of the exports of the reference area. A region reveals comparative advantages in products for which this indicator is higher than 1, showing that its exports of those products are more than expected on the basis of its importance in total exports of the reference area.

This index can be modified using data on imports, industrial production, foreign direct investment (FDI) or employment in order to get an integrated specialisation value. If we consider data for Morocco we can see that the sector Electric and Electronic Equipment enjoys a comparative advantage in the country that could be used to establish a platform for a cluster including related services and products.

Table 1: RCA for Morocco (INTRACEN, 2012)

RCA Index	Industry
18.2	Salt, sulphur, earth, stone, plaster, lime and cement
16.7	Meat, fish and seafood food preparations nes
15.5	Fertilizers
13.0	Articles of apparel, accessories, not knit or crochet
12.5	Lead and articles thereof
11.5	Inorganic chemicals, precious metal compound, isotopes
11.1	Edible vegetables and certain roots and tubers
10.4	Fish, crustaceans, molluscs, aquatic invertebrates nes
9.0	Cork and articles of cork
8.2	Products of animal origin, nes
7.1	Edible fruit, nuts, peel of citrus fruit, melons
5.8	Lac, gums, resins, vegetable saps and extracts nes
4.8	Other base metals, cermets, articles thereof
4.6	Articles of apparel, accessories, knit or crochet
4.0	Footwear, gaiters and the like, parts thereof
3.9	Vegetable, fruit, nut, etc food preparations
3.3	Impregnated, coated or laminated textile fabric
2.6	Other made textile articles, sets, worn clothing etc
1.7	Residues, wastes of food industry, animal fodder
1.6	Milling products, malt, starches, inulin, wheat gluten
1.5	Dairy products, eggs, honey, edible animal product nes
1.5	Pulp of wood, fibrous cellulosic material, waste etc
1.5	Manufactures of plaiting material, basketwork, etc,
1.4	Miscellaneous edible preparations
1.3	Articles of leather, animal gut, harness, travel goods
1.3	Headgear and parts thereof
1.2	Ores, slag and ash
1.2	Manmade staple fibres
1.1	Electrical, electronic equipment
1.1	Aircraft, spacecraft, and parts thereof
1.1	Cotton
1.1	Raw hides and skins (other than furskins) and leather
1.0	Copper and articles thereof
1.0	Animal,vegetable fats and oils, cleavage products, etc
1.0	Oil seed, oleagic fruits, grain, seed, fruit, etc, nes
1.0	Ceramic products

1.0	Carpets and other textile floor coverings

An alternative method would identify the physical agglomeration of activities. The agglomeration index (AI) focuses on the economic implication of regional agglomerations. People and activities are typically located in such areas, which gives rise to the notion of agglomeration economies. The AI uses three main elements: population size, population density, and travel time. The agglomeration index is designed solely to quantify the degree of settlement concentration (Uchida & Nelson, 2009). If we consider the data collected by Hirotsugu Uchida and Andrew Nelson (Uchida & Nelson, 2009), it is possible to see that Morocco would have a moderated agglomeration index.

Table 2: Agglommeration Index (Uchida and Nelson, 2009)

	AI (a)	AI (b)
Morocco	53.6	46.9
Algeria	56.9	49.8
Tunisia	51.9	39
Libya	83.4	76.6
Egypt	92.6	90.2
Mauritania	26.8	23.1
Spain	75.3	71.4
France	71.4	66.2
Italy	77.0	68.5

Note: For agglomeration index, column (a) uses largest city size threshold of 50,000 or more, and column (b) uses the threshold of 100,000 or more.

Finally, it is possible to consider the interactions within the cluster among the different units. However, the level of complexity of the proposed system induces the use a special kind of analysis based on complex systems.

A complex system is a large network of relatively simple components, in which emergent complex behaviour is exhibited. Although the standard explanation (Mitchell, 2006) does not consider a central control, it would be possible to adapt the tools of this theory in order to study the interaction within the cluster. The cluster approach arises from the collective actions of actors whose behaviour is conscious. The complexity of the cluster is based on: the behaviour pattern (degree of cooperation, cooperative or non-cooperative aptitudes), the process of information (and its exchange) and the degree to which this pattern formation and information processing are adaptive for the system (Roldan-Ponce, 2008).

All in all, a cluster policy would be based on an analysis of the specific circumstances of a region or sector, evaluating the potential and setting one unambiguous strategy considering explicit goals. Such research is necessary to avoid an arbitrary intervention and industrial policy based on the sole use of subsidies and protective regulation. The definition of the strategy has to balance the resources available with the objectives; therefore, it is vital to have adequate information as a source of knowledge and insight. The cluster approach considers small, emerging, or traditional areas of specialisation integrating them as foundation of a more ambitious and large-scaled strategy. Therefore, such sectors have to be identified and valued.

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FOREIGN DIRECT INVESTMENT DRIVERS IN THE MENA REGION: A SPECIAL FOCUS IN MOROCCO

Rafael de Arce, Fabian Kleinschumacher and Eva Medina

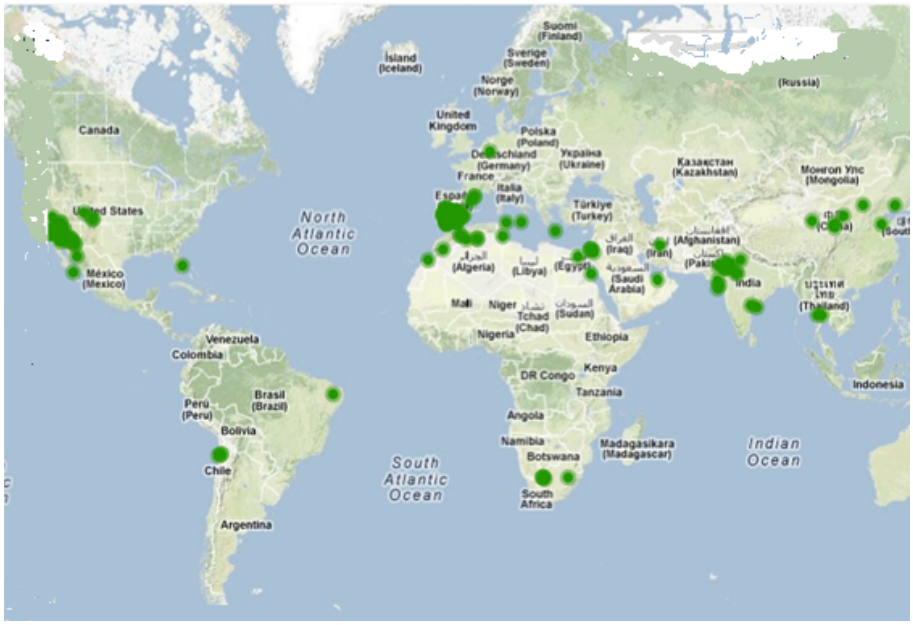
INTRODUCTION

Foreign Direct Investment (FDI) in MENA is gaining momentum in the context of the Mediterranean Solar Plan. This region maintains a clear advantage in terms of the natural conditions for this kind of energy. In the near future, a very large solar plant program is going to be developed in a selection of North African countries (specifically, Morocco, Egypt and Tunisia). Obviously, the characteristics of each country can contribute to a an improved Solar Energy industry by creating employment by not only its installation in the region as well as production components of Renewable Energy Sources (RES) (mirrors, wires, computational systems for control, heaters and oils…).

Of course, natural resources/conditions (density of normal irradiation, geo-morphological characteristics, normal wind…) are "sine-qua-non" requirements for creation of these plants, but more strategic decisions must be taken into account by entrepreneurs in the following years in order to increase the yield of these investments.

A clear strip in the Tropic of Cancer draws the area where the Concentrated Solar Power (CSP) is - or is going to be - installed. In spite of the California area and Spain, North Africa countries, Arabic peninsula, India and China mostly concentrate the operating and planned projects of CSP deployment in the XXI century. As such, decisions about optimal location of CSP components producers will be crucial in the next few years. A detailed examination of the FDI determinants in these countries may help to make these decisions.

CSP Plants around the world (operating and planned)



Source: data from CSP Today, July 2012.

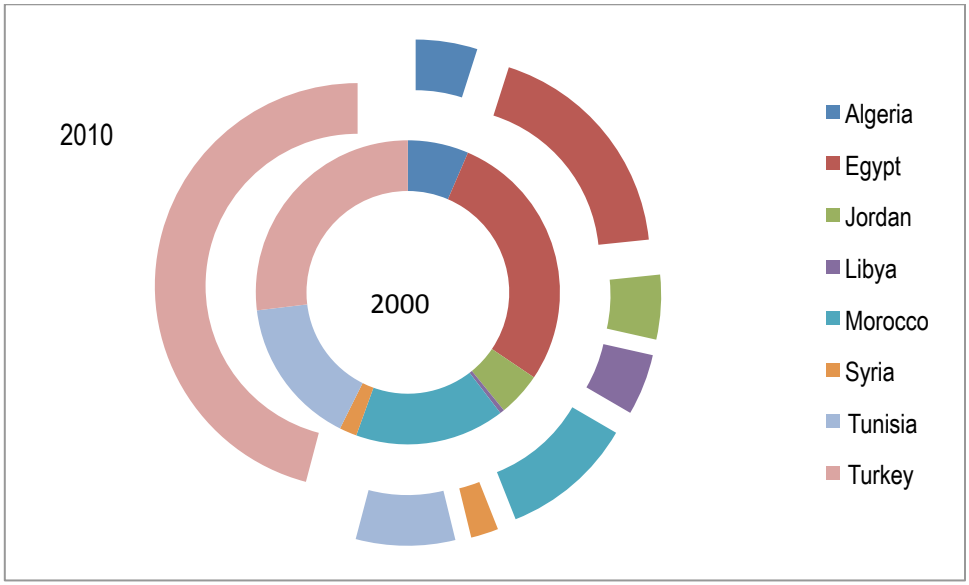
By considering the FDI drivers in the MENA countries and in the potential competitors of these countries in terms of “Solar Attractiveness” light may be shed on some of the aspects to take into account in the next years.

In the following sections, we review the evolution of FDI in the MENA region, followed by a summary of the FDI in the MENA literature. We then analyze the evolution of the main economic, institutional, governance and HDI indicators. A panel data model is carried out in order to find the main drivers of FDI in the region and finally, we conclude.

FDI EVOLUTION IN THE MENA REGION IN RECENT YEARS

, In the 2000s, FDI in the MENA region multiplied 4.5 times: in 2000, the total stock of FDI was 45,590 million of dollars. The North African area captures about 3.3% of the total world FDI stock. In 2011 it was worth 210,487 million dollars (UNCTAD dataset, 2012). Without doubt, Turkey is the country that has benefited most from this huge stock increase, absorbing more than 45% of the total foreign capital attracted by this area at the end of the period; originally it accounted for 27% of the total amount.

Country share of FDI in the MENA Area



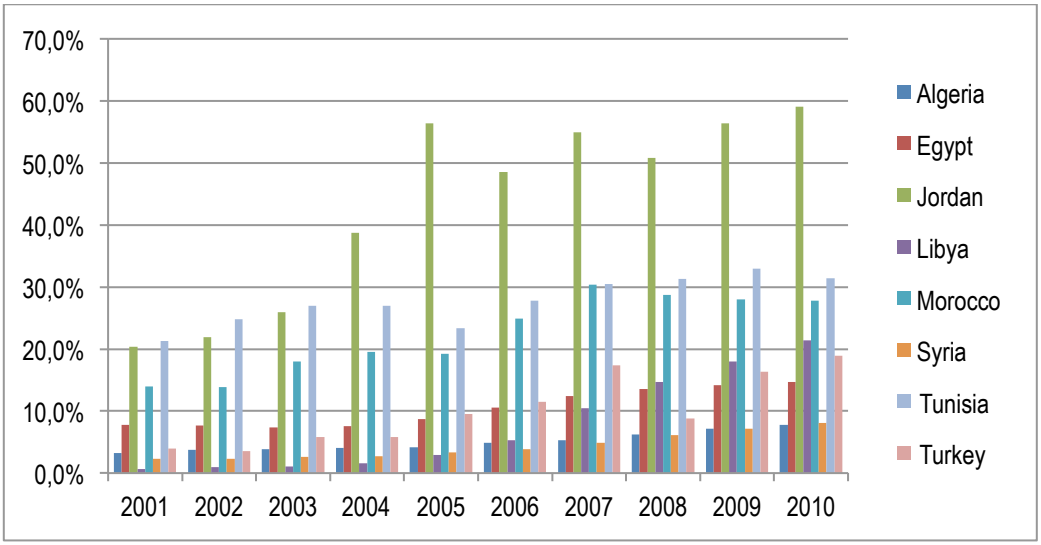
Source: Authors' calculations with UNCTAD, May 2012

In spite of the Turkish case, North African Countries have maintained a similar share of the FDI attracted by MENA as a whole. The only point to highlight is the case of Libya given that it totally changed its position in the 2000's. In the first years, it represented approximately 0.6%, and in 2010, this figure rose to 9% over the total in the zone (Turkey not considered).

The nature of the annual flows by country is very erratic. For example, the total median for the zone and for the entire period is around 1.3% of GDP, but there are several extreme cases in the sample (e.g. extraordinary increases in Morocco 2006-07, Jordan 2004-05, or Turkey 2007-09).

In terms of FDI stock to GDP ratio, Jordan has the largest (with around, and eventually more than 55%). Morocco and Turkey show consistent figures in the whole period with an increasing trend (around 28% for Morocco and 15% for Turkey).

FDI stock to GDP by country



Source: own calculations using UNCTAD, 2012 and IMF, 2012 datasets

In the case of Morocco, the Free Trade Agreement with USA in 2005 (which went into effect on January 1st, 2006) boosted the FDI coming to the country. The agreement removed barriers of investment and provided for the protection of intellectual property. Furthermore, liberalization of gas and oil exploration rules spurred international investment.

Jordan has approved an important privatization plan since 2004, however, following the conclusions from Mansur (2008), FDI increase is due to real estate investments more than this governmental plan. This has only attracted sporadic and limited international funds. However, the progression of FDI GDP ratio demonstrated impressive results: it passed from 20% in 2000 to 59% in 2010.

The Turkish FDI Law no. 4875, 2003 has totally changed the legal system of foreign investment in the country. After the 2001 internal economic crisis in Turkey, privatization programs in the fields of energy, telecommunications and banking have triggered FDI flows throughout Turkey (see Salacuse, 2012). During this decade, the FDI in Turkey increased from 4% to 18% over GDP.

Tunisia has experienced a huge increase of FDI relative to GDP too. In 2000, this figure represented 21% of GDP, now it is around 32%. Here, the sudden increase in the tourism activities and the fast entry of international companies in the sector are sources of this extraordinary growth.

India and China, as the main potential competitors in CSP investment recipients, must be considered at this point. China has totally changed its FDI behavior in the last years: it holds 10% of the world's FDI stock. However, more than 60% of this FDI is based in Hong-Kong SAR. Therefore, the People's Republic of China represents 3.3% of the total FDI stock of the world. Taking into account its population and the extension of its territory, it can be considered a lower amount than that observed for North Africa. This trend is changing and the openness of the country is likely to produce an important rise in the following years.

In India, the total amount of FDI stock in 2011 was around 201,724 million dollars. This means that the country represents 3% of the world's total FDI. In the last 20 years, India has multiplied its FDI stock tenfold and it still continues this exponential trend. It is likely that this country is North Africa's major potential competitor in terms of CSP industry installation. India has developed metal and glass transformation industries, with a modern structure and international openness.

FDI DETERMINANTS IN THE MENA REGION LITERATURE REVIEW

FDI has been widely discussed in economic literature. In particular in recent years, this topic has attracted academic researchers' interest within the MENA region. In the following paragraphs, we review the main contributions regarding research of FDI inflow determinants in this region we highlight the main economic, sociological, institutional and governmental variables that are driving these differences.

Traditional economic approaches focus on company strategies as the most important determinant in FDI decisions. Following Markusen (1995) whether a company aims to enter a market in order to reduce its production costs (vertical or "Ricardian" approach) or to gain access in a new (consumer) market (horizontal or "Krugmanian" approach), the localization choice can vary. The "vertical strategy" approach indicates that the proximity to the home market is an important factor in the localization choice, while the "horizontal strategy" aims to secure advantages in the host country before the new market opens up to foreign industry. Additionally, the host country is perceived as the entry to a regional market, hence its integration in the region is a key factor for FDI attractiveness.

Revisiting the literature about the main drivers of FDI, the following aspects could summarize the most relevant in FDI location decisions:

- Macroeconomic conditions (like market size, public expenditure, external stability, wealth growth, inflation and exchange rate volatility among others)
- Governance and institutional performance (in the sense of rule of law, level of corruption and/or bureaucracy, etc.) and privatization policies.
- Infrastructure and ITC (for example human capital, education level, physical infrastructure, internet accessibility).
- Openness of the market (entry barriers for foreign companies, regional integration, …)

Authors	Year	Topic	Methodology	Drivers of FDI
Baldwin et al	1995	Investment creation and diversion of the European Single Market	Cournot simulation	Free trade area
Dunning	1997	The European Internal market programme and inbound FDI	Literature review + cross/section regression	Free trade area
Blomstrom and Kokko	1997	Regional integration and FDI	Survey of previous literature about CUSFTA, NAFTA, MERCOSUR	
Buch et al	2001	FDI diversion in Europe	Cross country regression - gravity	
Balasubramanyam et al	2002	Regional integration agreements and FDI	Cross/section model for 1995	Host-origin countries particular characteristics
Wolf	2002	Regional integration and other FDI determinants in SADC	Cross/section model	Regional integration with less than 10% of sig.
Dee and Gali	2005	The trade and investment effects of preferential trading arrangements	Cross/section model	Tariff jumping investment,
Stein et al	2003	Regional integration and the location of FDI	Cross/section model	Regional integration
Te Velde and Bezemer	2006	Regional integration and FDI in developing countries	Cross/section model	Differentiate agreements
Lesher and Miroudot	2006	Economic Impact of Investment Provisions in RTAs	Cross-section for NAFTA, ANZSCEP	Bilateral Investment Treaties do not

Authors	Year	Topic	Methodology	Drivers of FDI
Altomonte	2007	Regional integration and the location of FDI	Cross/section model	
Kubny et al	2008	Regional integration and FDI in emerging markets	Survey of previous literature	country-specific factors
Uttama and Peridy	2009	The Impact of Regional Integration and Third-Country Effects on FDI	Cross section model	Specific policies and regional integration
Mohamed and Sidiropoulos	2010	Determinants of FDI in MENA region	Panel data, Mena countries, 1976-2006	Size of host economy, inflation rate, government spending, natural resources, corruption, investment profile
Bénassy-Quéré, Coupet, Mayer	2007	Institutional Determinants of FDI	Gravity regression model for 2006	Institutions encourage FDI. Not GDP
Demirhan, Masca	2008	Determinants of FDI Flows to developing countries: a cross-sectional analysis	Panel data 38 developing countries, 2000-2004	Market size, infrastructure and the willingness to accept FDI
Caetano, Galego	2009	FDI in the EU and MENA countries: Institutional and Economic Determinants	Panel data (17 MENA, 25 EU from 1995 to 2005)	GDP and Openness, government size significant. Business Freedom and Corruption Freedom are not significant
Sekkat, Véganzonès-Varoudakis	2004	Trade and Foreign Exchange Liberalization, Investment Climate, and FDI in the MENA countries	Panel data 72 countries, 1990-2000)	Foreign exchange liberalization, infrastructure
Yilmaz, Basar	2006	FDI in the Mediterranean Countries: Developments and Determinants of FDI in the Mediterranean Countries	Multiple regression analysis (Mediterranean countries, 1996-2004)	Tariffs, and non-tariff barriers, inflation and price controls.
Hasan		FDI, Information Technology and Economic Growth in the MENA region	Panel regression (95 countries, 1980-2001)	Globalization index, military expenditures, Infrastructure, in sense of ICT,
Chan, Gemayel	2004	Risk instability and the pattern of FDI in the Middle East and North Africa Region	Dynamic panel model (Mena countries1990-99)	Risk instability: economic, financial, and political risk
Hisarcikilar, Kayam, Saime, Kayalica	2006	Locational Drivers of FDI in MENA Countries: a spatial attempt	Panel model (18 countries, 1980-2001)	Size of the host economy and regional connection

Authors	Year	Topic	Methodology	Drivers of FDI
Chakrabarti	2001	The Determinants of FDI: Sensitivity Analysisof Cross-Country Regressions	Extreme Bound Analysis	GDPpc, trade openness. Sensible to small changes: wage, growth rate, tax
Wei	2000	local corruption and global capital flow		Level of corruption
Kamar, Bakardzhieva	2002	The Reforms needed to attract more FDI in Egypt: Lessons from the CEEC experience	Survey of previous literature	Privatization process of companies. Political instability and the lack of reforms
Hasen, Gianluigi		The Determinants of Foreign Direct Investment	Panel data (Magreh countries 1990-2006)	GDP growth in terms of PPP, size of the government. Not trade openness

Kamar and Bakardzhieva (2002) study vertical and horizontal strategies in order to compare the CEEC area to Egypt regarding their FDI inflows. By reviewing empirical literature and surveys, they point out that the CEEC area is a target of vertical integration, contrary to Egypt which is a target of horizontal integration. Following these authors, FDI is injected into Egypt due to their high amount of bi- and multilateral commercial contracts compared to their neighbor countries and as a 'gate' to the whole MENA area.

Further on, they divide the companies' FDI placement decision into two steps: in pre-conditions that a country has to fulfill and, as a second step, the decisive factors. Pre-conditions are, among others, political (internal and external) and economic stability, GDP growth, an institutional framework and a well-functioning financial system. Once these requirements are met, the infrastructure, labor force, market accessibility, access to companies' information, the geographic proximity and the regional market size determine the localization choice of an investment. Kamar and Bakardzhieva come to the conclusion that the high amount of FDI inflows (compared to Egypt) in the CEEC area results mainly from the advanced privatization. The uncertainty about the political situation and the lack of institutional are additional factors that deter companies to invest in the Arabic country.

Chan and Gemayel (2004) used a different approach to identify the weak FDI inflows of the MENA states. Using the International Country Risk Guide (ICRG), they focus on the risks connected to the MENA region instead of economic and institutional measurements. They divided the sample into three-year episodes as well as the indices of economic, financial and political risk. The findings point out that the degree of

instability (higher risk indices) associated with the investment risk in the MENA region is much higher than in developed countries. Furthermore, they conclude that the instability of the index itself gives a better fit than the index for FDI inflows in the MENA region.

Sekkat and Véganzonès-Varoudakis (2004) used panel data for 72 countries (including 7 MENA countries) to investigate economic variables in the 1990s as determinants for FDI in the MENA region. The authors found evidence about trade and foreign exchange liberalization as general attractors for FDI.

Sekkat and Véganzonès-Varoudakis (2004) compare the reforms made in the MENA region with similar measures in Latin America and East Asia during the 1990s and they conclude that, under certain conditions, FDI inflows could have been up to 2% of the GDP. The lack of willingness to reform in the MENA countries is found as the main reason for receiving significantly less FDI in comparison to Latin America and East Asia.

Hisarcikilar et al. (2006) concentrate entirely on the MENA region in terms of FDI inflows to find out how and why the investments are distributed among the MENA countries. They include 18 countries in the MENA region from 1980 to 2001. Their results indicate that besides the size of the host economy (GDP), a strong connection to the regional market increases FDI. High and increasing imports and exports among MENA countries increase this variable, while exports to the EU and the rest of the world reduce FDI. This could tell us that external companies invest in a MENA country in order to get access to the local MENA market.

These results follow the investigation of Dunning (1997) who showed that FDI flows increased when a region was strongly connected (in his case the European Community) – due to political or economic factors such as trade. For further insight in this topic, see Altomonte (2007), Baldwin et al. (1995), Bezemer and te Velde (2006), Blomstrom and Kokko (1997), Daude et al. (2003), Dee and Gali (2005), Lesher and Miroudot (2006), Peridy and Uttama (2009) and Wolf (2002).

Hasen and Hianluigi (2007) investigated the determinants for FDI inflow in the Maghreb region (Libya, Tunesia, Morocco, Algeria) between 1990 and 2006 by applying a simultaneous equation regression for the panel data. Their results indicated that GDP growth in terms of PPP and existing FDI stock attract further FDI, while high government expenditure and inflation prevent investments from abroad. The importance of the GDP growth in terms of PPP indicates a horizontal integration in

companies' strategy to enter the market (this finding is supported by Hisarcikilar et al. (2006)). Determinants like trade openness do not play a significant role to attract FDI according to their findings. Hasen and Hianluigi conclude that Maghreb countries should reduce the size of the government by privatization programs and introduce reforms to secure economic stability.

Besides the size of the host economy, exchange rate volatility has a negative impact on FDI inflows (in contradiction to Lal and Van Wick (2010) among others). Furthermore, they pointed out that variables such as physical infrastructure (measured by the number of fixed phones, computers…) and the political environment have a positive impact on FDI inflows in the manufacturing sector of an economy. Macroeconomic factors are not significant in this specific area.

Bénassy-Quéré et al. (2007) investigated the significance of institutions to attract or deter FDI independently from GDP per capita, but they do not focus on a specific region. They indicate that institutions appeal FDI inflows independently from a country's GDP per capita. Predominantly, a lower level of bureaucracy and corruption attract FDI while a weak concentration of capital and strong employment protection rules reduce the inflows. They also pointed out that the distance in the ranking of institutions of Fraser Dataset has a negative impact on FDI, concluding that this aspect is more important than the institutions' quality which might be interesting observing the developing South-South FDI flows.

Balasubramanyam et al. (2002) has similar findings, pointing out that similarities between the host and receiving economy play a crucial role in FDI flows. See Buch et al. (2001) and Kubny et al. (2008).

Lal and van Wyck (2010) investigated the role of institutions by using the "New Institutional Economics" approach which includes the role of institutions in macroeconomic factors regarding FDI. Using data from 1995 to 2004 (World Development Indicators, Freedom House, Wall Street Journal, Heritage Foundation) the authors applied a pooled least squares regression to determine the significant variables for FDI in the MENA region. Unsurprisingly, the market size, calculated in GDP in PPP terms and the growth of GDP, has a positive impact on FDI inflows. Contrary to Sekkat and Véganzonès-Varoudakis (2004), the countries' currency exchange rates are not significant enough to attract FDI inflows. The openness of the market (measured as a merchandise trade as a percentage of GDP) is significant, indicating that an open market leads to higher FDI. Higher political freedom is not significant to attract FDI, while a high index of Business Freedom does attract FDI and

is relevant at a modest level (20%). The level of corruption appears to not be significant, which is in line with several investigations, but is challenged by Bénassy-Quéré et al. (2007).

Caetano and Galego (2009) compared the FDI inflows in 25 European countries and 17 MENA countries from 1995 to 2005. Using a gravity type model, they included institutional and macroeconomic variables to distinguish between the differences in determinants for the mentioned regions. They concluded that GDPpc in terms of PPP and economic openness (measured with the Balassa Index) have a positive impact on FDI inflows in both regions. “Business Freedom” and “Freedom from Corruption” variables (both measured by the Index of Economic Freedom by the Heritage Foundation) resulted not significant in order to attract FDI in none of the two regions,, however, they do not give explanations for these controversial findings. In the MENA region, they concluded that Investment Freedom attracts FDI, while there is a negative relationship with government size (again using the Index of Economic Freedom by the Heritage Foundation).

Hasan (2010) investigated the data of 95 countries from 1980 to 2001 to find out whether Information and Communication Technology (ICT) and the level of globalization are significant for economic growth and for the attractiveness of FDI. The ICT infrastructure is a composite variable of indicators such as density of internet hosts, number of computers and telephone lines among others. Globalization is calculated as the sum of exports and imports divided by the GDP, so it reflects the economy openness. Data derived from the WDI, International Financial Statistics, the World Telecommunication Development Report and the UNESCO Dataset, is used in a panel regression. He concludes that the factors influencing GDP growth and FDI are not the same: globalization impacts FDI negatively, but contributes to GDP growth. This author found that government expenditures have a negative impact on FDI and that ICT infrastructure has no significance regarding GDP growth, but has a significant positive influence on FDI. Population growth as well as human capital (, defined by the percentage of relevant group participating in secondary education) are not significant enough to explain GDP growth, however, both variables influence FDI negatively. Military expenditure does have a negative impact on GDP growth, but a positive impact on FDI. Hasan suggests that foreign companies feel safer if they know that there is a strong military presence in the country, but also that many of these expenditures might be listed under military expenditures even though they are not strictly contributed to the army, but much more to the elite of a country.

Mohamed and Sidiropoulos (2010) came to the conclusion that between 1976 and 2006 the key determinants to attract FDI in the MENA region are the size of the host economy, the government size, natural resources and institutional variables. The size of the host economy is measured by the log value of GDP and indicates that the larger the market of the country, the more FDI can be expected. The government size (measured as government expenditure over the GDP) is found relevant in the sense that lesser government spending attracts more FDI.

Mohamed and Sidiropoulos (2010) also investigated the significance of natural resources as a driver of FDI. They used oil exports as a share of merchandize export as a proxy for natural resources. MENA countries with a high amount of natural resources receive more FDI than countries with less.. In order to find out if the institutional variables have an impact on FDI, they used two variables of the International Country Risk Guide (ICRG) elaborated by the PRS Group[4]: the investment profile and the level of corruption. They found the logical relationships that a lower level of corruption and a better investment profile leads to higher FDI inflows.

In short, the concluding remarks concerning recent literature about FDI in the MENA region can be summarized in the following aspects:

1. Both vertical and horizontal strategies are within the objectives of multinational enterprises investing in MENA.
2. Market size is a key aspect in order to attract FDI in the area.
3. Institutional issues (quality, good performance, relative position and similarity in the rankings with FDI investors) have been found to exert a significant impact on abroad investment attractiveness.
4. The role of natural resources is crucial in the case of the MENA countries.
5. There is no consensus about the significance of corruption measures and, in general, governance indicators, in the empirical findings.
6. The role of government expenditure is also discussed and there is controversy about its positive or negative impact on FDI.
7. Regional integration does not appear as an important FDI trigger for the MENA region. Several aspects like historical links, natural resources, are found more decisive in the FDI decision.

[4] ICRG is an index composed of 22 variables divided into three subcategories: politics, financial, and economy topics.

EVOLUTION OF FDI POTENTIAL DRIVERS IN MOROCCO AND ITS MSP COMPETITORS

Economic freedom measured through the Fraser Institute Index

In this section, we compare Morocco with its regional competitors: Algeria, Egypt, Jordan, Syria and Tunisia as well as with China, India and Pakistan among further developing countries of the MENA region and Asia by their roles as serious competitors for MSP investments by analyzing their performances in the Fraser Index.

The Fraser Index measures a country's economic freedom by five variables that refer to different areas:

1) Size of Government
2) Legal Structure and Security of Property Rights
3) Access to Sound Money
4) Freedom to Trade Internationally
5) Regulation of Credit, Labor and Business

Each of these variables is a joint measurement of several indicators; all together over 500 variables are included in the Index for Economic Freedom.

Since we focus on developing countries in Asia and North Africa and the Middle East, the available data allowed us to compare 19 countries between 1980 and 2009. We started by taking the five main variables and created an index by pooling its information by using a factor analysis[5].

Economic Freedom

	1980	1985	1990	1995	2000	2005	2009
Algeria			-4.11	-3.71	-2.61	-0.76	-1.05
Bahrain		1.04	0.88	0.82	1.40	0.50	1.20
Bangladesh	-3.90	-3.48	-3.31	-2.14	-1.46	-1.22	-0.91
China		-2.03	-2.34	-1.34	-0.55	-0.07	0.12
Hong Kong	3.04	2.58	2.40	2.58	2.29	2.52	2.49
Egypt	-2.27	-1.66	-2.20	-0.79	-0.05	-0.26	-0.21
India	-1.33	-1.79	-1.97	-1.19	-0.59	-0.12	-0.34
Iran	-3.94	-4.03	-3.05	-3.08	-1.11	-0.48	-0.70
Jordan	-1.01	-0.46	-0.95	-0.24	0.80	1.08	0.75

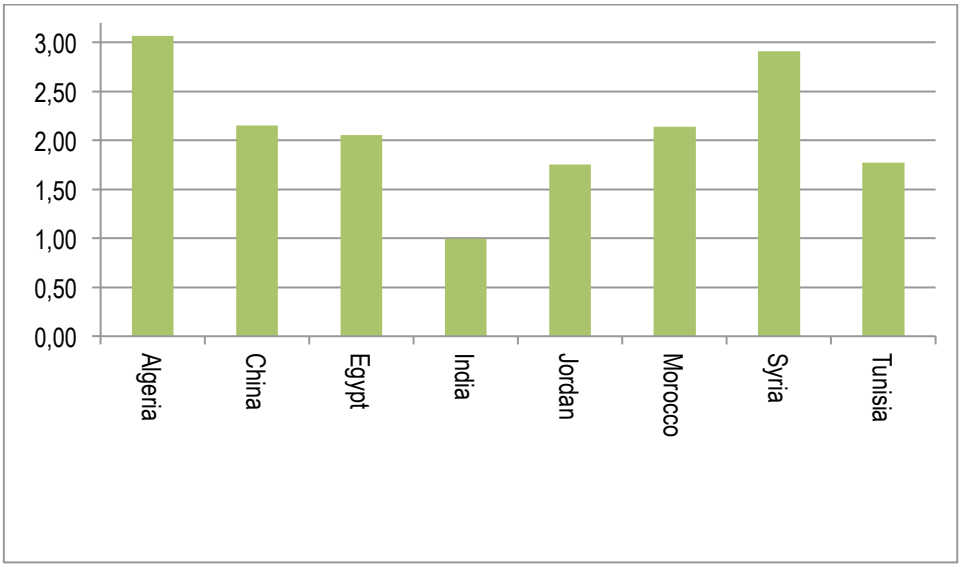
[5] Via a sensibility analysis of the new factors, we found a high dispersion until the year 2000. As a consequence we used the 2009 factor and applied it on the whole time period. The variance among the group equals 55%.

	1980	1985	1990	1995	2000	2005	2009
Kuwait		0.03	-1.51	0.24	0.30	0.67	0.81
Morocco	-2.76	-1.63	-1.99	-0.54	-0.61	-0.62	-0.61
Nepal				-1.62	-0.83	-1.24	-1.39
Oman		1.26	0.34	0.68	1.46	1.15	1.06
Pakistan	-2.60	-1.72	-1.91	-1.18	-1.66	-1.04	-1.07
Sri Lanka	-1.70	-1.58	-2.35	-0.65	-0.77	-0.77	-0.71
Syria	-3.92	-4.36	-4.30	-3.16	-2.16	-1.00	-1.01
Tunisia	-1.87	-2.25	-1.41	-0.55	-0.42	0.03	-0.10
Turkey	-3.60	-1.92	-2.29	-1.25	-1.17	-0.72	0.00
UAE	-0.57	0.94	1.29	-	1.22	1.04	1.04

Source: Own Calculations, Data of Fraser Institute

At first glance, one can observe an improvement trend from 1980 to 2009. This is proven by the average value of the indicator: In 1980 the average was -2.03 and improved by two points until 2009 up to -0.03. Out of the selected group Turkey, Iran, Algeria, Bangladesh and Syria could improve impressively by approximately 3 points. At the same time, there are only two countries that lowered its economic freedom: Hong Kong and Oman. Therefore it is strange that these two countries still maintain the highest level of economic freedom among the selected group.

Improvement in Economic Freedom



Source: Own Calculations, Data of Fraser Institute

Morocco improved its grade of economic freedom by 2.14 points from 1980 to 2009 and now contains an index of -0.61 points. Compared to the sample of countries back in 1980, it had a relative disadvantage in four of the five categories that determine economic freedom: Size of Government, Legal Structure and Security of Property Rights, Freedom to Trade Internationally and in Regulation of Credit, Labor and

Business. In Legal Structure and Security of Property Rights, Morocco was performing only as half as good as its competitors as well as in Regulation of Credit, Labor and Business. Its main improvements until 2009 were in Legal Structure and Security of Property Rights and in Size of Government where the country even holds a small relative advantage above its competitors in 2009. In Access to Sound Money, Morocco improved its performance as well, but due to the increases of its competitors in this field, it now holds a slight disadvantage in this field, Freedom to Trade Internationally and in Regulation of Credit, as well as Labor and Business.

In comparison with its main MSP competitors, China, India and Egypt, Morocco contains the lowest Economic Freedom Index . Since Egypt improved almost equally with Morocco, the gap became closer by only 0.1 points and remains at 0.4 points.

The difference between Morocco and India decreased from 1.43 points in 1980 to 0.27 points in 2009 due the impressive improvement in Legal Structure and Security of Property Rights, where the Maghreb country now performs slightly better than India. Due to Morocco's improvements in Regulation of Credit, Labor and Business, India's relative advantage in this field over the African state decreased. On the other hand, Morocco lost its considerable relative advantage in Freedom to Trade Internationally and now performs weaker than India in this area.

In 1985, China used to hold an index in economic freedom significantly lower than Morocco: -2.03 points to -1.63 respectively. In 2009, China outperformed Morocco with an index of 0.12 points (Morocco: -0.61). This evolution is mainly explained by one variable: Regulation of Credit, Labor and Business. Back in 1985, Morocco held an enormous advantage in this area and performed 3.7 times better than China. By 2009, China could turn this disadvantage into a small advantage over Morocco. In four of the five determining variables that determine economic freedom, China holds now small advantages over the Maghreb state.

To summarize , we can say that Morocco improved its economic freedom in all of the determining variables, most impressively in Legal Structure and Security of Property Rights. However, due to the evolution of its main competitors (China, India and Egypt) and the low level of the Maghreb country in 1980, Morocco still performs the least favorable in terms of economic freedom.

World Governance Index of the World Bank (GWI)

In this section we compare the performance of Morocco with its competitors in the MSP sector in the World Governance Indicator (WGI).

The WGI has been available since 1996 and refers to six different areas:

1) Voice and Accountability
2) Political Stability and Absence of Violence/Terrorism
3) Government Effectiveness
4) Regulatory Quality
5) Rule of Law
6) Control of Corruption

These six indicators are compiled out of 30 independent data sources that all measure components that are influencing the country governance. The indicators range approximately between -2.5 and 2.5, indicating "bad" to "good" governance respectively.

Governance, as described earlier, is a major determinant of FDI, therefore we wanted to find out if great discrepancy exists in the level of governance of the selected countries.

Out of the six variables, we created one index that focuses on the information about each country's governance. Therefore, we used a factor analysis and the newly created index ranks between -2.5 and 2.5. Since yearly changes appear to be very small, we observed the development from 1996 to 2010 every two years.

Governance Index

	1996	1998	2000	2002	2004	2006	2008	2010
Afghanistan	-2.34	-2.38	-2.44	-1.91	-1.55	-1.83	-1.93	-1.93
Algeria	-1.00	-1.11	-1.02	-0.76	-0.53	-0.51	-0.63	-0.71
Bahrain	0.62	0.67	0.77	1.06	1.04	0.60	0.67	0.69
Bangladesh	-0.57	-0.37	-0.57	-0.79	-1.03	-0.91	-0.73	-0.73
Bhutan	0.59	0.59	0.57	0.54	0.45	0.58	0.58	0.56
China	-0.14	-0.21	-0.19	-0.36	-0.27	-0.32	-0.19	-0.31

	1996	1998	2000	2002	2004	2006	2008	2010
Hong Kong	1.88	1.84	1.86	2.10	2.50	2.51	2.50	2.44
Macao SAR	0.87	0.88	0.95	1.10	1.99	1.38	1.12	1.56
Taiwan	1.50	1.57	1.51	1.54	1.73	1.48	1.52	1.75
Egypt	0.13	0.04	0.00	-0.16	-0.20	-0.44	-0.25	-0.29
India	0.22	0.20	0.25	0.05	0.10	0.26	0.17	0.06
Iran	-0.68	-0.73	-0.64	-0.60	-0.58	-0.87	-0.95	-1.11
Iraq	-2.01	-1.90	-1.96	-1.90	-2.09	-1.94	-1.68	-1.47
Jordan	0.41	0.53	0.50	0.21	0.57	0.46	0.57	0.35
Republic of Korea	1.15	1.02	1.18	1.35	1.37	1.33	1.36	1.45
Kuwait	0.82	0.70	0.78	0.85	0.93	0.75	0.72	0.67
Lebanon	-0.05	0.04	0.01	-0.13	-0.08	-0.52	-0.55	-0.36
Libya	-1.11	-1.19	-1.06	-1.09	-0.83	-1.06	-0.74	-1.12
Mongolia	0.40	0.39	0.41	0.63	0.29	0.17	0.08	-0.01
Morocco	0.41	0.57	0.30	0.15	0.19	-0.04	-0.09	0.02
Nepal	0.08	-0.22	-0.32	-0.51	-0.87	-0.69	-0.69	-0.76
Palestinian territory	-0.82	-0.82	-0.90	-0.99	-0.54	-0.94	-1.18	-0.25
Oman	0.77	0.85	0.90	1.03	1.01	0.67	0.92	0.84
Pakistan	-0.64	-0.58	-0.79	-0.80	-0.88	-0.70	-0.93	-1.00
Qatar	0.47	0.78	0.91	0.96	0.92	0.97	1.20	1.36
Saudi Arabia	-0.09	-0.13	-0.07	0.01	-0.12	-0.12	0.07	0.11
Sri Lanka	0.03	0.07	0.00	0.29	0.09	0.04	-0.11	-0.04
Sudan	-1.70	-1.60	-1.52	-1.36	-1.46	-1.48	-1.71	-1.70
Syria	-0.63	-0.79	-0.80	-0.50	-0.73	-0.99	-0.81	-0.81
Tunisia	0.34	0.37	0.39	0.50	0.49	0.43	0.28	0.20
Turkey	0.12	-0.08	0.13	0.04	0.30	0.41	0.41	0.43
UAE	0.97	0.95	1.03	1.37	1.18	1.04	1.11	1.00
Yemen	-0.59	-0.77	-0.88	-1.06	-1.03	-0.91	-0.98	-1.16

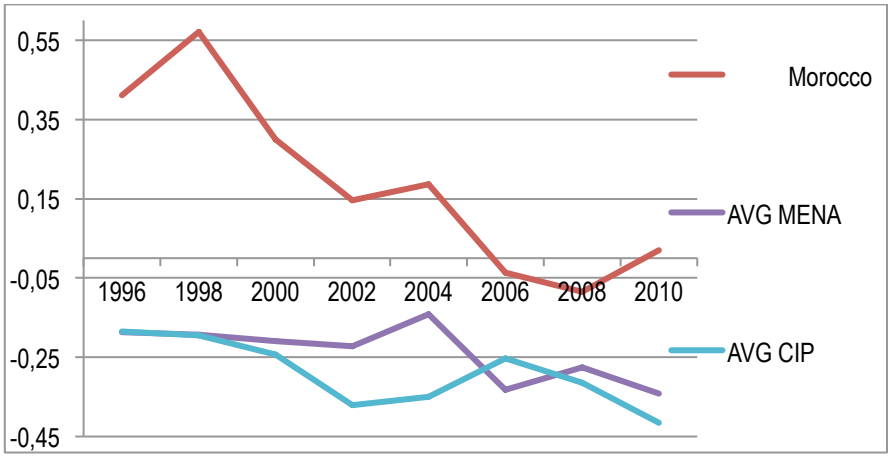
Source: Own Calculations. Data of World Governance Indicator (World Bank)

At a first glance, one gets the impression that there is neither a great deal of improvement nor worsening in the countries observed. This notion is supported by the average improvement of all countries from 1996 to 2009: the improvement was marginal with only 0.01 points. There are only seven countries with an improvement or decline of more than 0.5 points: Qatar (0.89 points), Macao SAR (0.69), Palestinian Territory (0.57), Hong Kong (0.56), Iraq (0.54), Yemen (-0.57) and Nepal (-0.84).

In 2010, Morocco had a lower index than in 1996; the Maghreb country lowered its index by 0.39 points and contains now an index of 0.02 points.

In comparison with the average of the MENA region as well as with the average of China, India and Pakistan, Morocco is performing far better than its competitors. Even though an obvious trend is highly visible, its performances were all worsening.

Index Performance Comparison



Source: Own Calculations. Data of World Governance Indicator (World Bank)

It appears that Morocco has experienced the greatest downfall in its performance.

By analyzing the six components of the World Governance Index, we see that Morocco deteriorated in five of the six determining variables: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Rule of Law and in Control of Corruption. Only in Regulatory Quality, the North African country could improve –though only marginally.

In relative terms, Morocco used to hold small comparative advantages compared with the average of all other countries listed in the table above in every determinant in 1996, though only in Control of Corruption was the advantage notable. By 2010, Morocco performs average in every determining variable.

Compared to its main competitors in the MSP sector China, India and Egypt, only India has a higher index than Morocco, still the two countries are on the same level (India: 0.06 points, Morocco: 0.02). India holds a very strong advantage in Voice and Accountability where it performs twice as well as Morocco.

Differences compared with China are are clear in one sector: Voice and Accountability. The Maghreb country could enlarge its advantage; as a consequence Morocco performs now more than 3.5 times better than its Asian competitor in this area.

Morocco also contains a relative advantage in Control of Corruption over China. Thus, these two advantages explain Morocco's better relative performance in terms of governance.

Morocco holds a notable relative advantage over Egypt in two sectors: Voice and Accountability and in Control of Corruption – only in Rule of Law does Egypt perform slightly better than Morocco. Overall, Morocco could enlarge its relative advantages over Egypt to some extent.

As a conclusion, we can note that Morocco's development in terms of good governance is negative due to a decreasing performance in five out of six areas. However, in relative terms the Maghreb country still performs average compared to the chosen country set. Compared to its main competitors China and Egypt, Morocco has a better index in governance and could even increase its advantages. Only India was able to outperform the North African country in the observed period of time, though by very little.

"Doing Business" Index of the World Bank

In the following section we compare Morocco's performance in the Doing Business Indicators with the performance of further MENA countries and with China and India, its potential competitors in the MSP sector. The well-known Doing Business Indicator, elaborated by the World Bank, measures the business friendliness of a country by a variety of variables. The Ease of Opening a New Business, Paying Taxes, Trading across Borders, Getting Credit, Dealing with Construction Permits and the Installation of Electricity as well as the Protection of Investors, the Possibility of Enforcing Contracts and Resolving Insolvency are each summarized in a ranking.

Since we are focusing on the recent data, as well as the development since the Doing Business Indicators were published the first time in 2004, we cannot include all of the mentioned variables in our analysis. Consequently, we focused on the available data and analyzed the following variables: Starting a Business (Procedures, Time, Cost, Paid-in-Minimum Capital), Enforcing Contracts (Time, Costs) and Resolving Insolvency (Time, Costs, Recovery Rate). We created a new indicator out of the mentioned variables by using a factor analysis. The final index was the arithmetic average of the three factors that we obtained from the preliminary nine variables composing our study.

Given our focus on developing countries in Asia and the Middle East/North Africa, the available data allowed us to build this new indicator for 22 countries from 2004 to 2011.

Observing 2004 and 2011, Morocco exhibits a very good evolution in terms of time, cost, and procedures to start a business, with no major changes for the rest of variables of Doing Business. However, while it used to have a competitive advantage in terms of costs and time in 2004, the country lost its advantage in both of the categories by 2012 due to a significant improvement by the observed competitors. Morocco still shows an advantage in two categories: resolving insolvency in terms of time as well as starting a business in terms of paid-in-min. capital where only a third of the effort is necessary compared to the average.

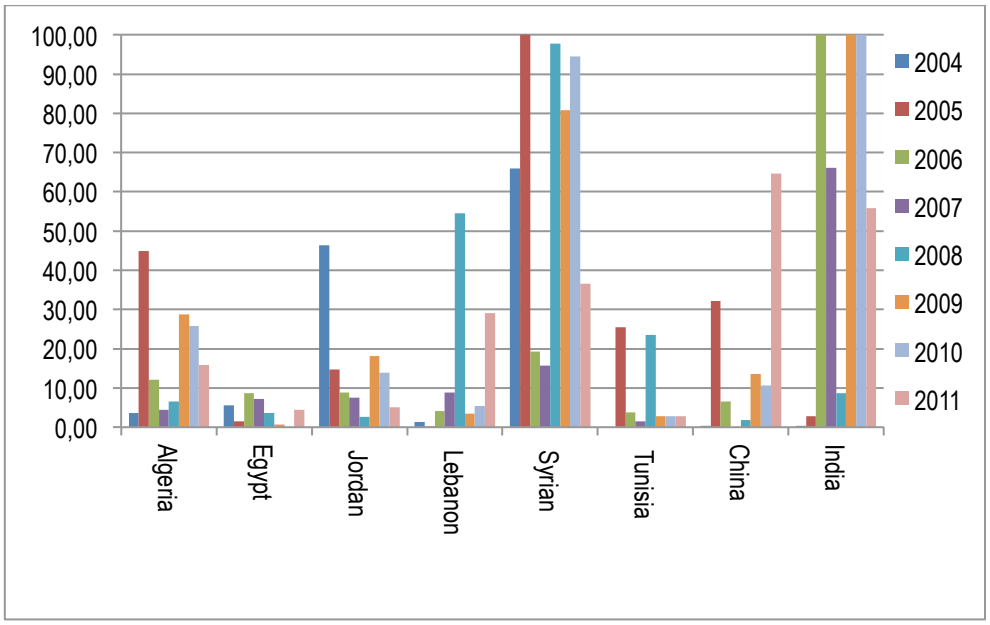
Evolution of the distance in Doing Business between Morocco and other countries

	2004	2005	2006	2007	2008	2009	2010	2011
Algeria	3.67	44.89	12.04	4.43	6.52	28.77	25.84	15.83
Bahrain					19.19	0.32	2.95	0
Bangladesh	3.58	3.99	61.13	100	24.69	45.73	45.90	7.34
China	0.41	32.22	6.54	0	1.85	13.57	10.66	64.66
Hong Kong	0.49	6.81	4.84	8.23	100	5.13	3.18	100
Taiwan	22.35	62.83	24.64	30.38	94.68	3.74	2.67	50.71
Egypt	5.65	1.47	8.74	7.19	3.69	0.73	0	4.47
India	0.41	2.79	100	66.05	8.75	100	100	55.84
Iran	1.43	5.24	6.83	4.32	0.47	18.58	6.67	2.70
Jordan	46.38	14.65	8.90	7.47	2.58	18.20	13.98	5.03
Kuwait	8.53	52.46	27.09	15.64	16.39	51.18	53.74	18.69
Lebanon	1.40	0.18	4.05	8.88	54.59	3.38	5.35	29.03
Mongolia	7.90	0.73	7.19	7.29	5.57	10.73	10.51	0.73
Nepal	4.66	0	25.42	39.13	1.19	14.90	26.36	1.25
Oman	4.96	37.15	15.13	10.25	5.78	11.78	15.59	2.16
Qatar					0	0	0.01	9.95
Saudi Arabia	13.16	34.71	16.39	3.52	11.48	0.01	2.35	0.01
Sri Lanka	2.07	15.16	35.13	49.91	81.05	0.04	4.28	43.32
Syria	65.87	100	19.32	15.74	97.70	80.80	94.45	36.64
Tunisia	0	25.43	3.74	1.51	23.56	2.86	2.83	2.76
Turkey	1.04	9.55	0.18	0.19	0.52	2.12	1.07	1.93
UAE	37.11	3.92	0	1.32	75.42	15.82	1.75	87.76
Yemen	100	86.06	44.91	74.20	93.83	4.13	8.97	0.59

Source: Own Calculations, Data of Doing Business (World Bank)

Looking at the table above, it appears that India, Syria and Yemen (until 2008) are the countries with the least similarity to Morocco. Having said this, there are various countries that perform similarly to Morocco throughout the whole time period: Turkey, Tunisia, Saudi Arabia, Iran, and Egypt. Furthermore, the performance in the created index appears to be highly volatile. The United Arab Emirates, Taiwan, Hong Kong and India exhibit in the highest possible distance, 100 points, to Morocco, in the following year its distance to Morocco falls partially under 5 points.

Distance of selected competitor countries to Morocco from 2004 to 2011



Source: Own Calculations, Data of Doing Business (World Bank)

In quantitative terms, Morocco offers a great advantage in terms of number of procedures and paid-in-min.-capital to start a business in 2004 as well as in 2011. China however, has reduced costs to start a business significantly , consequently, by 2011, it held an enormous advantage over Morocco: it is four times cheaper to open a business and two times cheaper to enforce contracts in China than in its North African competitor. Therefore, China was able to increase its overall advantage over Morocco in the sense of Doing Business from 2004 to 2011 due to the cost factors.

While India used to hold a great advantage over Morocco in terms of costs and recovery rate in resolving insolvency in 2004 and 2011, the Asian country could not maintain its advantage in paid-in-min.-capital from 2004. In fact, Morocco is a lot more favorable now in this respect: it takes only 7% of the effort compared to India today. Interestingly, Morocco offers various advantages over India observing 2004 as well as 2011: significantly less time is necessary to start a business, enforce contracts and

resolve insolvency and the Maghreb country could also increase its advantage over India in costs to start a business. Considering all variables together, Morocco could turn its overall disadvantage into a more favorable business environment compared to India.

Another serious competitor in the area of MSP is Egypt. Even though the tables suggest that there is no difference between the two MENA countries, however, Egypt could turn its disadvantage into an advantage over Morocco in the Easiness of Doing Business. In 2004, Egypt used to be better-off in only one field: the recovery rate of resolving insolvency. In 2011, Egypt demonstrated a higher performance in "time and costs of starting business" indicators. It experienced a huge reduction in this commonly used variable from "Doing business" dataset". Finally, in "procedures to start a business", Egypt closed the gap with Morocco. This development results in the fact that Egypt offers a more attractive business environment than Morocco now.

Essentially, we can state that Morocco lowered the difficulties to open a business in terms of time and costs tremendously. Due to the evolution of other countries in this area, the advantage is not very large, the biggest advantage contains Morocco in paid-in-min.-capital when opening a business. In comparison to its main competitors in the MSP sector, China and Egypt, offer a more favorable environment in the Ease of Doing Business due to factors stated above. In comparison with India, Morocco could increase its competitive advantage.

Human Development Index by UNDP

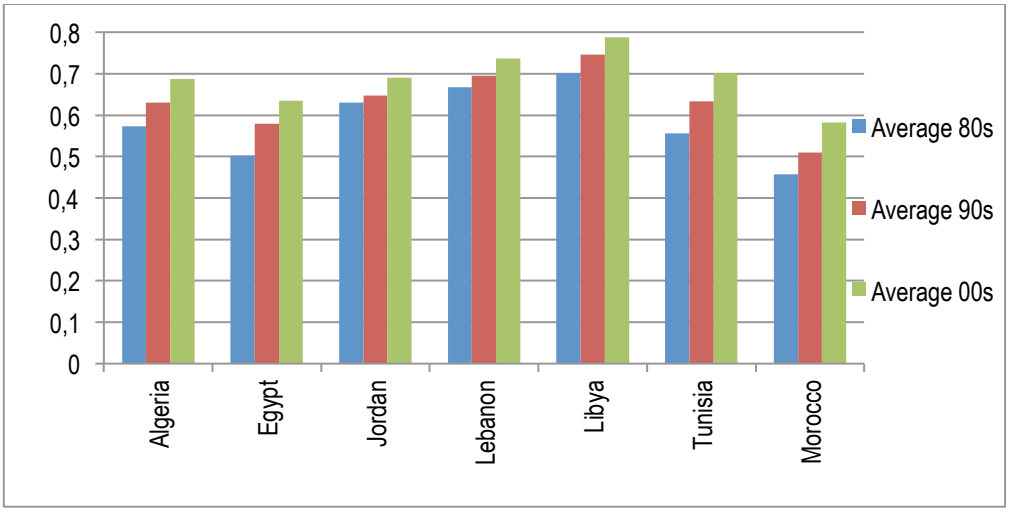
In the following section, we review the main components of the Human Development Index, HDI, for the MENA region and China, India and Pakistan, understanding that HDI performance is a crucial issue in order to attract FDI. As it is well-known, the HDI is a composite index containing three dimensions of the Welfare in a country: a long and healthy life (Health), access to knowledge (Education), and a decent standard of living (Income). Each component varies between 0 and 1, representing "bad performance" and "good performance" respectively. [6]

Over the last three decades all of the selected MENA countries could improve their performances in the HDI. Libya contains the highest HDI, 0.78 points, throughout the

[6] http://hdr.undp.org/en/statistics/hdi/

last three decades, while Tunisia increased by 0.15 points, rising from rank five to three. Egypt and Morocco as well improved by approximately 0.13 points. Nevertheless, over the whole period Morocco and Egypt are the poorest performing countries of the region with 0.58 and 0.63 points respectively. Consequently, Morocco´s gap to Egypt remained stable with 0.5 points. The gap to Algeria of 0.11 points – Algeria being in the fifth rank in the last decade and containing 0.69 points – seems difficult to eliminate, since Morocco contains the lowest score in every component of the HDI except the Health Index.

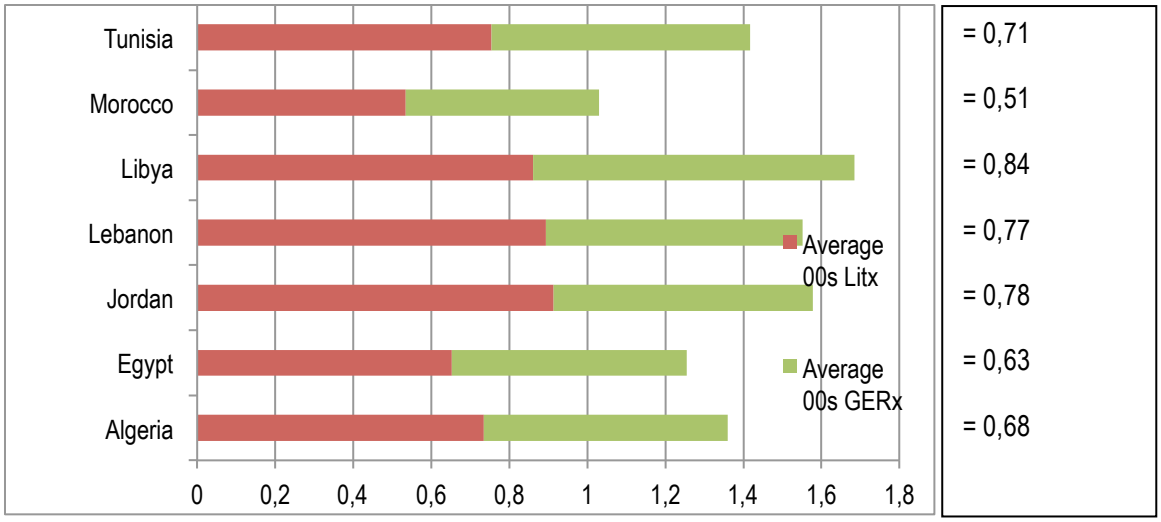
Human Development Index



Source: HDI, United Nations Development Program (UNDP)

The Education Index is calculated from the Literacy Index and the Combined Gross Enrolment Rate Index. Morocco is performing poorly in both of these categories: the country has an Education Index of 0.51 points, while, Egypt records 0.63. The MENA average in this category is 0.7 points and the average improvement from the 80s until the last decade was 0.16 points which also reflects Morocco's improvement during this period. In both the Literacy Index and the Combined Gross Enrolment Rate Index, Morocco contains a notable gap to the MENA average: 0.23 and 0.15 points respectively.

Literacy Index, Combined Gross Enrolment Rate Index Education Index

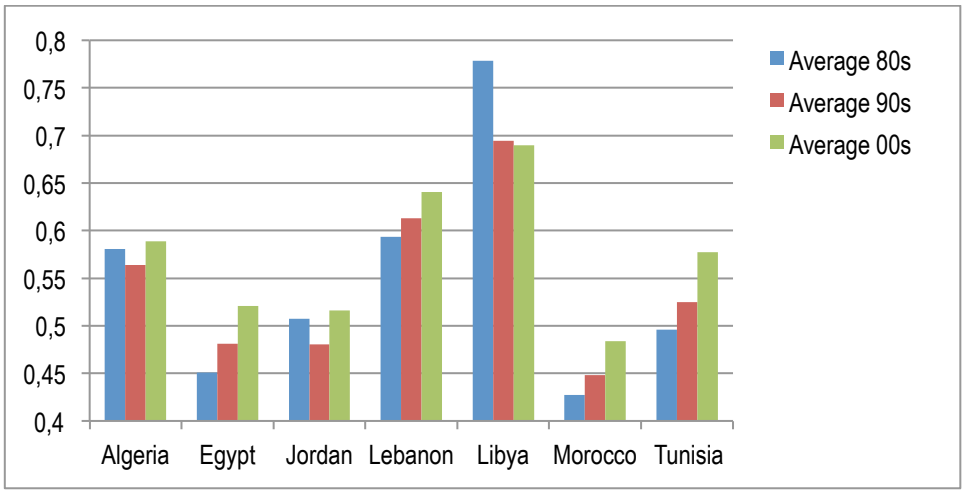


Average 00s Litx: Average performance in the Literacy Index from 2000-2009
Average 00s GERx: Average performance in the Combined Gross Enrolment Rate Index from 2000-2009

Source: HDI, United Nations Development Program (UNDP)

The GDP Index is MENA's weakest component of the HDI: its average was 0.57 points in the last decade.. Morocco's performance with 0.48 points is the weakest among the MENA countries and lacks 0.09 to the MENA average. It is remarkable that the MENA countries' average rose only by 0.02 points over the last three decades.

Gross Domestic Product Index

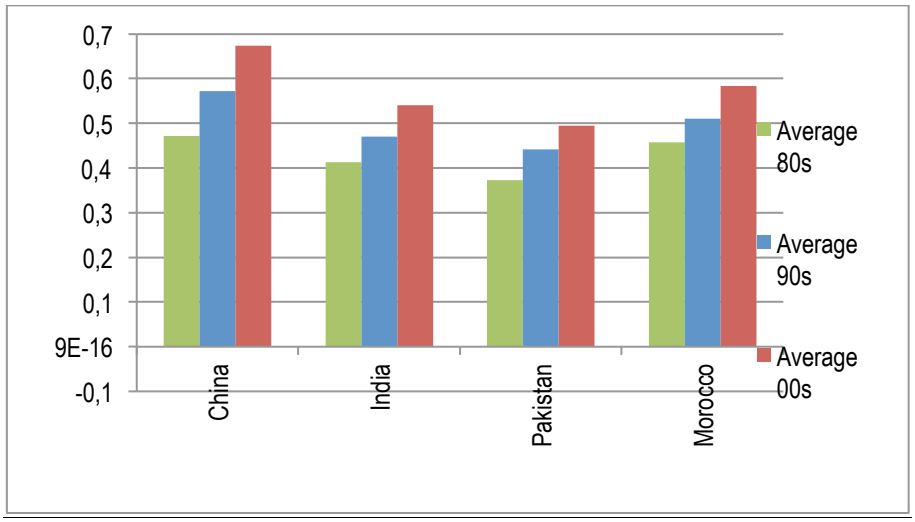


Source: HDI, United Nations Development Program (UNDP)

In comparison with China, India and Pakistan, Morocco performs better in terms of HDI. Its overall performance ranks Morocco only behind China (with a difference of 0.09 points) and ahead of India and Pakistan (with 0.04 and 0.09 points difference respectively). While Morocco, India and Pakistan improved equally over the past three

decades with 0.13 points, China outperformed its competitors with an improvement of 0.2 points.

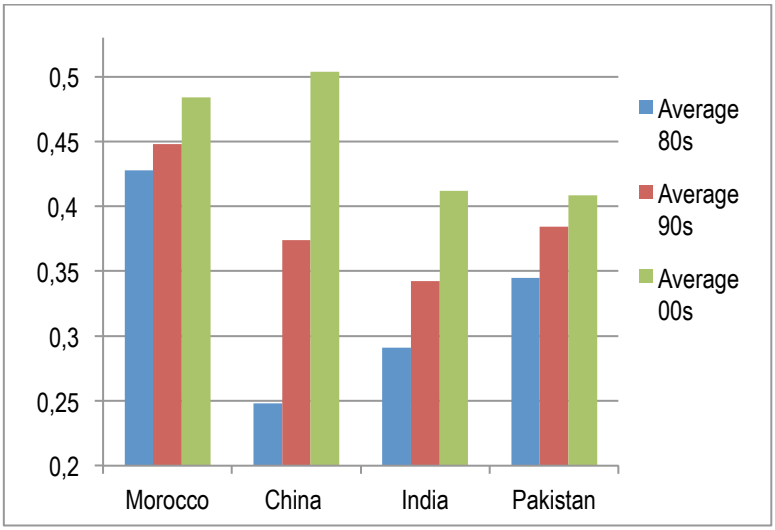
Human Development Index Evolution by decades



Source: HDI, United Nations Development Program (UNDP)

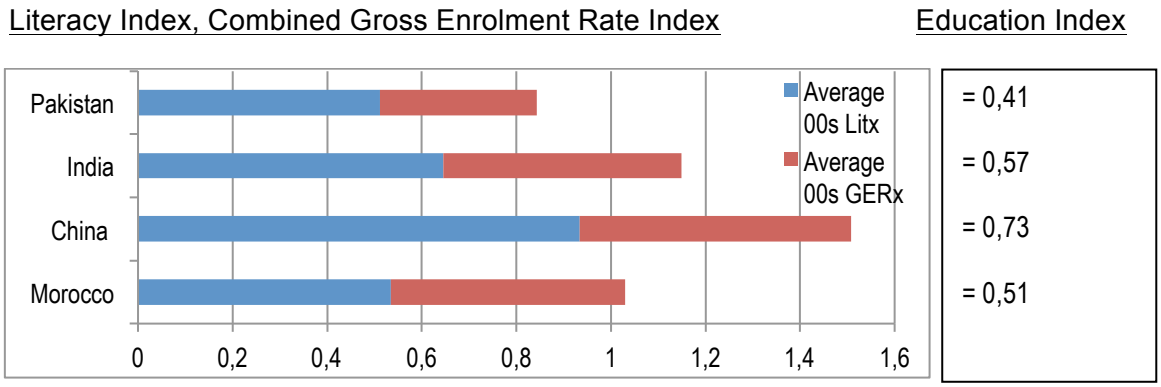
In every category of the HDI, Morocco lies behind China. In the GDP Index, China shows potential to overtake Morocco due to a steady rise over the last three decades: improving by 0.25 points in comparison to 0.05 points. India and Pakistan, almost perform equally with an index of 0.41 points, but are still behind Morocco by 0.07 points, nevertheless India also improved remarkably by 0.12 points in this category.

GDP Index Evolution by Decades



Source: HDI, United Nations Development Program (UNDP)

In the Education Index, the Maghreb country (0.51 points) ranks not only behind China (0.73 points), but also behind India, 0.56 points. This can be explained mainly by its poor performance in the Literacy Index. In this category Morocco contains 0.53 points which is 0.12 points less than India and 0.4 points less than China. Morocco's improvement of 0.2 points over the last three decades did not have an impact in closing this gap since China and India improved similarly or better: 0.23 points and 0.2 respectively.



Average 00s Litx: Average performance in the Literacy Index from 2000-2009
Average 00s GERx: Average performance in the Combined Gross Enrolment Rate Index from 2000-2009

Source: HDI, United Nations Development Program (UNDP)

Summarizing, one can observe that Morocco is not performing well in the HDI, especially in comparison to the other MENA countries. Since Morocco's improvement over the last three decades was only just higher than the average MENA improvement, Morocco still ranks last among its regional competitors. In comparison to China, India and Pakistan, only China contains a higher HDI.

Nevertheless, the weak results in the Education Index appear to be the biggest problem for the North African country in order to perform more successfully in the HDI. In comparison with the MENA countries, Morocco performs weak in both determinants of this Index: the Literacy Index and the Combined Gross Enrolment Rate Index. In comparison with China, India and Pakistan, Morocco's weak point is the Literacy Index. If the Maghreb country wants to outperform its competitors, an improvement in the Literacy Index seems to be essential.

MODELING FDI IN THE "CSP STRIP"

Following the literature experience in modeling the main drivers of FDI, a Panel data model has been conducted for 19 countries (all of them included in North Africa, Arabic Peninsula, and Asia - China and India included -) for the period 2004-2008.

The endogenous variable of our model is net FDI inflows over GDP in current dollars (by year and by country). Due to the erratic observed trend in this variable, a Hodrick-Prescott filter was used to draw the medium-long term trend in the FDI. In several cases, important decisions of investment are carried out in one year, producing a distortion effect in the normal evolution of the series when they are observed year by year. UNCTAD about net FDI inflows and IMF datasets were used as primary source of these variables.

The final goal of our model is to identify the main drivers conducting FDI in North Africa countries and its potential competitors for the CSP industries investors. The description of the exogenous variables is:

- FDISTOCK over GDP (lagged): Total accumulated stock over current GDP per year. This variable is lagged. UNCTAD dataset. As common in FDI literature, positive effect is expected, assuming that there is some kind of inertia in investment process.
- Exchange Rate Volatility: Implied PPP Exchange rate following IMF definition. More volatility produces more uncertainty so, negative effect is expected.
- International Trade performance: KOF index containing this aspect (external commerce, portfolio investment, income payments to foreign nationals). An upper value of the index, upper level of restrictions. So, negative effect is expected on FDI motivated by vertical integration.
- Trade Barriers: KOF index containing trade barriers (tariffs, hidden boundaries, capital account restrictions…). An upper value of the index means bigger restrictions, so FDI will decrease. Negative effect is expected.
- Control of Corruption: World Bank Governance indicators. Upper record in this index, worse control of corruption so negative effect is expected.
- Legal System & Property rights: Fraser institute definition. Upper value, better protection of these rights. So, positive effect on FDI is expected.
- Size of government: Fraser Institute definition. The effect of this variable is uncertain. A bigger size of government has served as vehicle for liberalizations in some of the analyzed countries. So, an upper value should be related with an

upper FDI. In the other side, excessive public control reduces the possibilities of FDI and, then, a negative effect would be expected.

- Growth rate of GDP pc PPP: IMF definition. A positive trend of this variable is considered a good sign for FDI with horizontal purposes. So, positive effect is expected.
- Restrictions to Property sale: Upper value means lower restrictions. So, positive effect is expected (easier to reclaim the foreign investments)
- Tariff volatility: Average standard deviation 2004-2008 of Tariffs rates (constant for all periods). Own calculation from Fraser Institute variable. A bigger volatility in tariffs should be conduct to a minor FDI due to vertical interests. So, negative effect is expected.

In the table of coefficients estimates, the main variables used in previous literature have been introduced from (1) to (11) regressions. Hausman test has always indicated that a random effects model was suitable and the total variance explained by the models is relatively high (between 70%-83%).

Panel Data Coefficient Estimates

17 countries – 2004/2008. Random Effects

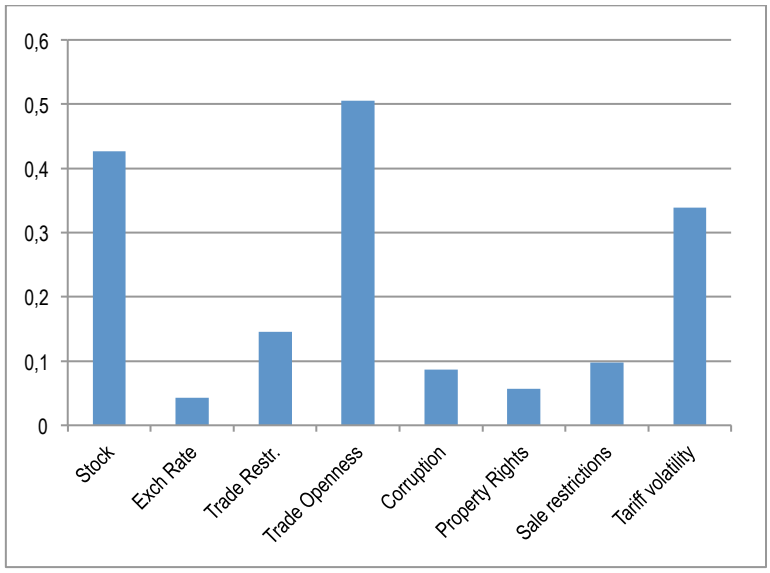
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FDISTOCK over GDP (lagged)	0.074***	0.058***	0.054***	0.053***	0.054***	0.056***	0.046***	0.050***	0.051***	0.042 ***	0.046***
Exchange Rate Volatility	-9.922***	-11.988***	-14.706***	-16.398***	-15.670***	-8.910***	-9.038**	0.810**	-10.954**	-14.246***	-11.954***
Trade Openness	0.160***	-0.113*	-0.161**	-0.172***	-0.177***	-0.113***	-0.153**	0.575**	-0.112	-0.186 **	-0.138**
Trade Barriers	-	0.478***	0.573	0.596***	0.579***	0.430***	0.442***	-0.128***	0.535***	0.582 ***	0.512***
Control of Corruption	-	-	-2.964***	-3.613***	-3.429***	-2.270**	-2.751**	-12.101**	-2.535**	-1.737	-2.357**
Legal System & Property rights	-	-	-	0.949**	1.038***	-	-	-2.715**	0.673 *	0.678	0.693***
Size of government	-	-	-	-	0.652	-	-	-	-	-	-
Growth rate of GDP pc PPP	-	-	-	-	-	27.259***	9.798	-2.117	7.880	-	-
Restrictions Property sale	-	-	-	-	-	-	0.932***	-	-	0.863 ***	0.815***
Tariff Volatility	-	-	-	-	-	-	-	-	-2.100***	-2.383 ***	-2.341***
Gross enrolment Rate	-	-	-	-	-	-	-	-	-	-4.017	-
R - Squared	0.7082	0.743	0.764	0.78	0.7913	0.753	0.768	0.784	0.825	0.801	0.839
Hausman Prob.	0.294	0.166	0.218	0.278	0.058	0.228	0.298	0.182	0.579	0.219	0.180

(***) 99% of significance, (**) 95% of Significance, (*) 90%

About the results, we can highlight the following aspects:

- All the significant variables showed ir expected signs.
- There is a clear stability in investment projects once they have sta cumulative stock in the previous year consistently shows a valuable significance and it presents an increasing trend in the FDI once it h too.
- The fundamental core of the variables shows that internatio characteristics of the country are the fundamental drivers condu increase/decrease of FDI.
- Some institutional aspects (like control of corruption, legal property s restrictions to property sale) were found to be relevant when trying the FDI flows.
- Size of government, GDP growth rate, educational skill of populat enrolment rate)… and the rest of the variables that could indicate a purpose of the FDI do not have high levels of statistical significance. more vertical orientation of FDI in the area could be supposed.
- Correcting for the different units of the variables, Trade openness is relevant variable when determining FDI, followed by the previous st volatility, trade barriers, legal system of property rights, and corruption.

Order of relevance of variables as FDI drivers



Source: own calculations with standardized coefficients

Paying attention to the cross-random effects for each country in the final model (in spite of some anecdotic cases in some of the less relevant countries in our study) Morocco and Tunisia exhibit important "specific characteristics" not controlled by the main drivers that we have found in our analysis. In the case of Morocco, the signature of the trade agreement with the USA is just in the middle of the period studied. Of course, it has produced a huge increase in FDI, and so the variables of our model have under-estimated this amount. For both countries, during these years an important volume of funds from World Bank have arrived, in order to initiate the CSP constructions. These funds have clearly distorted the normal evolution of the FDI in both countries.

Cross-random Effects by country

Country	**Cross Random Effects**
Algeria	-2.39561
Bangladesh	3.828851
China	-3.217641
Egypt	0.883942
India	0.606576
Iran	-0.704139
Kuwait	-3.126841
Morocco	6.464624
Nepal	-4.53542
Oman	1.840956
Pakistan	-2.676812
Sri Lanka	-4.563696
Syrian	-1.355712
Tunisia	-4.053803
Turkey	-0.338134
United Arab Emirates	4.210478

In despite of these reasonable two cases, the rest of the countries show a discrete specific coefficient out of the evolution of the main drivers of FDI in the area, confirming again the validity of this model.

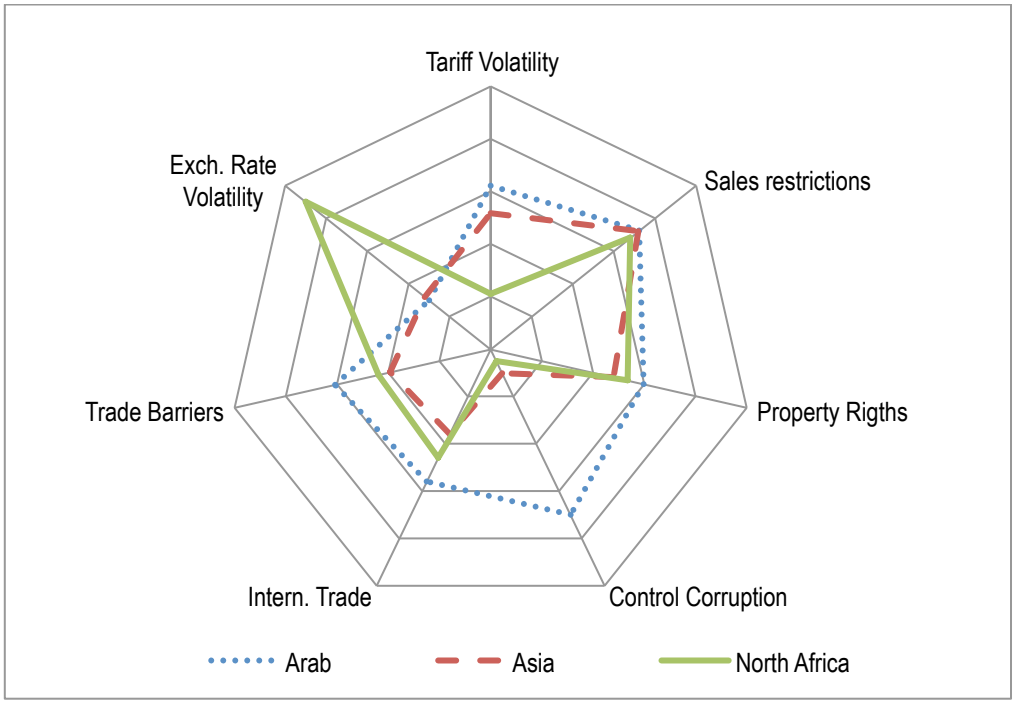
Paying attention to these variables, we can observe the following results:

- About Exchange rate volatility in Morocco and Tunisia show very good performance in terms of stability. During the last ten years, they maintain very high levels of performance, without huge changes in its exchanges rates with the dollar. Whilst this is true, Egypt and Algeria showed highly volatile exchange rates. In the Arab countries considered, they all showed worse performance

compared with Morocco and Tunisia. In particular Iran showed huge volatility. The rest of the countries showed more than two times the volatility observed in the two highest performing North Africa countries.

- International trade barriers in Asian countries (including China and India) show better ranking than the North African countries. The worst position in this indicator is occupied by the selected Arabian countries.
- The indicator of "International current Trade performance" in North Africa countries shows a relative advantage against the Arabian Peninsula ones, but a relative disadvantage compared with South-Asia countries. However, in this variable the differences are not very large.
- North-African and South Asia countries show a similar ability to control corruption. Here, there is a very large distance with the Arabian countries selected in our sample.
- As a whole, there are not significant differences between the three zones when referring to the "legal system & property rights" variable. Finally, it is worth pointing out the weak situation of Algeria in these variables, having similar values to Pakistan and Bangladesh.
- With regard to the regulatory restrictions on the sale of real property, the situation is fairly similar for the three zones. Only Syrian Republic shows a relative weakness in this indicator.

Relative position in significance variables by areas



Source: own calculations (upper value, better performance)

CONCLUSIONS

It is likely that Foreign Direct Investors are more focused in vertical than in horizontal strategies in the MENA area. Our findings of the relevant variables conducting FDI show this. Trade in openness, property rights, sales restrictions, reduced exchange rate and tariffs volatility were the main drivers of FDI in the past.

There is no evidence about significance of variables concerning HDI ranks, influence of government or relative per capita wealth (measured by gross enrolment, government size or GDP in PPP) over FDI in the last years. Apart from some cases, such as Jordan, the privatization process has been a determinant in last decade, but this is not the same for the rest of the countries in our sample.

With “doing business” indicators, maybe the main issues are already included in the specific international trade openness variables used in our model. The rest of indicators (including electric stability supply, number of days to start a business, days to enforce a contract…) show big lacks of information for these countries and non-continuous timeseries. It is possible that this problem has produced non-significant behavior in order to explain FDI.

There is room to improve the North African competitive situation as a potential FDI attractor. In spite of the recent gross investments coming from the World Bank Mediterranean Solar Program in the last years, the installation of solar industries in this area do not just depend on the construction and planned projects, but on the good expectations of each country as a potential platform of production for the whole area. Important efforts must be done in order to reduce corruption, to simplify the tariff system (and its volatility,) and to increase trade openness.

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DEVELOPMENT OF A CSP RELATED INDUSTRY IN MOROCCO: PROSPECTS, BARRIERS AND ADVANTAGES

Prof. Dr. Ramón Mahia

OBJECTIVE AND DESCRIPTION OF THE SURVEY

- The aim of this survey is to obtain the views of the international managers in the sector of renewable energy around the possibilities and difficulties of establishing a CSP local manufacturing technology industry in Morocco. The main objective is not to analyze the potential demand for new solar power plants in Morocco, but to explore in detail whether the CSP technology production process could be developed in Morocco, regardless of the final destination of manufactured components.

- The survey explores first what specific components of the production process and implementation of the technology could be manufactured in Morocco today and which require moderate or significant changes in the country over the next decade to be produced in this country.

- Secondly, the survey explores in detail business barriers, and market policies that hamper the development of the renewable production industry and, at the other end of the scale, the relative advantages offered by Morocco and the MENA region for the CSP sector development.

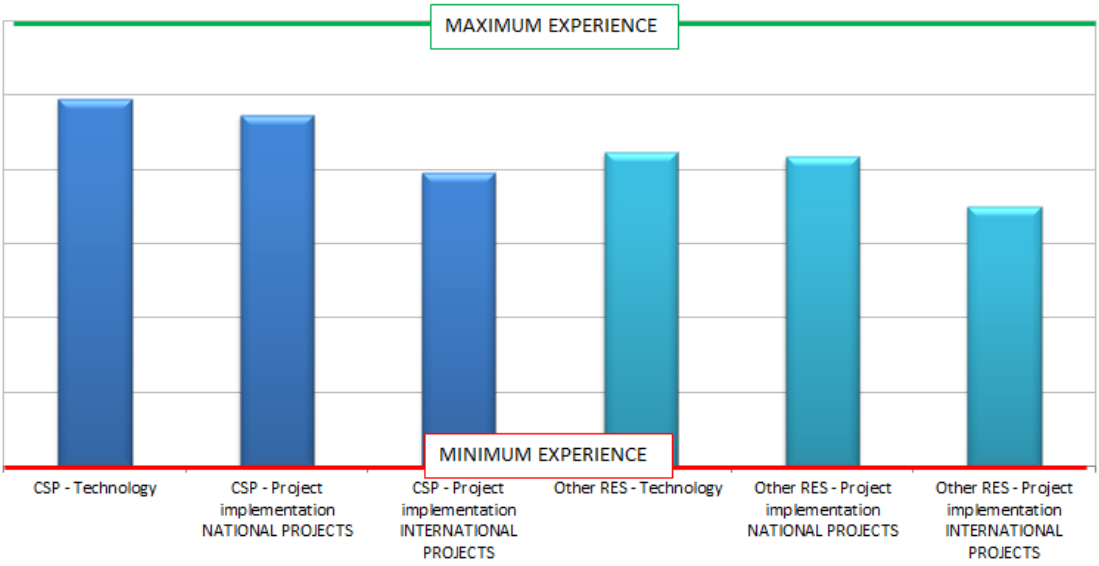
TECHNICAL DATA

- ✓ Sampling method: Surveys by Snowball procedure to senior managers in major companies in the renewable energy sector.
- ✓ Date: April – May 2012
- ✓ Number of “in depth” face to face interviews: 20 (**)

RESPONDENT PROFILE

- The surveys were conducted to outstanding members of major companies in the solar energy sector. **Almost all respondents hold positions of general manager, director or CEO.**
- As seen in the following chart, **the level of experience and knowledge of the renewable energy sector in general, and CSP in particular is very high**, scoring 4.3 on a scale from 0 (lowest) to 5 (highest).

Level of experience and knowledge of respondents
(Detailed for CSP and other RES technologies)



SURVEY RESULTS

The following sections detail the results of the survey. The text is structured using the questions in the survey as captions. After presenting the overall results on the possibilities of a CSP industry in Morocco, this assessment will be detailed in relation to each of the main stages of the production process. Then, we will explore business models to follow, ending with the results on the main barriers and relative advantages regarding the implementation of a CSP industry in the area, identified by the surveyed experts

Are industries ALREADY located in Morocco suitable NOW for local manufacturing of CSP components and the provision of CSP-related services?

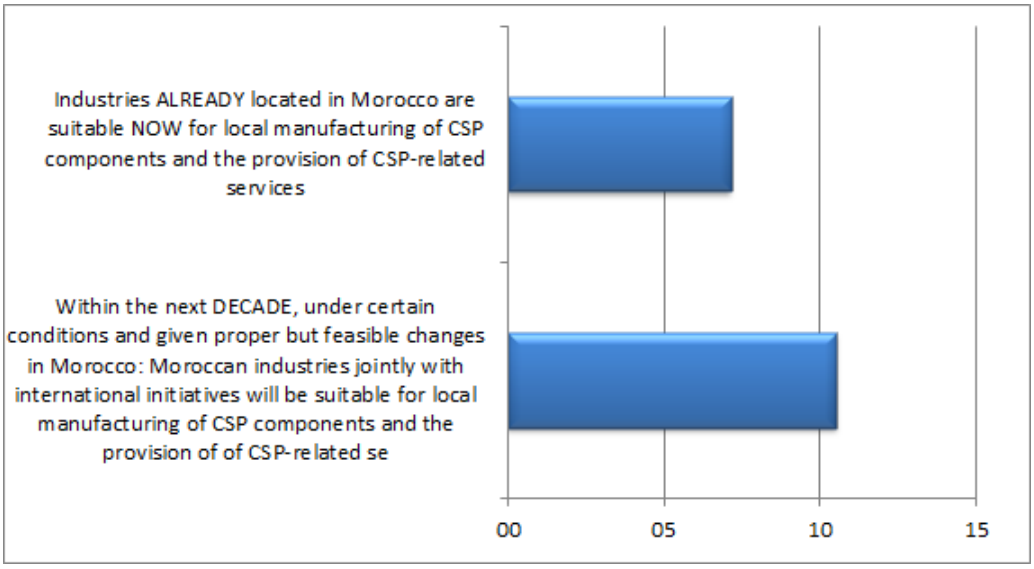
- This question outlines, in general terms, the overall objective of the survey: to assess the potential for a CSP manufacturing industry in Morocco at the present time.

- **According to the answers of these experts to the question above, a local CSP industry in Morocco presents a likelihood of 7.15 out of 15 (47.7%) but, if we look at the future and given certain "environment" adjustments during the next decade, the same experts agree that this likelihood increase to an average 10 over 15 (70%), (or 11/15 (73%) in median terms).**

- **It is also interesting to note that the feasibility of the project in the next decade will not only get a raised median valuation, but little dispersion**, ie a remarkable degree of agreement among experts: the interquartile range

shows that 50% of respondents recognized a potential of between 8.5 and 12 on the scale 0-15.

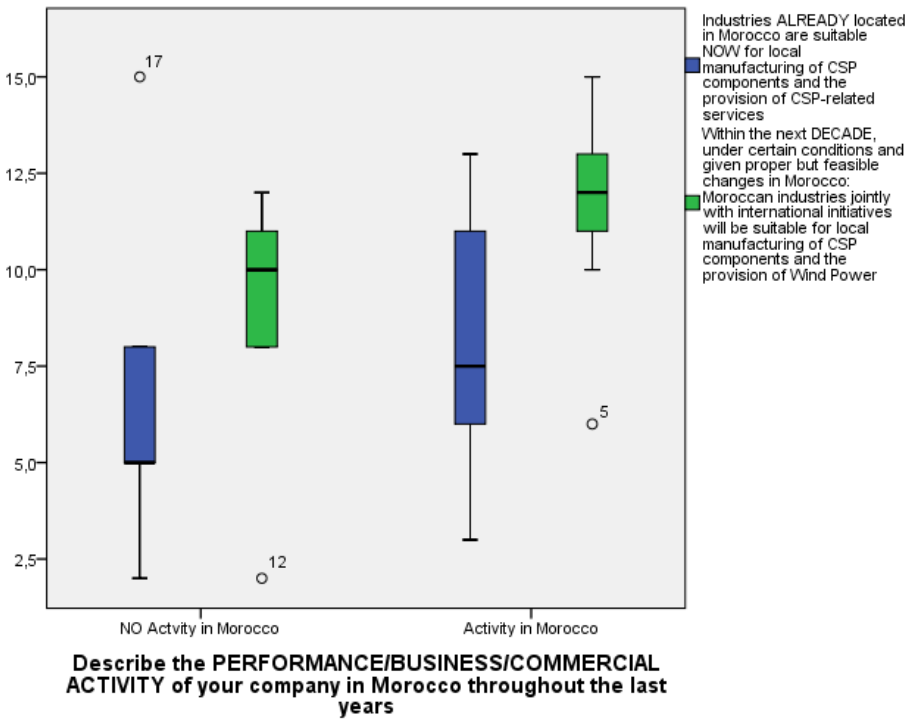
Is Morocco prepared for a CSP Industry?
(NOW and DURING THE NEXT DECADE)



- In addition, it is extremely interesting that, as shown in the following chart, **a CSP industry in Morocco, both now and in the next decade, assessing opportunities is best assessed by those who have experienced recent activity in Morocco** than those who have not had any previous business in the area.

- In this sense, **the possibilities of establishing a CSP industry in the country rise to around 12.5 (over 15) in the view of those entrepreneurs operating in Morocco**, and a valuation of only 10 from those who, for the moment, has no business experience in the area.

Likelihood of a CSP in Morocco
depending on CURRENT ACTIVITY of experts in the country
(NOW or DURING THE NEXT)



Which parts of the value chain of CSP technology are suitable NOW for local manufacturing?

- Apart from a global evaluation of the entire CSP production process, every respondent have been asked in this section for a specific evaluation of the likelihood of producing every significant component of CSP and providing every specific service related to CSP energy supply. Some of the CSP components are highly technological, require huge levels of fixed investment and its production is quite concentrated in a small bunch of well-known factories around the world so it looks quite ingenuous to imagine that the manufacturing of this components will be easy translated to Morocco. **The aim of this section is to identify those production stages and activities that could serve as a starting point for the birth of a local CSP industry in this country**.

- The whole value chain of CSP tech production and CSP related services has been split into more than 20 different stages and respondents have been asked to evaluate if each one could be manufactured or provided by a local Moroccan industry now or in the next decade, and under which circumstances.

Could the following stages of a CSP production value chain be assumed by local manufacturing in the current situation?
(Level of agreement of respondents)

Stage – Process	% of Respondents
Perform grounds (paving, fencing..)	65%
Construction works (plants, wharehouses,..)	65%
Float glass production	25%

Glass bending	25%
Mirrors manufacturing	20%
Receivers	0%
Support Structure (Steel construction)	85%
Support Structure (Foundations)	90%
Support Structure (Pylons)	80%
Trackers (Hydraulic and electrical Motors)	15%
Trackers (Control system)	0%
HTF (Production)	0%
HTF (Piping insulation)	25%
HTF (Heat exchangers)	0%
HTF (Pumps)	5%
Thermal Storage System	15%
Power Blocks	10%
Control System	5%
Electronics	0%
Cable	70%
Piping (main production)	70%
Other piping products (joints, flexible pipes,…)	5%
Valves	15%
Others	15%

- As shown in the previous table, **three major activities look suitable now for local manufacturing**: bulding up factories, construction of solar structures and manufacturing of minor complementary components such as piping and cable. AS expected, all this activities are clearly those of lower technological requirements and could easily match the actual potential of Moroccan industry.

- On the other side, **none or a clear minority of the interviewed experts think that the most technological production stages could be locally assumed in the current situation**: glass, mirrors, receivers, trackers, High Transfer Fluid, power blocks or system controls. We will explore in the following sections the reasons for this negative opinion.

Which parts of the value chain of CSP technology would be suitable IN THE NEXT DECADE for local manufacturing AND UNDER WHAT SCENARIO OF PROGRESS/CHANGES in the economic/political/social environment?

- As seen in the previous table, **some of the processes and services could not been locally produced now in Morocco in the opinion of the experts**. In the following question, we ask every interviewed to evaluate the extent of changes

needed to achieve in the economic, political and social environment for Morocco to be able to become a local CSP technology producer.

- The first interesting result is that **every CSP manufacturing process could be locally implemented in the next decade given the appropriate changes**. Besides, under a feasible scenario of minor or moderate changes, 15 out of the 23 stages could be locally implemented.

- **Among these achievable objectives, we want to underline the glass production, blending and mirrors manufacturing,** because these manufacturing stages are capital intensive and in hands of a few of international players but account for the most relevant share of the investment needed for the whole process and absorb the most important share of value added. At the end, mounting structures, mirrors and receivers are the three main CSP key components, the most capital-intensive and the largest part of the value chain (around 40%). Except for the receivers (with high entry barriers for new players) two of these three components seem achievable at a local level.

- **Another interesting process requiring just moderate progress is the one related to HTF manipulation**. The production of HTF seems unachievable, being quite capital intensive and currently monopolized by international chemical brands with large production, but complementary piping, heat exchangers and pumps could be done locally, adding an interesting share of value added to local players.

Changes needed to implement different production stages during the next decade

(Each stage is assigned to the modal category according to experts criteria)

Significant Changes	Moderate Changes	Minor Changes
• Receivers • Thermal Storage System • Control System • Electronics • Trackers (Control system) • HTF (Production) • Other piping products (joints, flexible pipes,…) • Valves	• Glass bending • Float glass production • HTF (Heat exchangers) • HTF (Pumps) • Power Blocks • Trackers (Hydraulic and electrical Motors) • Mirrors manufacturing • HTF (Piping insulation)	• Cable • Support Structure (Steel construction) • Support Structure (Pylons) • Piping (main production) • Support Structure (Foundations) • Perform grounds (paving, fencing..) • Construction works

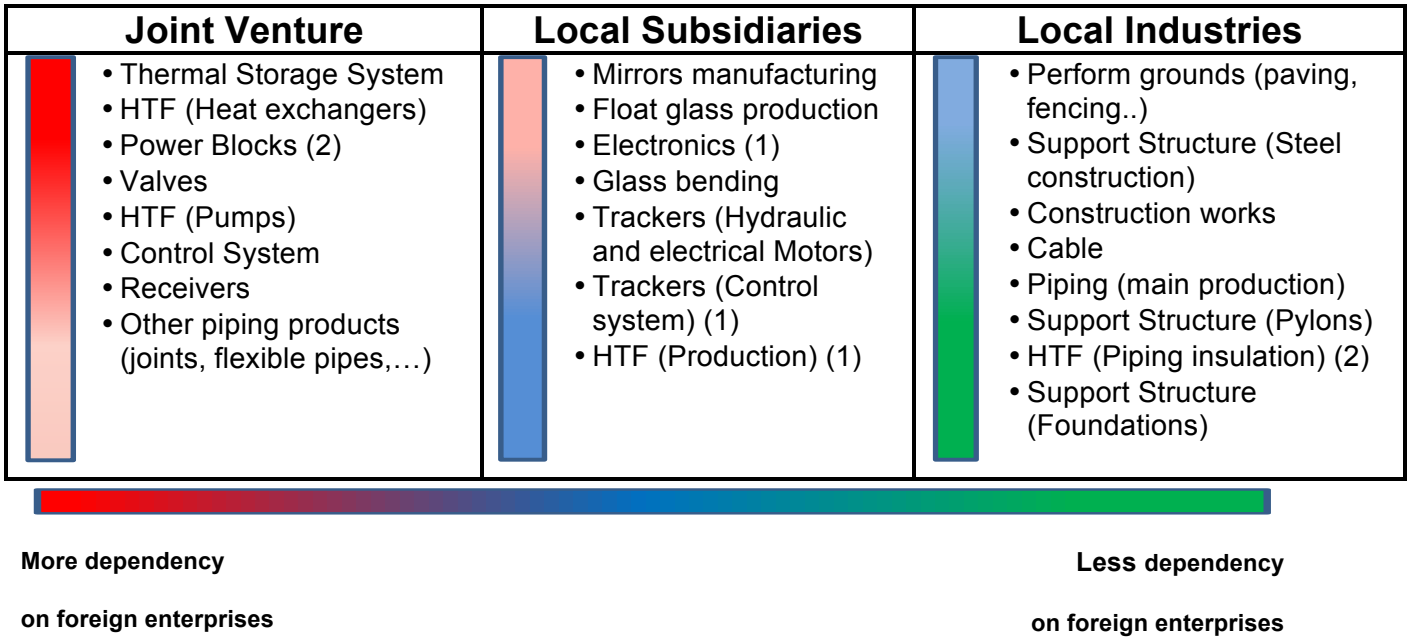
More Significant Changes — **Less significant changes**

- On the side of those processes that require significant changes, two of them, **receivers and thermal storage systems, would require the most substantial changes in the current economic and socio - political settings**. As we said before, local production of receivers is quite complicated because it requires highly specialized, specific, accurate and very high tech demanding industrial processes in a way that makes truly difficult the entry of new industrial players in a Moroccan context. The storage system needs civil construction, that could be done locally, but probably, design, architecture and salt supply could not be address at a local level.

What business model would be the most plausible towards developing a local industry in the medium term (next decade)?

- Focusing now different kind of business models for the development of a local industry, we ask every expert to select the most plausible one. We reproduce in the following table the modal category selected for each production stage.

Business model towards developing a local industry in the next decade
(Each stage is assigned to the modal category according to experts criteria)



- As expected, most of those stages of the manufacturing process being previously mentioned as requiring significant changes in Morocco to be settled down in this area are also those needing Joint Ventures with international companies to be developed in the local context over the next decade.

- We will explore lately the strengths and weakness of Moroccan "context", but **it seems plausible to think that the need of international support for enhancing local manufacturing of some CSP components seems to be related to basics local disadvantages**. On the one hand, a lack of technological know-how, key requirement in the manufacturing of some components such as receivers, HTF, storage system, electronic equipment. Secondly, a low level of local financial resources, required also for manufacturing receivers, mirrors or some specific piping parts and thirdly, a deficiency of local training education, required for almost every CSP manufacturing process.

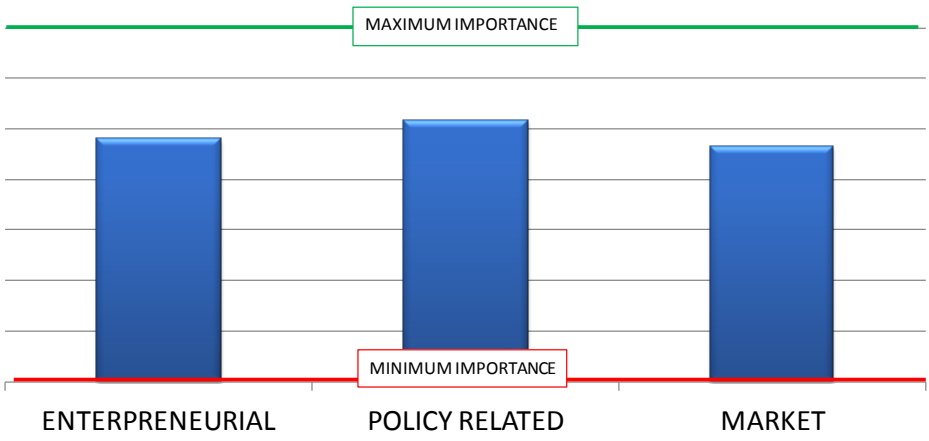
- Nevertheless, it is interesting to note that **8 manufacturing stages or CSP related services could be potentially delivered by PURE local industries without requiring too much international business cooperation**. Being realistic, however, it is obvious that this set of stages or services (such as construction, cable, piping,…) do not account for the most significant share of the total value added of a CSP manufacturing process and, in addition, these local activities would only be pertinent and profitable with the concourse of international companies in the rest of the CSP value chain.

RELATIVE IMPORTANCE of ENTREPRENEURIAL, POLICY RELATED AND MARKET barriers for the development of a combined INTERNATIONAL and LOCAL CSP industry initiative in the next DECADE?

- One of the fundamental aims of this survey in the framework of the current research project is to identify the relative weaknesses, disadvantages of Morocco in order to offer the CSP industry a credible environment that allows them to develop a new CSP industry in the country. We tried to summarize all this kind of "barriers" in three major groups: entrepreneurial, policy related and market barriers. We asked all the experts to score every single barrier in a scale of relative importance in the context of Morocco today.

- Comparing these three global groups, one thing seems clear: **barriers are quite relevant for the group of interviewed experts**. The global mean for all the 37 barriers to be evaluated is 9.9 (in an importance scale from 1 to 15). Considering simple group means, ENTERPRENEURIAL barriers score 9.6, POLICY RELATED barriers score 10.3, and MARKET barriers score 9.3; it seems therefore, that MARKET barriers are slightly more perceived as important in Morocco than ENTERPRENEURIAL or POLICY RELATED types.

Level of importance of different types of BARRIERS
(Group means for three categories of barriers)



What is the RELATIVE IMPORTANCE of the following ENTREPRENEURIAL BARRIERS for the development of a combined INTERNATIONAL and LOCAL CSP industry initiative in the next DECADE?

- Every expert was asked to score the importance of a set of 14 specific entrepreneurial barriers that potentially could be hindering the high potential

of Morocco as a future CSP manufacturing location. The results can be checked in the following graph and table.

- **The greatest concern seems to be about the uncertainty about the regional or country level RES (CSP) market development and prospects.** Although a significant number of CSP projects have already been successfully developed in the area, it is crucial to understand that, for the interviewed experts, a steady CSP market growth in Morocco and the MENA region as a whole is crucial to assess a future increasing potential for local manufacturing of CSP components and related services. Even if other weakness or restrictions tend to vanish gradually, no successful future scenario of local manufacturing in Morocco could be envisaged if the volume of the installed CSP capacity within the country and the region doesn't achieve a critical level of market development.

- **Well above the mean, it also appears a group of three cost related barriers.** As stated by experts, there is a deadly combination of a high risk premium in the area and lack of international or regional/local financial resources. CSP is a relative young industry and everywhere around the world there exist high initial capital costs for the adoption of CSP manufacturing technology. The most important manufacturing stages are high capital-intensive (glass production, mirror flat, automation for mounting structures,…) and that means that and although some relevant international financing initiatives have been launched (for example the MENA CSP IP, supported by the World Bank and the African Development Bank), access to financing appears to be a major barrier.

- Slightly above the group mean we find the **low level of specialization of Moroccan industry in CSP (or RES) technology**, insufficiently developed infrastructures and low level of automatization / modernization of local industries.

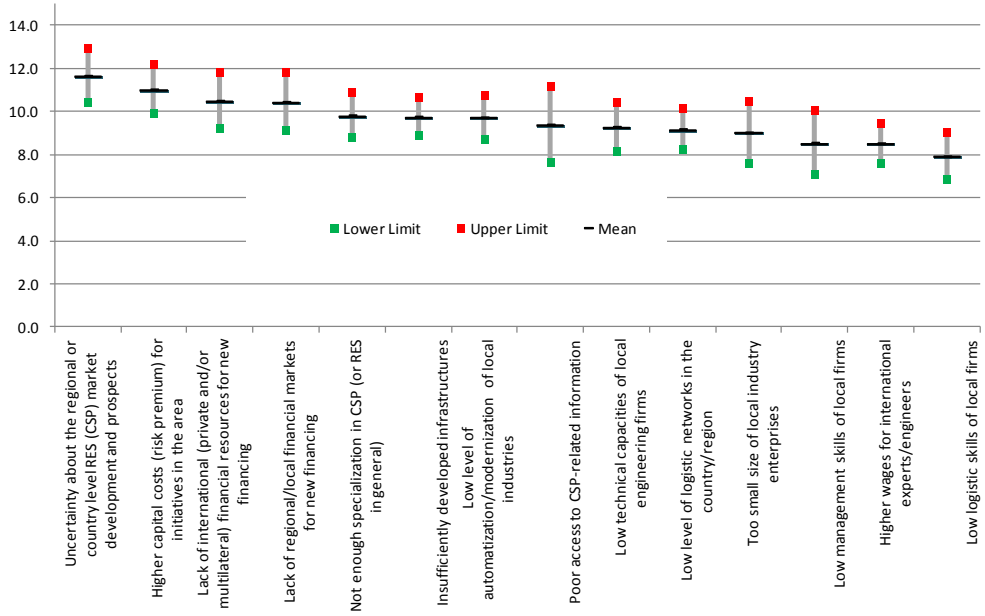
Level of importance of different ENTERPRENEURIAL BARRIERS

(1 – Minimum importance / 15 - Maximum importance)

BARRIER	SCORE
Uncertainty about regional/ country level of RES (CSP) market and development and prospects	11.6
Higher capital costs (risk premium) for initiatives in the area	11.0
Lack of international (private and/or multilateral) financial resources for new financing	10.5
Lack of regional/local financial markets for new financing	10.4
Not enough specialization in CSP (or RES in general)	9.8
Insufficiently developed infrastructures	9.7
Low level of automatization / modernization of local industries	9.7
Poor access to CSP-related information	9.4
Low technical capacities of local engineering firms	9.3
Low level of logistic networks in the country/region	9.2

Too small size of local industry enterprises	9.0
Low management skills of local firms	8.5
Higher wages for international experts/engineers	8.5
Low logistic skills of local firms	7.9
Mean	**9.6**

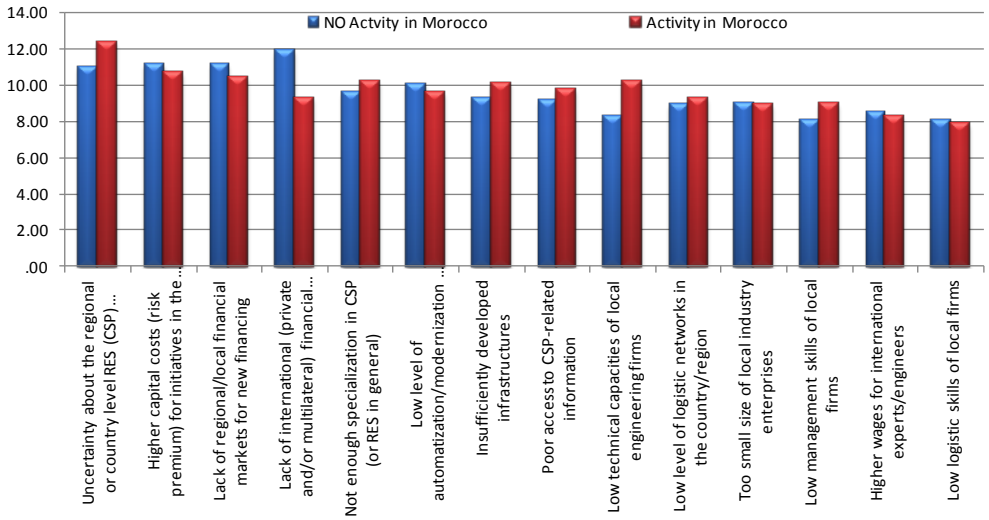
Average importance of different ENTERPRENEURIAL BARRIERS
(Average and interval[7] score)



- **Comparing the opinion of the experts that have business experience in Morocco with those that hadn't have any experience in the country** only a couple of results seems of interest. The first one is that the relevant perceived importance of entrepreneurial barriers as a whole is somewhat higher in the opinion of those with experience in the country (9.7 Vs 9.5), in any case, the difference is not statistically relevant so it doesn't deserve any attention. Only two specific barriers shows a statistically significant difference[8] comparing these two types of experts: on the one hand, "Low technical capacities of local engineering firms" that are more negative evaluated for those with experience in the country and, on the contrary, "Lack of international (private and/or multilateral) financial resources for new financing" that are more pessimistically evaluated by those with no experience over the terrain.

[7] Statistical interval for the mean at a 95% significance level.
8 At a minimum significance level of 95%.

Comparing the opinion of experts with and without experience in Morocco about the
Importance of different ENTERPRENEURIAL BARRIERS



What is the RELATIVE IMPORTANCE of the following POLICY RELATED BARRIERS for the development of a combined INTERNATIONAL and LOCAL CSP industry initiative in the next DECADE?

- Moving into policy related barriers, one major concern appears well above the group mean ranking the first in order of importance of the entire list of 37 obstacles of different type: **the absence or the instability of the fiscal and legislative framework for CSP development**.

- This barrier could be in clear connection with the one mentioned in the first place in the group of entrepreneurial weaknesses "uncertainty about regional/ country level of RES (CSP) market and development and prospects". In that sense, this uncertainty is more on the side of political decisions that in the market or business prospects and that means that every **feasible future scenario would require political decisions, clarifying legislative and fiscal issues in order to boost enterprise confidence and promote future initiatives**.

- In general terms, and in that sense, **the role of public policy in this specific context looks negatively assessed.** We have to take into account that interviewed experts agreed to reckon the "distorting presence of public actors in RES (CSP) value chain" and they also mention in sixth place "the high tax levels or difficulties in tax management". A negative view that is

not compensated with a positive side: the "low level of public support for RES (CSP) development" appears as the third main barrier in the opinion of experts and the problem of "no national strategies for industrial development" also scores above the group mean.

- The second important barrier "not enough long-term security for planning" is again clearly connected with all the previous points as a logical consequence. It looks perfectly clear that **the absence of a secure fiscal and legislative framework, a low level of public support, a lack of an industrial strategy (long term issue) jointly with a distorting "public presence", makes quite difficult a mid or long term planning, what induce the risk of hindering new initiatives in this country.**

- **Summing up, improvement of the institutional framework at the country level looks absolutely crucial for the instigation of new potential CSP market players and service providers** and, for that, it looks quite important to provide an administrative and legislative support, especially for further new entrance companies and foreign investments, and to promote relevant institutions to support long term security planning.

- It is also interesting to notice that **the "Low level of Multilateral or European institutions commitment/support in order to promote regional initiatives" was also pointed out by experts as an important barrier**. It is obvious that, for Europe and other areas, the benefits of a successful CSP industry development in the MENA region would be quite important but, it seems that, in spite of this, business experts don't really feel a significant commitment of Multilateral or European institution. Given that CSP industry still being in a "take off" stage in the area, a greater institutional support from abroad would be apparently necessary.

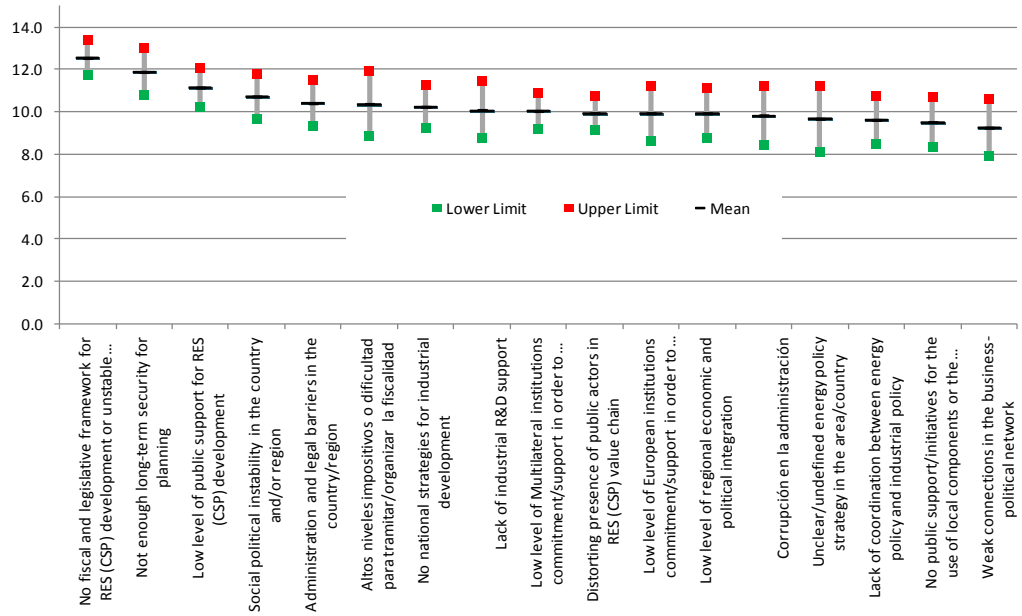
Level of importance of different POLICY ORIENTED BARRIERS

(1 – Minimum importance / 15 - Maximum importance)

BARRIER	SCORE
No fiscal and legislative framework for RES (CSP) development or unstable framework at regional/country level	12.6
Not enough long-term security for planning	11.9
Low level of public support for RES (CSP) development	11.2
Social political instability in the country and/or region	10.7
Administration and legal barriers in the country/region	10.4
High tax levels or difficulties in tax management.	10.4
No national strategies for industrial development	10.3
Lack of industrial R&D support	10.1
Low level of Multilateral institutions commitment/support in order to promote regional initiatives	10.1
Distorting presence of public actors in RES (CSP) value chain	9.9

Low level of European institutions commitment/support in order to promote regional initiatives	9.9
Low level of regional economic and political integration	9.9
Administrative corruption	9.8
Unclear/undefined energy policy strategy in the area/country	9.7
Lack of coordination between energy policy and industrial policy	9.6
No public support/initiatives for the use of local components or the promotion of international + local initiatives	9.5
Weak connections in the business-political network	9.3
Mean	**10.3**

Average importance of different POLICY RELATED BARRIERS
(Average and interval[9] score)



- Once again, we could compare the opinion of experts with and without experience in Morocco. **In general terms, the opinion of those with previous experience in the country is more positive**, or at least, less negative: 8.7 mean score of importance of policy related barriers Vs 9.9.

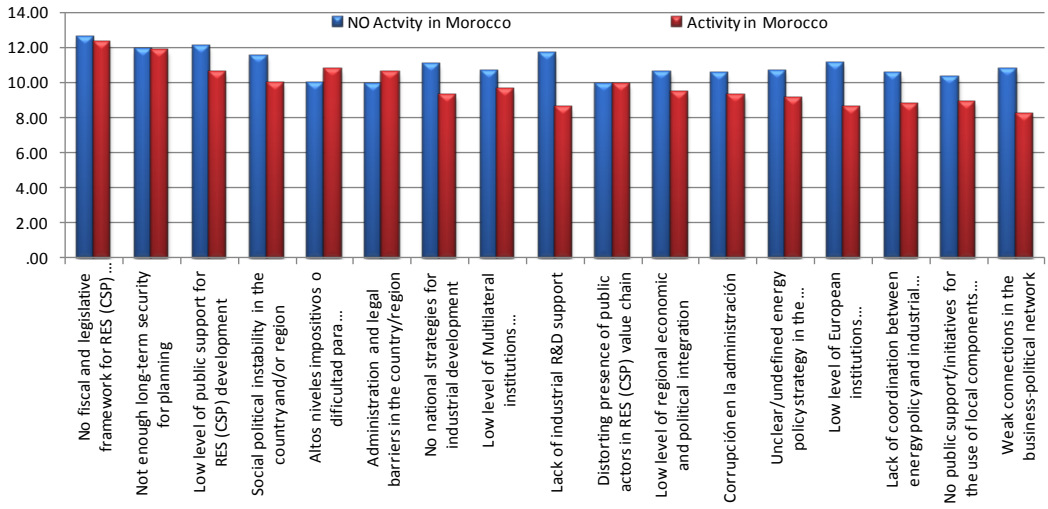
- Almost every barrier was considered more important by those without experience, but we would like to focus a first group of barriers that are all together inter-connected and all together being pessimistically evaluated by those without experience in the country: "lack of industrial R&D support", the absence of "national strategies for industrial development" the "lack of coordination between energy and industrial policy" and the "weak connections in the business – political networks". The better evaluation of businessmen with experience in Morocco tell us that outsiders may have a

[9] Statistical interval for the mean at a 95% significance level.

miss - perception of reality and that means that **Moroccan institutions should improve their international communication, strengthening the image of the country as a healthy environment for new industrial initiatives in order to avoid those kind of prejudges.**

- Another interesting difference comparing the opinion of both types of businessmen is the importance of "low level of European institutions commitment/support…". It looks like this opinion is majorly shared by those without experience in Morocco and that means that, once again, **European institutions should make an effort to better express its real commitment with the area and with RES industry in order to promote the interest of new players for this country.**

Comparing the opinion of experts with and without experience in Morocco about the
Importance of different POLICY RELATED BARRIERS



What is the RELATIVE IMPORTANCE of the following MARKET BARRIERS for the development of a combined INTERNATIONAL and LOCAL CSP industry initiative in the next DECADE?

- Moving finally to a set of 6 market barriers, we find three major obstacles pointed out by experts with a significant score above 10.

- The first one is related to "volatility of CSP market". **The expert opinion is that CSP market is somehow unstable, and that obviously complicates mid and long term planning**. In effect, in the opinion of experts, "the market for CSP systems looks somehow paused at the moment and the sector has been marked by volatility since the technology began to experience a revival in 2004. That up-and-down movement is likely to

persist through the remainder of the decade as the price of rival photovoltaic modules continues its dramatic decline"[10].

- In this sense, latest news seems not very optimistic. According to market expert, and despite continued market growth, low prices for CSP technology are obstructing the maturation of the industry. Some specialized reports conclude that solar power industry "are going through a significant correction as a seven-year period of capacity building, aggressive pricing, and promises of grid parity – driven largely by feed-in tariffs – comes to an end"[11]. In unstable context, with feed-in-tariff incentives fading and many solar industry players are recognizing "the need to develop new business models and markets". **Such a complex environment doesn't help to encourage companies to start new initiatives in a developing area such as Morocco, but at the same time, we think that, from the opposite point of view, it could be perceived as an opportunity:** the promotion of solar business in the first world is changing, and with these changes, more attention should be focused on the developing areas.

- **The market instability joins negatively with the risk of a "low level of regional demand for RES (CSP)".** This issue is a very important one in the sense that every expert agrees that, using a well-known World Bank report[12]: "It is assumed that the volume of the installed CSP capacity within the MENA region (home market volume) is a main precondition for the emergence of local manufacturing, thus the scenarios represent critical levels of market development for local manufacturing. The home market volume and the potential amount of export (external market volume) are regarded as indicators for the development of a successful policy scheme".

- **The third main market barrier appears is also indirectly connected with the instability of CSP market, the "High level of competition with other RES technologies".** In effect, one of the main problems of CSP technology is the relative price disadvantage with other RES technologies, and even with respect to solar PV. The price disadvantage "could be overcome by reducing costs as a result of larger scale and new technology models"13 and, to in some sense, this improvement of relative cost – competition could be achieved with the relocation of manufacturing processes in developing areas.

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[10] "Marked by Volatility, the Market for Concentrated Solar Power Will More Than Double by 2020". Forecasts Pike Research. May, 2012. Downloadable at http://ar.finanzas.yahoo.com/noticias/marked-volatility-market-concentrated-solar-090000148.html

[12] *The World Bank. Middle East and North Africa Region. Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects. January 2011.*

[13] "Marked by Volatility, the Market for Concentrated Solar Power Will More Than Double by 2020". Forecasts Pike Research. May, 2012. Downloadable at http://ar.finanzas.yahoo.com/noticias/marked-volatility-market-concentrated-solar-090000148.html

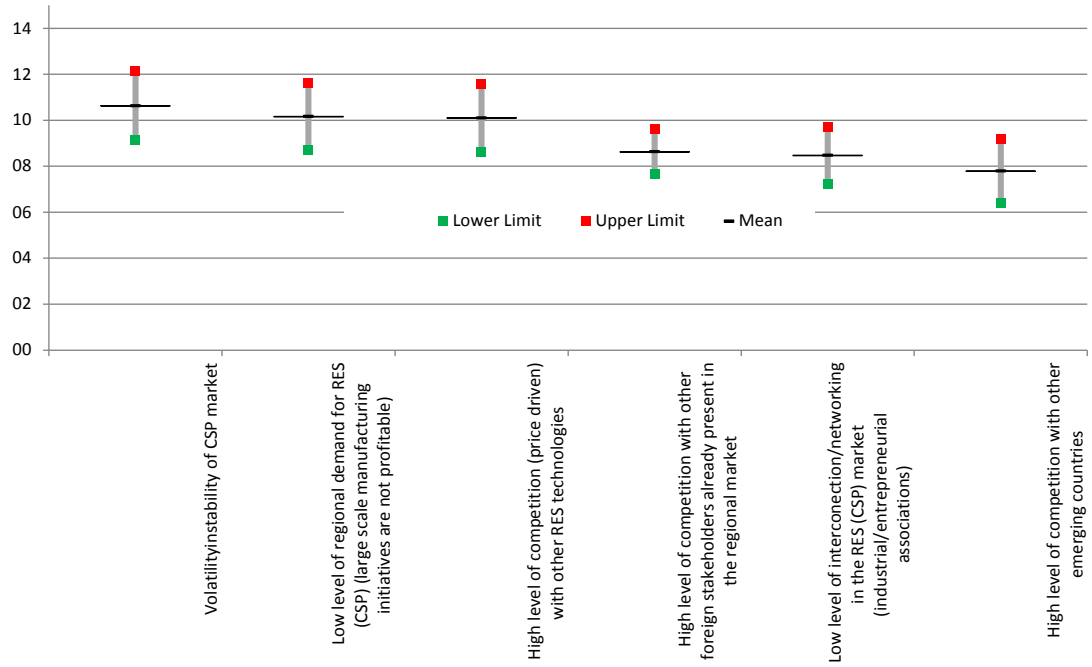
Level of importance of different POLICY OREINTED BARRIERS

(1 – Minimum importance / 15 - Maximum importance)

BARRIER	SCORE
Volatility/instability of CSP market	10.6
Low level of regional demand for RES (CSP)	10.2
High level of competition (price driven) with other RES technologies	10.1
High level of competition with other foreign stakeholders already present in the regional market	8.6
Low level of interconection/networking in the RES (CSP) market	8.5
High level of competition with other emerging countries	7.8
Mean	**9.3**

Average importance of different MARKET BARRIERS

(Average and interval[14] score)



[14] Statistical interval for the mean at a 95% significance level.

Which of the following OPPORTUNITIES/COMPARATIVE ADVANTAGES could be perceived as a chance for the CSP initiatives in the area over the next decade?

- Not only the perceived barriers or relative disadvantages have been analyzed in this survey, but also the relative opportunities or comparative advantages of the area and the country to become a destination for a large scale CSP manufacturing area. **The good new is that, in average terms, the whole set of perceived barriers or disadvantages scored LESS (9.9) than opportunities (10.5).** This comparison does not have any real analytical background, but it reflect to some extent that, although some significant changes are necessary, Morocco is perceived as a good candidate for CSP initiatives.

- The first relative advantage mentioned by interviewed experts was quite predictable: "High solar potential (irradiation)". In effect, the country is characterized by an intensive solar irradiation: the annual duration of sunshine hours ranges from 2700 h in the north to over 3500 h in the south, which is equivalent to an average of 5.3 kWh/m2/day[15].

- **The second relative advantage is quite interesting because it reckons the Moroccan will to increase RES (CSP) potential,** directly connected with the "Political/Institutional will, at the country level, to promote a local RES technological industry". Since 2009, this country has one of the most ambitious RES program in the entire MENA region. Morocco releases in late 2009 the Moroccan Solar Plan, a nine billion dollar program for installing solar energy power plants with a total capacity of 2 GW by 2020. By 2020, renewable energy is projected to account for a share of 42% of the 14,580MW power capacity in Morocco compared to 26% of the 5292MW capacity in 2008. The total renewable energy production will be equally shared by solar, wind and hydro power. [16]

- **The high level of "European commitment for the development of RES potential in the region" is also scored above the group mean of advantages.** The interest of Europe is out of doubt because a successful CSP initiative would carry a joint benefit of European and Northern African and Middle Eastern citizens; in that sense, the Mediterranean Solar Plan (MSP) have been always assessed as a key contribution towards a new EU-MENA partnership based on renewable energy. **Nevertheless, we have to bear in mind that, at the same, interviewed experts reckon that this level of commitment should be even higher as we seen when we summarized the opinion of experts about policy related barriers.**

[15] Benkhadra A. Does Morocco provide a new model for bridging old and new energy systems? Morocco's Annual Investment Conference. London, November, 2009. /http://www.mem.gov.ma/Actualites/2009/Novembre/Pdf/London_speech.pdfS.

[16] Ouammi, A., Zejli, D., Dagdougui, H., and Benchrifa, R. (2012). Artificial neural network analysis of Moroccan solar potential. Renewable and Sustainable Energy Reviews 16 (2012) 4876–4889

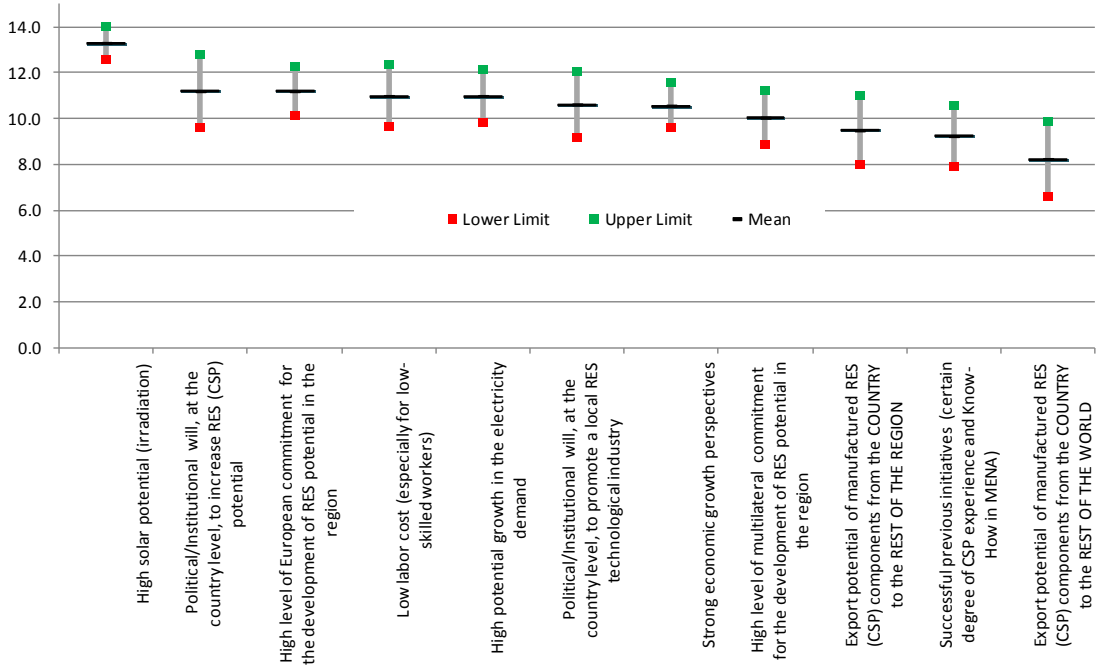
- **On the side of pure business or market relative advantages, the experts highlight a cost factor "**Low labor cost (especially for low-skilled workers)" and a demand factor "High potential growth in the electricity demand". It is quite important to remember that regional demand is on of the main pre-requisites for the activation of a large – sacle CSP manufacturing cluster in the area and it seems that, in the opinion of this experts, the potential for a steadily growing demand seems plausible.

Level of importance of different OPPORTUNITIES / ADVANTAGES

(1 – Minimum importance / 15 - Maximum importance)

BARRIER	SCORE
High solar potential (irradiation)	13.3
Political/Institutional will, at the country level, to increase RES (CSP) potential	11.2
High level of European commitment for the development of RES potential in the region	11.2
Low labor cost (especially for low-skilled workers)	11.0
High potential growth in the electricity demand	11.0
Political/Institutional will, at the country level, to promote a local RES technological industry	10.6
Strong economic growth perspectives	10.6
High level of multilateral commitment for the development of RES potential in the region	10.1
Export potential of manufactured RES (CSP) components from the COUNTRY to the REST OF THE REGION	9.5
Successful previous initiatives (certain degree of CSP experience and Know-How in MENA)	9.3
Export potential of manufactured RES (CSP) components from the COUNTRY to the REST OF THE WORLD	8.3
Mean	**10.5**

Average importance of different OPPORTUNITIES
(Average and interval[17] score)



[17] Statistical interval for the mean at a 95% significance level.

AN SMIC ANALYSIS FOR THE ASSESSMENT OF FUTURE FDI ON CSP TECHNOLOGY IN MOROCCO

Prof. Eva Medina Moral (UAM)

INTRODUCTION

Morocco's excellent geographical conditions for the production of solar energy have made it home for important investment projects around this industry during the next few years with the support of multilateral institutions such as the World Bank. Several research studies have recently analyzed the economic impacts related to the adoption of solar technology in Morocco, particularly in terms of total GDP, chain effects in the different sectors, as well as direct and indirect employment creation (see de Arce et Al., 2012 and FEMISE, 2012).

The limited availability of domestic technological resources in Moroccan companies makes quite difficult to produce some of the CSP technology's key components (World Bank, 2011). This scarcity, coupled with the finance requirements needed to start up these kind of long term investment projects implies that local and international enterprises collaboration is needed. The experience of international companies of this sector jointly with the local knowledge of Moroccan companies would warranty the common success of these the projects.

Therefore, and compared with an import dependency model, the development of a CSP business cluster in Morocco could have a large positive impact in the whole country's economy, not only in terms of growth and employment, but also through improvements in infrastructure, increase of technology resources and knowhow, as well as a strengthening of R&D sector. In addition, a domestic sector capable of producing these CSP components could attract expanding markets outside Morocco, in many other countries such as Asia and the United States for example. In turn this could create spill-over effects in the economy, thus contributing to a greater development of the Moroccan economy.

The presence of RES international companies in the industrial production sector of Morocco is however, still relatively scarce despite recent improvements in the legal framework aimed to encourage foreign investors by means of liberalizing the electrical sector and the passing of the Renewable Energy Law, which, for the first time, allows clean energy exports to third countries.

In this sense, the objective of this investigation it to identify which barriers are perceived as more important by international CSP companies with regard to a 10 years future scenario. As suggested by Head et Al. (1999), it is possible to reduce the uncertainty for new investors using the knowledge and experience of other international businesses, the results obtained in our project allow us to identify some of Morocco's Government action plans which could reduce the perceived barriers to invest, inducing the expansion of the CSP sector in Morocco.

Our results were obtained processing the outcomes of an in-depth survey to a panel of experts (comprising 20 leading companies in the sector)about business, political and market perceived barriers which inhibit their investment projects in the CSP sector in Morocco. Using this information, we carry on a prospective analysis in order to identify which barriers are more present in their investment decisions and which future scenarios are more feasible.

An analysis of the existing interrelationships between these barriers using SMIC technique helped us to identify the most likely scenarios and what kind of barriers are perceived as most important in each of these. We also present the different and interesting results obtained comparing the opinion between companies with a current presence in Morocco and those with no presence in the country can.

The main contribution of this paper is the definition of possible scenarios regarding the relative importance of investment barriers in Morocco. The definition of these scenarios combines two complex characteristics: the perceptions of how important each investment barrier is and the underlying interrelationships between these barriers. Starting from unconditional individual responses given by the interviewees, this joined focus allows us to organize the complete set of barriers by their conditional relative importance. Traditional prospective methods and an innovative scheme employed to capture the relationships between the various barriers (conditional probability analysis using logistic regressions) are from a permit us to identify strategic plans in order to remove the barriers to entry in the CSP sector investment in Morocco.

In a first section of this paper we briefly describe the raw data used as inputs in the analysis. Then we go through the advantages and the methodology of the prospective analysis and finally, we present the main results obtained.

DESCRIPTION OF THE DATA

The main input of our analysis is the value of importance that every expert of the panel have assigned to each of the barriers included in the questionnaire The main question was:

> **What is the RELATIVE IMPORTANCE of the following BARRIERS for the development of a combined INTERNATIONAL and LOCAL CSP industry initiative in the next DECADE?**

Information from 20 leading companies was collected (70% Spanish and 30% non-Spanish) for a total of 37 barriers, of which 14 refer to business barriers, 17 to policy related barriers and 6 to market barriers (see Annex 1 for details). The perceived importance of each of these barriers was rated on a scale of 1 to 15, where 1 means "not important" and 15 "critical importance". A high rating, indicating greater importance, is taken in our analysis as a higher perceived presence of this barrier in the future scenarios for companies.

A first simple descriptive analysis allows us to identify those barriers perceived by companies as more important, or said in another way, which are more often present in their investment decisions both now and in the near future. Mean scores for each of the barriers included in the analysis are shown in Annex 1.

Generally speaking, the experts believe that the importance/future presence of the three types of barriers is similar, observing only small differences in the mean importance scores. The more important barriers, although with only a slight difference, are policy related (10.3 rating), and the lowest importance seems to be for market barriers (9.3). Dispersion levels are acceptable amongst responses, market barriers being those with greater heterogeneity in their responses.

Within the group of business barriers, the highest scores were obtained in aspects such as uncertainty and insecurity, namely: Uncertainty of the prospects for the CSP market development in Morocco and/or

the region; excessive level of informality in markets / transactions, and high capital costs (risk premium) for the development of initiatives in the area.

The next group of business barriers that received high scores (more importance) was related to financial barriers (lack of international funding (private or multilateral) for new funding and lack of regional financial markets/local access to finance). No high importance was given to barriers associated with the existence of perceived weaknesses in Moroccan enterprises such as lack of logistic abilities, low management skills, low level of automatization/modernization or too small size.

In relation to the political framework, the absence of a fiscal and legislative framework for RES development or the presence of an unstable framework , is believed to be very important. While in recent years the government of Morocco has made progress in this area, foreign companies still do not perceive a sufficiently stable environment.. The passing of the Renewable Energy Act, that allows clean energy exports to third countries for the first time, coupled with the significant progress in the liberalization process of the electricity sector, should encourage the entry of foreign investors in the country in the coming years.

Other political barriers that scored highly are those related to the lack of long-term security for planning, insufficient level of public support, socio-political instability, and the existence of administrative and legal barriers along with the existence of high tax levels or difficulty dealing with taxation. No national strategies for industrial development in Morocco, which translates to the absence of public initiatives, weak connections between the political and business sectors, and lack of coordination in energy policy, are considered as less important barriers.

Market barriers which obtained relative high scores include those related with market volatility and instability, the existence of a low level of regional demand as well as the existence of a high level of price competition amongst CSP and other renewable energies.

Summing up, the barriers most frequently identified regarding international investment decisions in Morocco CSP are those related to uncertainty and insecurity, existence of financial, legal and administrative barriers, lack of public support, and the existence of a low demand and high price competition renewable energies market ..

Whilst this descriptive analysis gives a first overview of the main obstacles to the entry of FDI in Morocco CSP sector, it does however presents two limitations. First, a small sample size (the panel consists of only 20 observations) limits the use of its results in inferential analysis. Nevertheless, it has to be mentioned that we are dealing with a very specific sector, deeply concentrated in a relatively small number of big players. Although 20 respondents may seem a small number in absolute terms, these 20 represents the set of enterprises that managed over 80% of the investment projects currently carried out or planned in this CSP.

Secondly, it does not take into account the interrelationships between the barriers being analyzed. For example, a barrier perceived being important could eventually reduce its true impact on investment decisions if it is strongly linked to other less important barrier. For example, the existence of an unstable legal framework increases the uncertainty in the planning of investment projects, if future legal barriers are reduced in the country, we could also expect a lower planning uncertainty in future scenarios.

A barrier perceived as very important in the sector could reduce the impact of the average investment in the long-term by being associated with another that will reduce its presence in the future. So, the existence of an unstable legal framework can increase the uncertainty within investment projects, thus in

the future the legal barriers fall Morocco and the planning uncertainty will reduce the presence of future scenarios.

In the following section, we try improve the previous descriptive analysis observing the communalities between barriers (with a factor analysis), their statistical conditionality (with a logistic regression analysis), their cause-effect relationships and their relative importance (analysis SMIC).

IDENTIFYING FUTURE SCENARIOS USING PROSPECTIVE

As previously mentioned, the prospective analysis can facilitate the process of defining appropriate lines of strategic action in order to encourage future international investment in the Moroccan CSP sector.

Based on the theory developed by Michel Godet (1996) we apply the 'Scenario Design'. In the scenario design method the first step is to identify the key variables whose evolution will define the events that will shape the alternative scenarios. Then we collect the opinions from a group of experts regarding the existence of such events on future scenarios. Specifically, they were asked about the individual probability of each event occurring as well as the conditional probability that the event will occur or not with each of the other events. Different combinations of events, define the alternative scenarios that are commonly presented as binary numbers representing the probability of each event occurring[18].While the main advantage of this method is to take into account the relationships between events (by means of conditional probability), its disadvantage is that it only lets the researcher to work with a limited number of six variables (events). If more events are considered, the number of questions each expert is asked for would have to be very high.

For data analysis, the SMIC tool (Cross Impact Matrix System), created by Michel Godet (1996) and developed by LIPSOR - Epita for Porspektiker Institute (France), is used. The SMIC analysis quantifies the probability associated with each of the 2^n scenarios built (where "n" is the number of events) , using experts opinion of the individual and conditional probabilities of events,. The idea is establish a hierarchy of scenarios according to the likelihood of the event taking place.

In our case, we will use the barriers to invest as the the events that make up each of the alternative scenarios. The probability of each event's occurrence will now be the expert perception of the presence of such barriers in the next 10 years.

At the end, the SMIC method results in a hierarchy relating the likelihood of scenarios related with the future presence of barriers to foreign investment in the CSP sector of Morocco in the following 10 years. Identifying the most likely scenarios reveals which barriers are more influential in the future of business investment decisions and thus, which are the proper strategic actions to be taken by Moroccan government in the medium and long term in order to revert this situation.

Working with small samples reduces the reliability of the results when using classical methods based on statistical inference. This is not the case in the prospective field, where the absence of statistical

[18] So a coded scenario coded as "110001", would be included in the first two and last of six events.

information implies that researchers often have to work with expert opinions to examine the matter, and the sample sizes (or number of experts) are lower than commonly used in the field of survey analysis[19].

METHODOLOGY

Applying the scenario design methodology to questionnaire raises two problems.

Firstly the number of barriers in the questionnaire is 37, while, technically, the maximum number of events that you can incorporate each scenario is 6. It seems therefore necessary to reduce the dimensionality of the analysis as we describe in the 4.1 section.

The second problem related with the application of the scenario design methodology is that information about the conditional probability of occurrence of each event (or barrier) is needed.. Given that this conditional opinion wasn't actually surveyed, we would induce it by the application of an innovational technical approach as we describe in the 4.2 section.

Dimension Reduction: Factor Analysis

To reduce the dimension of the original analysis, from the 37 barriers to the maximum of 6 events allowed in the method, a factor analysis is applied. **Factor analysis** is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called **factors;** the aim of a factor analysis is, therefore, to obtaining a simpler structure with fewer dimensions. In addition, as well as reducing the number of variables this technique also contributes to a major objective of the study: to capture the underlying and relevant information contained in the former and large set of different measurements.

In order to obtain a limited number of factors, the Factor Analysis was carried out only considering a set of 14 barriers (see Table 1) that obtained an average importance above their group average (9.7 in the group of business barriers, 10.3 in the policy group and 9.3 in the market). Five factors[20] with an eigenvalue greater than 1, explaining 80% of the total variance[21] were obtained.

The coefficients and load coefficients in the structure matrix (Table 1) provide information on the correlation between factors and barriers. The values which are either bold or shaded gray permit us to identify which barrier contributes most to each factor. Using this information, the resulting factors could be defined as:

- Factor 1: Uncertainty and insecurity
- Factor 2: Financial barriers

[19] Although in a common market study a minimum of 400 people are interviewed with relatively short questionnaires, in foresight methods, panel data is used using samples no greater than 50, with questionnaires greater than 70 questions.

[20] The rotation method "Oblimin" was used seeing as using Varimax rotation which provides orthogonal factors, was not possible. Since the factors will be used after, for the conditional probabilities it is necessary to maintain the correlation process in the original data to quantify the relationship on the probability of occurrence of the factors.

[21] When regarding the logical correlations between the responses to the survey, but also trying to facilitate the interpretation of the different aggregates/built factors, the Oblimin method oblique rotation used.

- Factor 3: Market barriers
- Factor 4: Informality
- Factor 5: Legal barriers

Since the contribution of the most influential barriers in factors 1, 3 and 4 (uncertainty and insecurity, market barriers and informality) is positive, an increase in the values (importance) of these factors indicates an increased likelihood of presence of the barriers. The opposite occurs in the case of factors 2 and 5 (financial and legal barriers), where the negative contribution recorded in the most influential barriers indicates that higher values on these factors are associated with lower probabilities of occurrence of barriers. To homogenize the interpretation of data values factors, 2 and 5 are multiplied by minus 1.

Table 1: Factor analysis matrix with Omblimin rotation (Delta=0.57)

BUSINESS, POLITICAL AND MARKET BARRIERS	Factor 1 UNCERTAINTY & INSECURITY	Factor 2 FINANCIAL BARRIERS	Factor 3 MARKET BARRIERS	Factor 4 INFORMALITY	Factor 5 LEGAL BARRIERS
- Uncertainty about the regional or country level RES (CSP) market development and prospects	**0.402**	0.022	0.167	0.012	0.038
- High informality level	-0.195	0.233	0.151	**0.766**	0.310
- Lack of regional/local financial markets for new financing	0.304	**-0.750**	-0.301	-0.240	-0.286
- Lack of international (private and/or multilateral) financial resources for new financing	0.790	**-0.757**	-0.457	-0.547	-0.681
- Higher capital costs (risk premium) for initiatives in the area	**0.700**	-0.200	-0.248	-0.525	-0.354
- Social political instability in the country and/or region	**0.689**	-0.227	-0.460	-0.206	-0.400
- Not enough long-term security for planning	**0.742**	-0.367	-0.402	-0.228	-0.312
- Low level of public support for RES (CSP) development	0.289	-0.370	-0.241	-0.349	**-0.734**
- Administration and legal barriers in the country/region	0.121	-0.106	-0.174	0.351	**-0.385**
- No fiscal and legislative framework for RES (CSP) development or unstable framework at regional/country level	0.403	-0.430	-0.475	0.036	**-0.507**
- High levels of taxation or difficulty to organize taxation	-0.046	**-0.351**	-0.255	0.225	-0.159
- Low level of regional demand for RES (CSP) (large scale manufacturing initiatives are not profitable)	-0.289	0.039	**0.623**	0.110	0.221
- Volatility - instability of CSP market	0.094	0.124	**0.469**	-0.243	-0.049
- High level of competition (price driven) with other RES technologies	-0.398	0.531	**0.812**	0.362	0.373

Source: Personal compilation

Calculating the individual conditional probability of the occurrence of the factors: Analysis of Logistical Regression

In order to compute the conditional probabilities of occurrence for each factor, we have to assume that the perception of importance of every barrier can be assimilated to : if a barrier is perceived by an expert as important for investment future decisions we suppose that the expert foresees this barrier in the future scenarios. Using this scheme, the probability of occurrence of a barrier can be simply computed taking the average value over 15 (the limit of the scale).

With the intention of computing the probability of occurrence of factors we have to take into account that the new scale for factors is now different (varying between -3 and +3) ,therefore, the transformation of the probability value is performed through a simple standardization formula (1).

$$\frac{(Value-Minimum)}{(Maximum-Minimum)} = \frac{(Factor\ score+3)}{6} = Prob.\ of\ occurrence \quad (1)$$

Once the the individual probability of occurrence or each factor is computed, it is now necessary to incorporate the conditional probability.

In the original survey, experts were only asked about individual importance (individual probability of occurrence)so we need to apply an indirect method for calculating conditional probabilities, through the use of a regression approach. This approach is underlined by the idea that when the respondent answers a question, consciously or not, he is considering the effect of other barriers at the same time. Regression analysis can expose the structure of relationships among all of the barriers using individual responses.

Since the dependent variable represents a probability, a logistic regression was chosen to ensure that the result of the estimation was bounded between 0 and 1. The proposed model will be estimated through the expression (2):

$$\log\left(\frac{Y}{1-Y}\right) = X\beta \quad (2)$$

Where Y is a vector of standardized scores of the endogenous factor model, and X is a matrix of standardized scores of other factors.. Vector measures the relationship between exogenous (other factors) and each of the 5 endogenous factor. Since we obtained a total of 5 factors in the final solution of the factor analysis, there will be five different estimates, using each one of the factors as endogenous variable. Table 2 shows the ratios obtained in each of the five estimates raised.

Table 2. Factor interrelations: coefficients of the logistic regressions

		ENDOGENOUS BARRIERS				
		UNCERTAINTY & INSECURITY	FINANCIAL BARRIERS	MARKET BARRIERS	INFORMALITY	LEGAL BARRIERS
EXOGENOUS BARRIERS	Intercept	2.0682	-1.6154	-0.8830	-0.0646	-0.9745
	UNCERTAINTY & INSECURITY		-0.3963	-1.0494	-1.7274	-1.0994
	FINANCIAL BARRIERS	-0.4420		1.6127	0.8641	1.1597
	MARKET BARRIERS	-1.0910	1.4498		-0.1487	1.1933
	INFORMALITY	-1.3580	0.8022	-0.2193		0.7141
	LEGAL BARRIERS	-1.2599	1.4119	1.4600	1.1579	

Source: Personal compilation

Given that the coefficient of each variable measures how the "odds" ratio's[22] logarithm of the endogenous factor varies with changes in exogenous factors, these values allow us to calculate the conditional probabilities.

We calculate the likelihood of a financial barrier conditioned by the presence of an uncertainty barrier by adding: 1.) the individual observed likelihood of a financial barrier; 2.) the variation of the estimated likelihood of a financial barrier when the uncertainty barrier is greater than 1.

Similarly, the financial barrier's occurrence probability, subject to the uncertainty barrier's presence is calculated by adding: 1.) the individual observed likelihood of a financial barrier; 2.) the variation of the estimated likelihood of a financial barrier when the uncertainty barrier reduces to 0. This analysis (Appendix 3) is performed for each of the observations included in the analysis.

[22] The "odds ratio" is defined as the quotient between the probability of an event occurring and the probability of it not occurring.

MAIN RESULTS OF THE SMIC ANALYSIS

With the data obtained in the previous section concerning probability, individual and conditional occurrence of each of the factors, we proceeded to perform the SMIC analysis. Table 3 shows the 25^5 (32) hierarchical scenarios according to the probability of occurrence from the most likely scenario to the least likely.

The analysis was performed firstly for the experts interviewed as a whole, and secondly, to distinguish between the companies that currently have some activity in Morocco (55%), either through project implementation, consulting, export components, etc., and others which have no presence in the country (45%).

Based on the results obtained in the three samples, it appears that the total sample demonstrates the average pattern observed in both groups, slightly closer to that obtained in the group of companies operating in Morocco because of their greater weight sample. Given the different perceptions recorded among groups of companies with and without activity in Morocco, the analysis of the results of the groups is more useful than the total sample.

Therefore, although the most likely scenarios are the most extreme, they do allow us to obtain useful information especially when comparing between groups. It is important to note then that the first scenario for active companies in Morocco is the opposite for inactive companies. While in the second case, the presence of barriers associated with uncertainty and insecurity is more likely, companies operating in Morocco incorporate this barrier in their investment decisions to a lesser extent, prioritizing the rest. In scenarios 3 through 6 therefore, the uncertainty and insecurity barrier is never present in this group, however, it does appear to be the most probable scenarios for companies inactive in Morocco.

After eliminating the extreme most scenarios (scenarios 1 and 2) one can see that among the companies operating in Morocco, the main concern in the design of future investment projects in the CSP sector in Morocco, focusing on the financial and legal aspects, which are present in scenarios 3, 4 and 6 in the case of financial barriers, and 3, 4 and 5 in the legal barriers. To a lesser extent, market barriers associated with low demand, volatility and high price competition with other renewables, are also taken into account in future investment decisions for this group of companies, being present in scenarios 3, 5, 6 and 7. The informality barrier is the least influential in this group since their first appearance does not occur until stage 4.

In the group of companies with no activity in Morocco, the most important barriers after insecurity and uncertainty are related to informality, appearing in scenario 3, and the market that appears on scenario 4. To a lesser extent affect the legal barriers, which first appear in scenario 6, and financial barriers related to scenario 7.

Therefore, reducing uncertainty and informality would be a key factor in particular to strengthen the arrival of companies not yet present in the country. In relation to companies that already have some sort of relationship with Morocco, an increase in the activity would be achieved through improvements in financial and legal barriers.

Tabla 3. Hierarchy of the scenarios according to their probability of occurrence[23]

ALL companies		ACTIVE businesses in Morocco		INACTIVE businesses in Morocco	
Scenario	**Probability**	**Scenario**	**Probability**	**Scenario**	**Probability**
1 - 01111	0.18	1 - 01111	0.16	1 - 10000	0.13
2 - 10000	0.11	2 - 10000	0.10	2 - 01111	0.10
3 - 01011	0.07	3 - 01101	0.06	3 - 10010	0.07
4 - 01110	0.06	4 - 01011	0.06	4 - 10100	0.07
5 - 00111	0.05	5 - 00111	0.05	5 - 00000	0.06
6 - 01101	0.05	6 - 01110	0.05	6 - 10001	0.05
7 - 11111	0.05	7 - 11101	0.05	7 - 11000	0.05
8 - 10010	0.05	8 - 10010	0.05	8 - 11100	0.05
9 - 11000	0.04	9 - 11111	0.04	9 - 01101	0.04
10 - 11101	0.04	10 - 00011	0.04	10 - 11101	0.04
11 - 11010	0.04	11 - 00000	0.04	11 - 00010	0.04
12 - 11100	0.04	12 - 00010	0.04	12 - 01110	0.03
13 - 00010	0.04	13 - 10100	0.03	13 - 01011	0.03
14 - 10100	0.03	14 - 11100	0.03	14 - 11010	0.03
15 - 11011	0.03	15 - 10001	0.03	15 - 00111	0.03
16 - 00011	0.03	16 - 11011	0.03	16 - 00011	0.03
17 - 00000	0.03	17 - 11010	0.03	17 - 00101	0.03
18 - 10001	0.02	18 - 11000	0.03	18 - 00100	0.02
19 - 00100	0.01	19 - 00101	0.02	19 - 10101	0.02
20 - 11001	0.01	20 - 00100	0.01	20 - 11111	0.02
21 - 01010	0.01	21 - 10011	0.01	21 - 10011	0.01
22 - 00101	0.01	22 - 01010	0.01	22 - 11011	0.01
23 - 10011	0.01	23 - 11001	0.01	23 - 11001	0.01
24 - 11110	0.00	24 - 10101	0.01	24 - 01100	0.01
25 - 10101	0.00	25 - 01100	0.01	25 - 00110	0.01
26 - 00110	0.00	26 - 11110	0.00	26 - 01010	0.01
27 - 01100	0.00	27 - 00110	0.00	27 - 10110	0.01
28 - 10111	0.00	28 - 00001	0.00	28 - 11110	0.01
29 - 10110	0.00	29 - 10111	0.00	29 - 00001	0.00
30 - 01001	0.00	30 - 10110	0.00	30 - 10111	0.00
31 - 01000	0.00	31 - 01001	0.00	31 - 01001	0.00
32 - 00001	0.00	32 - 01000	0.00	32 - 01000	0.00

Source: Personal compilation

It is worth noting the high probability that the barrier-free scenario shows in the inactive group companies in Morocco, stands at the fifth position. This result yields a high incentive for companies to invest in Morocco, a situation that directed properly can become an opportunity to enhance the CSP sector. Among

[23] For any given future scenario, a combination can be defined. The results of each scenario are presented in a binary manner depending on the outcome of such events. Consequently, a scenario coded as "110001", will be one in which of the 6 events, the first two occur including the first two and the last.

the companies operating in the country, this scenario occupies a lower position (11), which could indicate that the barriers are perceived more negatively in companies already operating in the country.

Finally a sensitivity analysis was performed in order to identify driving (influential) factors, and dominated (dependent) barriers, in addition to barriers on business investment decisions. The elasticity coefficients (e_{ij}) measure the effects of one factor in relation to another. Using these coefficients, a matrix of elasticity can be created. In this matrix, row marginals (the sum of every column across the row) measure the sum of the variations of other factors' probabilities, when the probability of a factor varies. These row marginals are equal to the influence of each factor relative to the others. Similarly, the column marginals measure the dependence of the factors.

The results of these calculations are shown in Table 4. In both analysis groups, there is practically the same order in the barriers, both in influence analysis and dependence. The uncertainty and insecurity barrier is the most influential on the rest, thus its presence increases the weight of the others in the investment decisions. Quite different from the rest are barriers which maintain the following order of influence: informality, market barriers, legal barriers and financial barriers.

Table 4. Sensitivity analysis: Influence and dependence ratios

Factors / Barriers	ALL companies		ACTIVE businesses in Morocco		INACTIVE businesses in Morocco	
	Influence	Dependence	Influence	Dependence	Influence	Dependence
UNCERTAINTY & INSECURITY	1.69	1.72	1.51	1.63	2.67	1.22
INFORMALITY	0.99	0.79	1.00	0.81	0.83	1.15
MARKET BARRIERS	0.62	0.68	0.68	0.66	0.65	0.96
LEGAL BARRIERS	0.56	0.56	0.62	0.61	0.48	0.91
FINANCIAL BARRIERS	0.45	0.58	0.44	0.53	0.36	0.75

Source: Personal compilation

Therefore, the Moroccan government should prioritize strategic action policies in the medium and long term to correct the perception of uncertainty and insecurity perceived by foreign investors. An improvement on this factor will in turn generate a spillover effect creating an improvement of the remaining barriers, due to the high influence detected in this barrier on the rest.

CONCLUSIONS

Despite progress made in recent years to encourage investment in the energy sector in Morocco, there are still many barriers that hinder the entry of foreign companies. Given that the CSP sector development must be based on knowledge, experience and technology of leading international companies in the sector, this research aims to provide knowledge on what the barriers inhibit to foreign companies' investment in the sector. Identifying them should facilitate the design of a strategic policy action by the government of Morocco to promote CSP investment.

Using the data from a survey of a panel of experts, it appears that the most important barriers are political, related to the lack of a legal and legislative framework for the development of renewable energy and an insufficient level of support public, followed by business barriers that refer to uncertainty, informality and high capital costs. Meanwhile, with less concern are market barriers, where higher scores are recorded in aspects of market volatility and instability.

However, the small sample size of the survey, along with the failure to incorporate the analysis of the interrelationships between the presence of barriers, weakens the results. A prospective analysis based on the method scenario design allows these elements to be incorporated in the analysis. By doing this, the business barriers become of greater importance than in the basic descriptive analysis.

Specifically, the results obtained through the SMIC tool show that attracting foreign investment should be supported by policies that prioritize medium and long term strategic actions based on improving the perception of uncertainty and insecurity perceived by foreign investors. Due to how strong an influence this barrier has on the rest, these actions would generate a multiplier effect on the reduction of the presence of other barriers.

Likewise, reducing informality would be a key factor in promoting the entry of foreign companies that have not developed any kind of activity in the CSP sector of the country. Meanwhile in relation to companies that already have some sort of relationship with Morocco in the field of renewable energy, greater activity could be achieved by improvements in financial and legal barriers.

Finally, it is worth nothing the high probability that the barrier-free scenario shows in the inactive group companies in Morocco. This result yields a higher incentive for companies to invest in Morocco, a situation that managed properly can become an opportunity to enhance the CSP sector.

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ANNEX

Annex 1: Descriptive statistics of the 'relative importance' of each barrier

BUSINESS BARRIERS	Mean	Median	Std. Deviation	Minimum	Maximum
- Uncertainty about the regional or country level RES (CSP) market development and prospects	11.63	12.00	2.733	6	15
- Not enough specialization in CSP (or RES in general)	9.80	9.00	2.353	7	14
- Insufficiently developed infrastructures	9.74	10.00	1.910	7	13
- Low level of logistic networks in the country/region	9.16	9.00	2.115	5	12
- Low logistic skills of local firms	7.89	8.00	2.401	2	14
- Low technical capacities of local engineering firms	9.26	8.00	2.469	6	15
- Low management skills of local firms	8.53	8.00	3.255	2	14
- High informality level	11.08	11.08	1.715	8	15
- Higher wages for international experts/engineers	8.50	8.00	1.978	5	12
- Low level of automatization/modernization of local industries	9.70	10.00	2.273	6	14
- Too small size of local industry enterprises	9.00	9.00	3.109	1	13
- Lack of regional/local financial markets for new financing	10.42	11.00	2.912	5	15
- Lack of international (private and/or multilateral) financial resources for new financing	10.47	11.00	2.796	6	15
- Higher capital costs (risk premium) for initiatives in the area	11.00	12.00	2.494	6	15

POLITICAL BARRIERS	Mean	Median	Std. Deviation	Minimum	Maximum
- Low level of regional economic and political integration	9.94	11.00	2.485	5	13
- Social political instability in the country and/or region	10.74	11.00	2.306	8	15
- Not enough long-term security for planning	11.89	13.00	2.424	8	15
- No national strategies for industrial development	10.25	10.50	2.245	8	15
- Lack of industrial R&D support	10.10	10.00	3.007	4	15
- Lack of coordination between energy policy and industrial policy	9.63	10.00	2.454	5	14
- Unclear/undefined energy policy strategy in the area/country	9.68	10.00	3.384	1	15
- Low level of public support for RES (CSP) development	11.16	12.00	2.035	8	15
- No public support/initiatives for the use of local components or the promotion of international + local initiatives	9.53	10.00	2.525	5	14
- Weak connections in the business-political network	9.26	9.00	2.903	1	14
- Administration and legal barriers in the country/region	10.42	10.00	2.388	4	15
- Distorting presence of public actors in RES (CSP) value chain	9.95	10.00	1.779	7	13
- No fiscal and legislative framework for RES (CSP) development or unstable framework at regional/country level	12.56	13.00	1.756	9	15
- Low level of European institutions commitment/support in order to promote regional initiatives	9.95	10.00	2.838	3	15
- Low level of Multilateral institutions commitment/support in order to promote regional initiatives	10.05	10.00	1.840	8	15
- High levels of taxation or difficulty to organize taxation	10.38	10.38	2.249	4	15
- Corruption in the Administration	9.85	9.85	2.051	5	14

MARKET BARRIERS	Mean	Median	Std. Deviation	Minimum	Maximum
- Low level of regional demand for RES (CSP) (large scale manufacturing initiatives are not profitable)	10.17	10.00	3.092	4	15
- Volatility - instability of CSP market	10.63	11.00	3.253	3	15
- Low level of interconection/networking in the RES (CSP) market (industrial/entrepreneurial associations)	8.47	8.00	2.695	4	15
- High level of competition (price driven) with other RES technologies	10.11	11.00	3.213	6	15
- High level of competition with other foreign stakeholders already present in the regional market	8.63	8.00	2.166	3	12
- High level of competition with other emerging countries	7.79	8.00	3.047	1	13

Annex 2: Sensitivity analysis of the factors/barriers

ALL companies	UNCERTAINTY & INSECURITY	FINANCIAL BARRIERS	MARKET BARRIERS	INFORMALITY	LEGAL BARRIERS	TOTAL SUM
UNCERTAINTY & INSECURITY	1	-0.347	-0.444	-0.449	-0.452	1.693
FINANCIAL BARRIERS	-0.339	1	-0.01	-0.097	-0.003	0.449
MARKET BARRIERS	-0.381	-0.051	1	-0.164	-0.027	0.623
INFORMALITY	-0.58	-0.133	-0.203	1	-0.074	0.991
LEGAL BARRIERS	-0.418	-0.052	-0.018	-0.075	1	0.562
TOTAL SUM	1.718	0.584	0.675	0.786	0.556	0

ACTIVE businesses in Morocco	UNCERTAINTY & INSECURITY	FINANCIAL BARRIERS	MARKET BARRIERS	INFORMALITY	LEGAL BARRIERS	TOTAL SUM
UNCERTAINTY & INSECURITY	1	-0.319	-0.391	-0.411	-0.383	1.505
FINANCIAL BARRIERS	-0.293	1	0.001	-0.098	-0.049	0.442
MARKET BARRIERS	-0.385	-0.034	1	-0.206	-0.059	0.684
INFORMALITY	-0.514	-0.129	-0.241	1	-0.121	1.004
LEGAL BARRIERS	-0.436	-0.052	-0.031	-0.099	1	0.618
TOTAL SUM	1.628	0.534	0.664	0.813	0.613	0

INACTIVE businesses in Morocco	UNCERTAINTY & INSECURITY	FINANCIAL BARRIERS	MARKET BARRIERS	INFORMALITY	LEGAL BARRIERS	TOTAL SUM
UNCERTAINTY & INSECURITY	1	-0.565	-0.645	-0.751	-0.713	2.674
FINANCIAL BARRIERS	-0.23	1	-0.026	-0.074	-0.029	0.359
MARKET BARRIERS	-0.348	-0.019	1	-0.236	-0.047	0.65
INFORMALITY	-0.35	-0.122	-0.234	1	-0.123	0.828
LEGAL BARRIERS	-0.294	-0.041	-0.058	-0.087	1	0.48
TOTAL SUM	1.222	0.747	0.963	1.148	0.912	0

Annex 3. Individual and Conditional Probabilities

OBS. 1	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.75	0.75	0.68773487	0.57033476	0.54805195	0.51619952	0.75	0.78535769	0.81867789	0.85059187	0.80947057
Factor 2	0.38	0.35949951	0.38	0.61870211	0.49384561	0.64016412	0.44614125	0.38	0.294151	0.31972027	0.31608589
Factor 3	0.31	0.25694228	0.54962294	0.31	0.28174818	0.58018002	0.49657359	0.19602873	0.31	0.328069	0.24320885
Factor 4	0.38	0.29628278	0.50392997	0.3585959	0.38	0.59243622	0.69113081	0.31477227	0.38990062	0.38	0.32634898
Factor 5	0.23	0.17249585	0.40244856	0.42850285	0.33380149	0.23	0.42880483	0.14103814	0.15415158	0.17318736	0.23

OBS. 2	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.16	0.16	0.1312387	0.10539804	0.11559493	0.09976019	0.16	0.2191346	0.33568081	0.41735171	0.36893953
Factor 2	0.65	0.58130163	0.65	0.71999794	0.67670459	0.71618587	0.66196711	0.65	0.410975	0.50620112	0.41426349
Factor 3	0.72	0.5129395	0.82214316	0.72	0.71176597	0.79451515	0.75350054	0.4713459	0.72	0.75577688	0.46699919
Factor 4	0.82	0.47649872	0.87635485	0.81158546	0.82	0.87810061	0.87183827	0.69511778	0.84092061	0.82	0.62548279
Factor 5	0.73	0.52069712	0.80020532	0.7889372	0.75393273	0.73	0.7623584	0.56263195	0.53668745	0.60320828	0.73

OBS. 3	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.49	0.49	0.47231892	0.39532368	0.38965318	0.40572134	0.49	0.5755529	0.64263113	0.70150806	0.69844677
Factor 2	0.82	0.77151682	0.82	0.94923072	0.88501814	0.91885361	0.86437274	0.82	0.61318113	0.6942556	0.58452113
Factor 3	0.58	0.45514132	0.63903078	0.58	0.56272869	0.67123133	0.67928897	0.26189975	0.58	0.60945775	0.34124737
Factor 4	0.64	0.42342661	0.67581226	0.6252148	0.64	0.72242859	0.81117268	0.46556424	0.66004499	0.64	0.44617848
Factor 5	0.68	0.54389502	0.72639087	0.78536715	0.73664847	0.68	0.79237784	0.44731985	0.51107252	0.5697715	0.68

OBS. 4	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.63	0.63	0.55688345	0.46182725	0.40580757	0.42856531	0.63	0.65793738	0.71123279	0.71907372	0.71792305
Factor 2	0.29	0.25728282	0.29	0.51679503	0.42190456	0.51776792	0.34886547	0.29	0.18159096	0.23380746	0.18940799
Factor 3	0.36	0.27849604	0.63830291	0.36	0.32722903	0.59477046	0.51979323	0.26345753	0.36	0.37598091	0.25816622
Factor 4	0.32	0.18819131	0.46979701	0.29829759	0.32	0.50729374	0.58552417	0.26425239	0.33246421	0.32	0.23466047
Factor 5	0.34	0.25571427	0.53971001	0.52483526	0.45546037	0.34	0.50708702	0.26928134	0.25142477	0.2909116	0.34

OBS. 5	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.53	0.53	0.46737803	0.34573272	0.43286804	0.37201121	0.53	0.57738525	0.60848384	0.75430764	0.6768922
Factor 2	0.43	0.38419497	0.43	0.67442677	0.48807185	0.60959894	0.48242077	0.43	0.32870684	0.29513358	0.27184809
Factor 3	0.29	0.17316174	0.51229464	0.29	0.2743164	0.47611089	0.4279589	0.13025096	0.29	0.32875608	0.12874498
Factor 4	0.71	0.52140889	0.83184133	0.68376431	0.71	0.8578706	0.92810835	0.61916802	0.72076244	0.71	0.57656474
Factor 5	0.48	0.35809918	0.64315087	0.68633477	0.53159074	0.48	0.62438915	0.36208125	0.39670154	0.36024252	0.48

OBS. 6	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.67	0.67	0.60474714	0.48606657	0.42453434	0.47456658	0.67	0.69951291	0.7295907	0.73327014	0.75110437
Factor 2	0.33	0.30276992	0.33	0.58055211	0.47246159	0.55280202	0.38939656	0.33	0.25048356	0.29042544	0.23762263
Factor 3	0.28	0.20556046	0.54345044	0.28	0.24298459	0.51542929	0.45120349	0.16986231	0.28	0.29209576	0.17648869
Factor 4	0.24	0.12177213	0.3807176	0.21579554	0.24	0.4269042	0.52152258	0.17742968	0.24962057	0.24	0.1553609
Factor 5	0.34	0.26888119	0.52338012	0.54390921	0.465255	0.34	0.51328891	0.26533228	0.27406387	0.30491995	0.34

OBS. 8	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.65	0.65	0.58052106	0.53603557	0.49581883	0.43390815	0.65	0.69020375	0.79805189	0.81908894	0.73828561
Factor 2	0.37	0.33591387	0.37	0.52057202	0.46199573	0.60996548	0.43424548	0.37	0.18024634	0.26639874	0.27181846
Factor 3	0.58	0.50297132	0.82727797	0.58	0.5577443	0.83225553	0.74470829	0.46097857	0.58	0.6070511	0.49224548
Factor 4	0.54	0.41724849	0.67137315	0.52592774	0.54	0.74061033	0.8133503	0.47112356	0.55986541	0.54	0.4678892
Factor 5	0.29	0.19735838	0.46919701	0.41449731	0.37192842	0.29	0.46547301	0.18719123	0.12979445	0.19717118	0.29

OBS. 9	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.42	0.42	0.36491839	0.26103722	0.2273519	0.26430882	0.42	0.47388837	0.52657329	0.55377269	0.56652076
Factor 2	0.5	0.44355673	0.5	0.70665332	0.61558095	0.67284782	0.54154492	0.5	0.35930876	0.41797521	0.33540548
Factor 3	0.41	0.2602337	0.59634993	0.41	0.37824127	0.5805822	0.51665657	0.21486292	0.41	0.43286114	0.23208402
Factor 4	0.42	0.18122291	0.52392547	0.3981502	0.42	0.55684948	0.58804625	0.3124836	0.43509893	0.42	0.27685503
Factor 5	0.5	0.34753254	0.64222494	0.67082963	0.60267603	0.5	0.61417222	0.36044798	0.38116833	0.42603301	0.5

OBS. 10	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.37	0.37	0.31329337	0.24863462	0.26579305	0.27279183	0.37	0.41855028	0.50495983	0.59028727	0.57493067
Factor 2	0.45	0.38903963	0.45	0.60485535	0.51302597	0.55733214	0.48446433	0.45	0.2709043	0.31921731	0.22126023
Factor 3	0.5	0.33633169	0.6934832	0.5	0.48162076	0.61555197	0.5917149	0.32087917	0.5	0.53510692	0.26606256
Factor 4	0.66	0.39621254	0.7679576	0.64194008	0.66	0.75056761	0.80115952	0.56386766	0.67781291	0.66	0.47124244
Factor 5	0.66	0.48934155	0.80786426	0.79913389	0.71900852	0.66	0.757208	0.5303544	0.51223171	0.54274036	0.66

OBS. 11	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.65	0.65	0.58327344	0.49238063	0.42026143	0.46137548	0.65	0.6871007	0.74656247	0.74133811	0.75516782
Factor 2	0.37	0.33782007	0.37	0.58050383	0.50613557	0.58192425	0.43237743	0.37	0.24228016	0.31321683	0.25067766
Factor 3	0.41	0.32740821	0.65858312	0.41	0.37484117	0.62901788	0.57825216	0.28127273	0.41	0.42622035	0.28651769
Factor 4	0.31	0.18024535	0.44388549	0.289498	0.31	0.48411662	0.58310311	0.237764	0.3245015	0.31	0.21025324
Factor 5	0.39	0.3060731	0.56917788	0.56257322	0.50982789	0.39	0.56520533	0.29718857	0.28541252	0.34031102	0.39

OBS. 14	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.39	0.39	0.33071808	0.2598283	0.18377029	0.2067804	0.39	0.43911796	0.52097371	0.51003548	0.51014817
Factor 2	0.46	0.40059663	0.46	0.63030831	0.58329828	0.66137197	0.4985875	0.46	0.2849293	0.38544765	0.32236897
Factor 3	0.52	0.36609432	0.72635077	0.52	0.48611517	0.72434704	0.62124388	0.34375019	0.52	0.54082808	0.37544672
Factor 4	0.38	0.1353593	0.49375676	0.3621649	0.38	0.54279228	0.54071783	0.28144246	0.3992793	0.38	0.26281649
Factor 5	0.41	0.2477966	0.56111599	0.54895694	0.51863575	0.41	0.51532217	0.27934877	0.25918915	0.3424836	0.41

OBS. 15	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.42	0.42	0.37369982	0.28669263	0.2410992	0.27010505	0.42	0.48368335	0.55285439	0.56790268	0.57501356
Factor 2	0.58	0.52272233	0.58	0.75293028	0.68825286	0.74568213	0.62146461	0.58	0.40561501	0.49053637	0.40668454
Factor 3	0.5	0.34907474	0.6540337	0.5	0.47014964	0.66167215	0.60378014	0.27270919	0.5	0.52409221	0.3165546
Factor 4	0.45	0.20890544	0.53683812	0.43158681	0.45	0.58224901	0.61509535	0.32536739	0.46825901	0.45	0.30359835
Factor 5	0.51	0.3529612	0.62656715	0.65088154	0.60495072	0.51	0.62082105	0.34474214	0.36268814	0.42983917	0.51

OBS. 16	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.39	0.39	0.36718848	0.35123211	0.2990865	0.34779449	0.39	0.45792208	0.592034	0.57827808	0.62935869
Factor 2	0.73	0.68099859	0.73	0.7792742	0.78540751	0.77572012	0.75853584	0.73	0.45827398	0.62588248	0.46240142
Factor 3	0.81	0.66566533	0.88881037	0.81	0.79246975	0.85971591	0.88458657	0.53223377	0.81	0.83610804	0.52732928
Factor 4	0.61	0.35476975	0.65914335	0.60375367	0.61	0.65411927	0.73847249	0.45972001	0.63592939	0.61	0.38032075
Factor 5	0.82	0.66397864	0.88146297	0.86539798	0.87510824	0.82	0.90185386	0.6201	0.59015252	0.72144159	0.82

OBS. 17	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.74	0.74	0.66100509	0.58096537	0.51640138	0.58124307	0.74	0.76806566	0.84019405	0.84036765	0.87410443
Factor 2	0.27	0.24529627	0.27	0.48039113	0.40331255	0.44809387	0.34237356	0.27	0.1369454	0.20771033	0.11779993
Factor 3	0.41	0.34992388	0.69610712	0.41	0.37695069	0.59210489	0.60003816	0.31702194	0.41	0.42680981	0.26607435
Factor 4	0.33	0.23516381	0.48329621	0.31021848	0.33	0.47322062	0.63902438	0.27865464	0.34405277	0.33	0.21313615
Factor 5	0.49	0.43113344	0.69330594	0.65768227	0.60169859	0.49	0.68506053	0.42589413	0.39375244	0.44095351	0.49

OBS. 18	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.53	0.53	0.48362813	0.37526037	0.37713658	0.35571087	0.53	0.59332221	0.64142763	0.70287422	0.66065763
Factor 2	0.58	0.53430422	0.58	0.78424196	0.67199471	0.77610087	0.63239082	0.58	0.43715907	0.47613078	0.43754444
Factor 3	0.42	0.29904981	0.58299712	0.42	0.39480115	0.61660176	0.55547044	0.20156747	0.42	0.44956273	0.26788131
Factor 4	0.54	0.34917699	0.63006066	0.5184882	0.54	0.70029214	0.75603471	0.41796592	0.55560724	0.54	0.4187361
Factor 5	0.43	0.30358454	0.54938775	0.59637027	0.51137417	0.43	0.57164123	0.26784924	0.30723402	0.33475652	0.43

OBS. 19	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.25	0.25	0.22999324	0.21220973	0.17126351	0.17634782	0.25	0.32333388	0.45741994	0.46462663	0.44796662
Factor 2	0.77	0.70725365	0.77	0.81862362	0.81788512	0.85007601	0.78920966	0.77	0.49087829	0.64983203	0.54787006
Factor 3	0.82	0.63906257	0.88856343	0.82	0.80561195	0.90421703	0.86984095	0.52602226	0.82	0.84911188	0.58771129
Factor 4	0.68	0.36943194	0.72024142	0.67432233	0.68	0.7521133	0.76281326	0.52486927	0.70509532	0.68	0.49447491
Factor 5	0.68	0.49861307	0.72639751	0.7178962	0.72016664	0.68	0.72770219	0.48176933	0.46055923	0.57899905	0.68

OBS. 20	Individual Probability	Conditional probability of occurring …					Conditional probability of not occurring …				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	0.47	0.47	0.41860833	0.35880393	0.30051196	0.3255221	0.47	0.52848588	0.62497433	0.62625095	0.63016542
Factor 2	0.53	0.47756994	0.53	0.67367006	0.63252075	0.68842169	0.57584578	0.53	0.32640108	0.43604923	0.35053461
Factor 3	0.58	0.44253239	0.75582144	0.58	0.55099646	0.74389332	0.69839846	0.37375786	0.58	0.60553749	0.39513502
Factor 4	0.47	0.25183141	0.56896128	0.45440927	0.47	0.60339585	0.65851851	0.35648413	0.49144603	0.47	0.32210545
Factor 5	0.52	0.37604451	0.64963469	0.63981774	0.61167785	0.52	0.643312	0.36844028	0.35025502	0.43629775	0.52

MACRO-SIMULATION OF CSP INDUSTRY DEPLOYMENT IN MOROCCO THROUGH A DYNAMIC INPUT-OUTPUT MODEL (DIO)

Prof. Dr. Rafael de Arce

INTRODUCTION

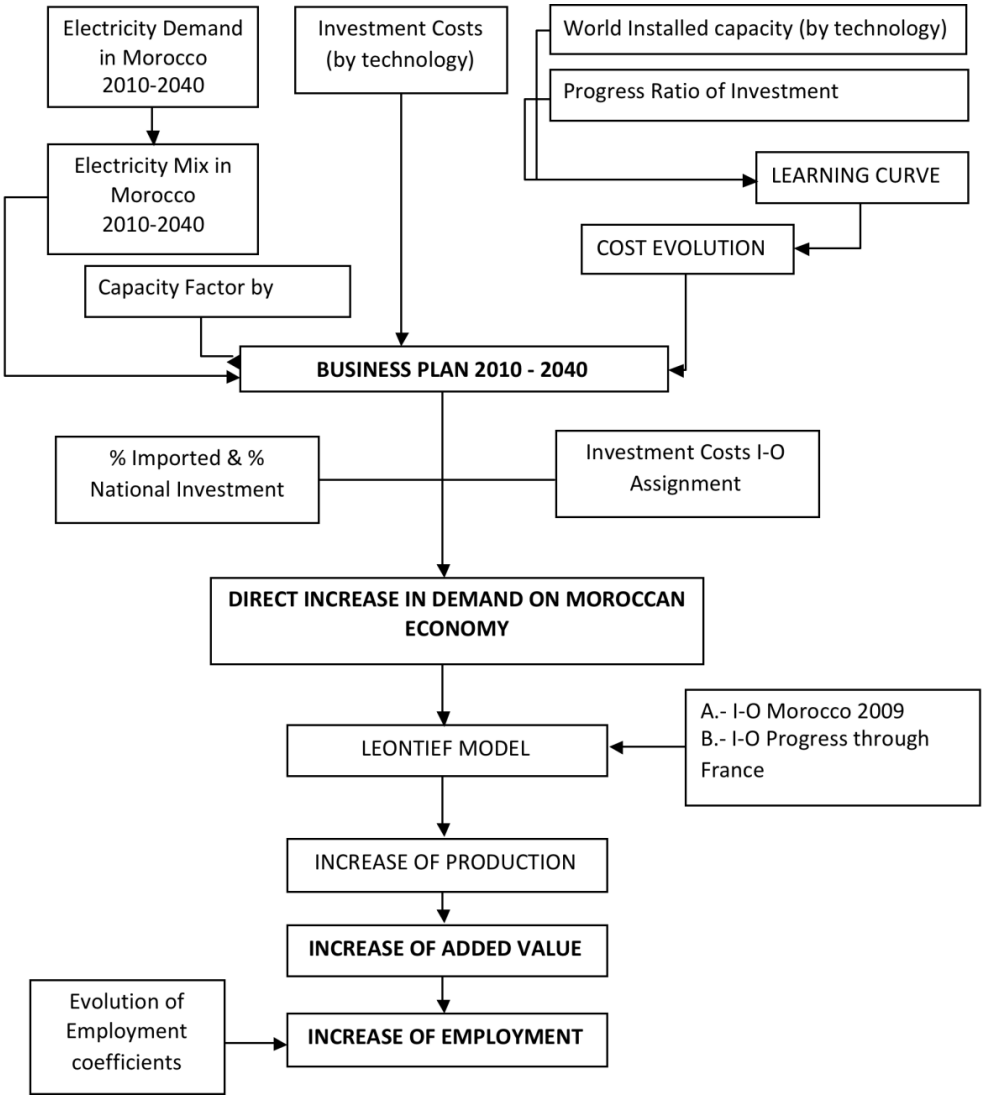
Following the same methodology used in De Arce et Al. (2012) for the estimation of the impact on GDP and employment, we carried out the following steps:

a) Planning of the future electrical demand in Morocco using international sources (IEA, MASEN…).
b) Setting up of the Electric Production Mix of Morocco for the next few years (using information from MASEN and the Ministry of Energy and mines of Morocco and University of Rabat FEMISE team).
c) Definition of the requirements of installed energy sources by technology in order to supply the domestic projected demand of electricity.
d) Using the international standards of investment cost for CSP technologies, determination of the total amount of funds to install this electrical capacity in the country.
e) Assignment of each component to its respective economic sector in IO of Morocco.
f) Computation of the domestic part of the total investment as Direct Production Effect over the involved sectors.
g) Estimate of the Total Production effect (direct plus indirect) through the dynamic Leontief Matrix.
h) Derivation of number of total employees and Value Added effects from the proper coefficients of IO table and productivity dynamic rates.
i) In a second round, new impact in domestic demand produced by new consumption yield from the employees in the first round (estimate of Induced Demand Effect).

As in our previous research for FEMISE (FEM34-02), we have used the RAS technique to evolve the Moroccan technical coefficient matrix through a more developed economy, France. With this evolution, we avoid the problems of using an IO structure for long-term simulations

(our simulation horizon ends in 2050). In our model, we draw a progressive evolution of the industrial structure of Morocco, changing the inter-sectors' links in a similar way that they are connected in a more developed economy. This progressive convergence of Moroccan I-O marginal does not imply that French and Moroccan economies will be the same in 2050, but only that the degree of total interdependency among sectors will be the same in Morocco in 2050 as the French today. In order to achieve this "marginal convergence", the technical coefficients of the current Moroccan I-O table have been progressively and slowly adapted, but at the end of the adjustment (in 2050) the internal structure of the Moroccan economy does not coincide with the French one; the coincidence between both IO tables is limited to the degree of total interdependency of each sector.

Figure 1. Simulation design



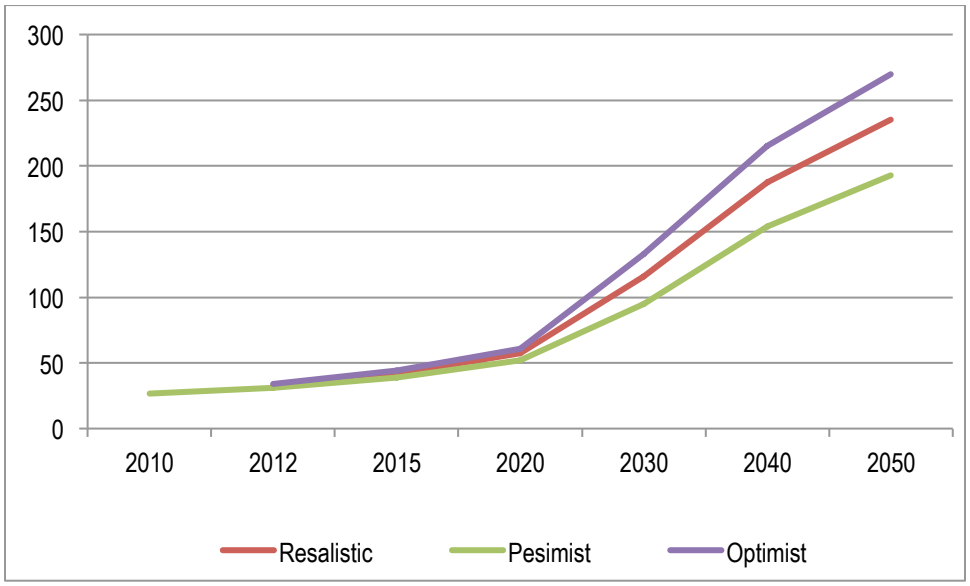
Source: De Arce et Al. (2012)

In the framework of the industrial CSP cluster potential creation that drives this project, we have incorporated a new definition of the import dependency scenarios of Morocco in terms of CSP components. In our previous research, this issue was tackled just by using hypothetical scenarios of a progressive reduction. In the present research, we have conducted a survey for experts to find out which are the most suitable components to be directly produced by Moroccan industries in the future. By doing this, we can obtain a more realistic picture of the impacts of CSP installation and production of its components on Morocco economy.

ELECTRICITY DEMAND IN MOROCCO AND ELECTRICAL POWER INSTALLATIONS

In the context of the MSP and the 20-20-20 plan of Moroccan government, we have merged different forecasts of the electricity energy demand for the next 50 years. In all of the sources, the analysts have used a simple model of electricity demand driven by the increase in GDP per capita. We have consulted IEA forecasts, Ministry of Energy and Mines of Morocco and REACCESS Project. Obviously, the trends drawn by these analysts are very similar (see more details in FEM34-02). Finally, we have opted for the definition of three scenarios, taking the average for each year of the three sources.

Electricity Demand in Morocco 2010-2050



Source: Own calculations from IEA, Ministry of Energy of Morocco and REACCESS data.

In our simulation the initial electricity demand is around 31 TWh in 2012, reaching 235, 193 or 270 TWh in the realistic, pessimist and optimist scenarios respectively for 2050.

Linked to these scenarios, and taking into account the objectives marked by MASEN, we can now design the necessary electricity power installation to covert this demand. Using the so-called “realistic scenario” and focusing in renewable energies, we have planned the bellow mix of installed electricity power.

Installed Electricity Power by RES – MW: "REALISTIC SCENARIO"

	CSP (PARAB. THROUGH)	WIND POWER	PHOTOVOLTAIC	TOTAL
2010	20	284	13	317
2012	20	1,192	20	1,232
2015	225	1,595	50	1,870
2020	416	2,000	80	2,496
2030	1,299	3,390	128	4,816
2040	2,893	5,777	205	8,875

Source: own calculations

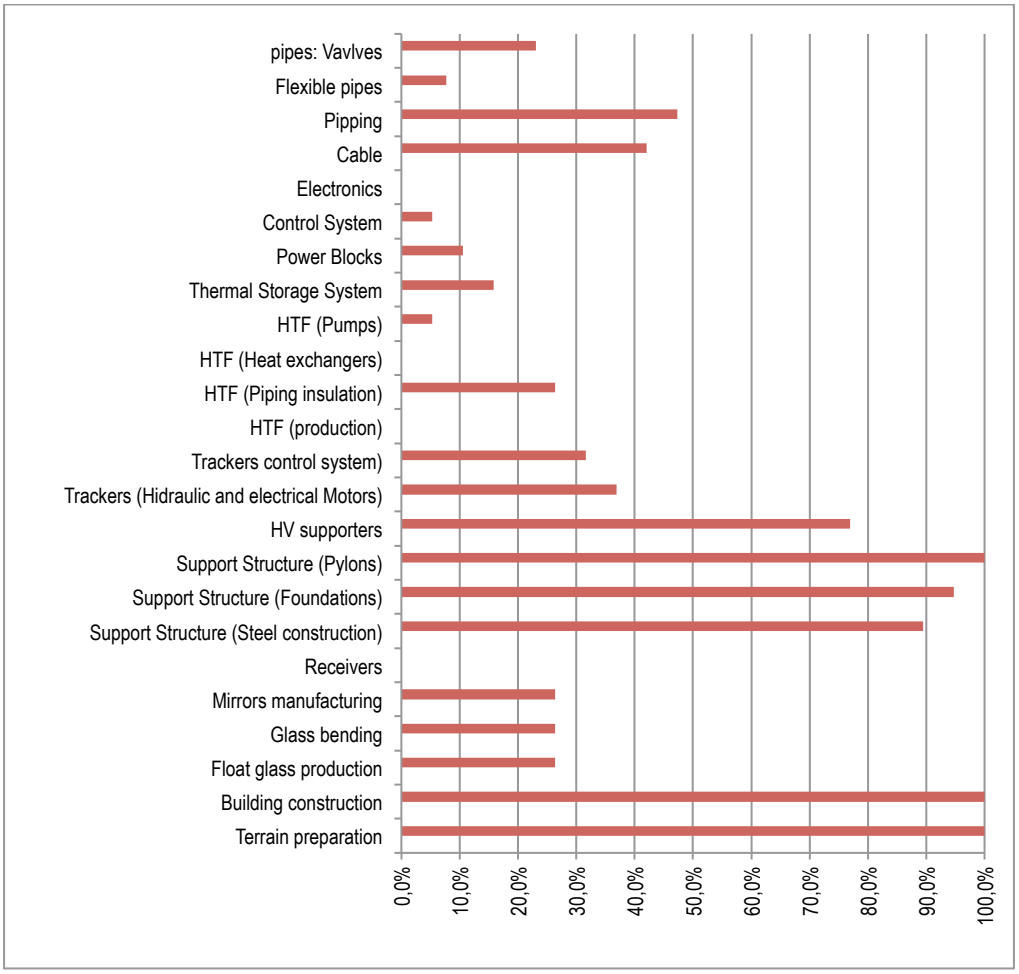
Of course, in order to design this power mix we have taken into account the annual capacity factors of each energy source (see more in FEM34-02).

DESIGNING IMPORT SCENARIOS OF CSP COMPONENTS

A survey among experts was carried out to draw the simulation scenarios for import dependency of CSP components in Morocco.

In a first question, the answers allow us to establish what the current situation is, specifically, the answer to the following question: "Which parts of the value chain of CSP technology are suitable NOW for local manufacturing?" We have obtained the following results:

Percent of Value chain of CSP components deliverable by Moroccan industries



Source: Survey FEMISE 35-02 Research Project

In the scenario called “business as usual” (BAU) we can set up that construction and terrain preparation can be almost totally produced by domestic Moroccan industries[24]. As in the case of some specific foundations and pylons foreign industries will be involved. Also Storage and Power block components show the bigger dependency on foreign imports. In the case of the Solar Field (mirrors, blending glasses…) a partial dependency is assumed (around 50% of components coming from abroad).

[24] The answer to this question implies that they can produce these components, but it does not necessary mean that they are producing them in the current projects.

Percent of import components: Business as Usual Scenario

% of total Cost	Component Group	2010	2020	2030	2040	2050
43.4%	Solar Field	57%	56.7%	56.7%	56.7%	56.7%
10.6%	Power block	89.2%	89.2%	89.2%	89.2%	89.2%
4.3%	Terrain	0.0%	0.0%	0.0%	0.0%	0.0%
19.11%	Storage	84.7%	84.7%	84.7%	84.7%	84.7%
1.1%	Construction	22.0%	22.0%	22.0%	22.0%	22.0%
11.6%	Engineering	100.0%	100.0%	100.0%	100.0%	100.0%
9.9%	Others	0.0%	0.0%	0.0%	0.0%	0.0%

In order to know the domestic production perspectives of these components in the future, the following question was formulated: “Which parts of the value chain of CSP technology would be suitable IN THE NEXT DECADE for local manufacturing AND UNDER WHAT SCENARIO OF PROGRESS/CHANGES in the economic/political/social environment?” The respondents have reported the following results:

	In any case	Significant Changes (1)	Modest changes (2)	Minor Changes (3)	(2)+(3)	(1)+(2)+(3)
Terrain preparation	9.1%	18.2%	0.0%	72.7%	**72.7%**	**90.9%**
Building construction	0.0%	18.2%	0.0%	81.8%	**81.8%**	**100.0%**
Float glass production	0.0%	22.2%	50.0%	27.8%	**77.8%**	**100.0%**
Glass bending	5.3%	15.8%	63.2%	15.8%	**78.9%**	**94.7%**
Mirrors manufacturing	5.9%	17.6%	52.9%	23.5%	**76.5%**	**94.1%**
Receivers	5.3%	**68.4%**	21.1%	5.3%	26.3%	**94.7%**
Support Structure (Steel construction)	23.5%	11.8%	29.4%	35.3%	**64.7%**	76.5%
Support Structure (Foundations)	25.0%	6.3%	12.5%	56.3%	**68.8%**	75.0%
Support Structure (Pylons)	26.7%	6.7%	13.3%	53.3%	**66.7%**	73.3%
control system	7.7%	53.8%	35.8%	0.0%	38.5%	92.3%
Trackers (hydraulic and electric motors)	7.7%	15.4%	**69.2%**	7.7%	**76.9%**	**92.3%**
HV supporters	0.0%	27.3%	27.3%	45.5%	**72.7%**	**100.0%**
HTF (Production)	15.4%	38.5%	30.8%	15.4%	46.2%	**84.6%**
HTF (Piping insulation)	0.0%	38.5%	23.1%	38.5%	61.5%	**100.0%**

	In any case	Significant Changes (1)	Modest changes (2)	Minor Changes (3)	(2)+(3)	(1)+(2)+(3)
HTF (Heat exchangers)	10.5%	36.8%	47.4%	5.3%	52.6%	**89.5%**
HTF (Pumps)	15.8%	26.3%	52.6%	5.3%	57.9%	**84.2%**
Thermal Storage System	10.5%	57.9%	31.6%	0.0%	31.6%	**89.5%**
Power Blocks	15.8%	26.3%	52.6%	5.3%	57.9%	**84.2%**
Control System	16.7%	44.4%	38.9%	0.0%	38.9%	**83.3%**
Electronics	5.6%	50.0%	38.9%	5.6%	44.4%	**94.4%**
Cable	18.8%	18.8%	31.3%	31.3%	62.5%	**81.3%**
Pipping	18.8%	18.8%	12.5%	50.0%	62.5%	**81.3%**
Flexible pipes	0.0%	50.0%	16.7%	33.3%	50.0%	**100.0%**
pipes: Valves	8.3%	41.7%	33.3%	16.7%	50.0%	**91.7%**

Bold letters: percentages upper 65%.
Source: Survey FEMISE 35-02 Research Project

Taking into account a consensus up to 65% in the case of “minor or modest changes” and up to 80% adding “significant progress” for the previous scales, we can draw the following alternative scenarios of import dependency for the main groups of CSP components:

Percent of import components: More likelihood scenario (with modest or minor changes)

	2020	2030	2040	2050
Solar Field	43.6%	30.6%	30.6%	30.6%
Power block	89.2%	89.2%	89.2%	89.2%
Terrain	0.0%	0.0%	0.0%	0.0%
Storage	84.7%	84.7%	84.7%	84.7%
Construction	22.0%	22.0%	22.0%	22.0%
Engineering	100.0%	100.0%	100.0%	100.0%
Contingencies	0.0%	0.0%	0.0%	0.0%

Percent of import components: More favorable scenario (with significant changes)

	2020	2030	2040	2050
Solar Field	29.7%	2.8%	2.8%	2.8%
Power block	44.6%	0.0%	0.0%	0.0%
Terrain	0.0%	0.0%	0.0%	0.0%
Storage	42.3%	0.0%	0.0%	0.0%
Construction	11.0%	0.0%	0.0%	0.0%
Engineering	100.0%	100.0%	100.0%	100.0%
Contingencies	0.0%	0.0%	0.0%	0.0%

SIMULATION RESULTS

INVESTMENT BY TECHNOLOGY AND BY SCENARIO OF IMPORTS

The first output that we can highlight as a result of our simulation scenarios is the investment amount required to install the electricity power implied by the previous information, taking into account the part that is going to be directly produced by Moroccan industries and the part that is imported.

Several previous projects (for example, Ain-Beni-Mathar) have been financed by the World Bank and by the African Bank for Development. In the last "summary of discussion" of this institution regarding the Ouarzazate Plant of CSP projected in Morocco (November, 15th 2011), the executive directors have approved to fund this project. However, *"directors acknowledged the various risks associated with the project, given the novelty of the technology and uncertainty of demand. Finally, Executive Directors encouraged close donor collaboration between co-financiers of the project"*. (World Bank, 2011)

Of course, an important debate about the way to finance this investment is crucial, but this issue is clearly out of the scope of this investigation given that we focus on the macroeconomic effects of the CSP deployment in Morocco.

TOTAL INVESTMENT IN MSP IN MOROCCO (,000 EUROS)

TOTAL INVESTMENT	**2010**	**2020**	**2030**	**2040**	**2050**
PARAB. THROUGH	106,335	669,053	2,567,373	4,339,444	4,923,042
WIND POWER	254,035	302,466	917,897	1,484,812	966,106
PHOTOVOLTAIC	47,600	71,559	88,524	126,516	192,324
TOTAL INVESTMENT	407,970	1,043,078	3,573,795	5,950,772	6,081,473
SC. 1: B.A.U.					
NATIONAL (IN MOROCCO)					
PARAB. THROUGH	16,254	250,274	945,000	1,592,965	1,805,271
WIND POWER	153,533	214,096	712,955	1,235,906	844,303
PHOTOVOLTAIC	14,477	37,824	60,555	97,416	157,963
TOTAL	184,263	502,194	1,718,510	2,926,287	2,807,537

SC. 2 : MORE LIKELIHOOD	2010	2020	2030	2040	2050
NATIONAL (IN MOROCCO)					
PARAB. THROUGH	16,254	281,635	1,173,936	1,966,920	2,219,633
WIND POWER	153,533	214,096	712,955	1,235,906	844,303
PHOTOVOLTAIC	14,477	37,824	60,555	97,416	157,963
TOTAL	184,263	533,555	1,947,447	3,300,242	3,221,899

SC. 3: SIGNIFICANT CHANGES	2010	2020	2030	2040	2050
NATIONAL (IN MOROCCO)					
PARAB. THROUGH	16,254	441,157	2,500,364	4,261,331	4,857,347
WIND POWER	153,533	214,096	712,955	1,235,906	844,303
PHOTOVOLTAIC	14,477	37,824	60,555	97,416	157,963
TOTAL	184,263	693,077	3,273,874	5,594,653	5,859,613

Essentially for each decade we have a progressive amount of investment required to reach the targets in the production mix fixed in the previous stage of this simulation. The total share of Moroccan industries in this project is related with the “import dependency scenario” chosen. So, at the end of the simulating horizon, 98% of the investment could be directly applied by Moroccan industries in the most favorable scenario, from a 45% in the “more realistic scenario” and 36% in the “BAU Scenario”.

All these figures are related with the whole decade where they appear. The rest of the RES technologies have been unchanged in terms of domestic/import dependency. They serve just as a comparison point with possible CSP progression.

EFFECTS ON VALUED ADDED AND EMPLOYMENT FROM THE CSP TECHNOLOGY INSTALLATION IN MOROCCO

Taking into account the three chosen import scenarios, we have found a total effect on Moroccan GDP that moves from 1.27% to 1.77% for 2050. The differences between scenarios are very small in terms of GDP between BAU and “More likelihood” (around 0.15%). Comparing BAU with “significant changes Scenario”, these differences can be around 0.5.

In all the three scenarios, there are huge differences in terms of number of employees. In the third scenario, the creation of a semi-complete industry of CSP components in Morocco is

related with an increase in the number of employments, around 85,000 (average for the entire simulation horizon). In the case of the second scenario, with just a partial installation of this kind of industry in the country, the employment average could be around 40,954 people.

BUSINESS AS USUAL

	2010	2020	2030	2040	2050
Added Value (K €)	137,936	350,315	1,123,754	2,132,626	2,026,956
Employment (employees)	35,989	85,790	247,045	409,245	342,448
Total Effect (A.V.) / GDP	0.18%	0.38%	1.02%	1.61%	1.27%

MORE LIKELIHOOD SCENARIO (MINOR OR MODERATE CHANGE)

	2010	2020	2030	2040	2050
Added Value (K €)	137,936	364,877	1,275,268	2,421,853	2,405,436
Employment (employees)	35,989	90,463	291,114	482,959	424,764
Total Effect (A.V.) / GDP	0.18%	0.40%	1.15%	1.83%	1.51%

SIGNIFICANT CHANGES SCENARIO

	2010	2020	2030	2040	2050
Added Value (K €)	137,936	385,481	1,445,661	2,739,569	2,815,694
Employment (employees)	35,989	96,491	339,535	562,931	513,427
Total Effect (A.V.) / GDP	0.18%	0.42%	1.31%	2.07%	1.77%

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APPENDIX

INVESTMENT FOR 1MW OF INSTALLED POWER USING CSP TECH.

	2010	2020	2030	2040	2050
Investment (K€)					
Solar Field	2469.7	1262.0	995.6	900.6	845.3
Power block	1113.8	979.3	935.7	917.9	906.8
Terrain	24.2	24.2	24.2	24.2	24.2
Storage	663.7	390.2	323.4	298.7	284.1
Construction	531.7	531.7	531.7	531.7	531.7
Engineering	256.8	159.1	48.4	24.1	11.6
Contingencies	256.8	159.1	48.4	24.1	11.6
Total	**5316.7**	**3505.5**	**2907.4**	**2721.3**	**2615.3**
% Import					
Solar Field	100.0%	56.7%	56.7%	56.7%	56.7%
Power block	100.0%	89.2%	89.2%	89.2%	89.2%
Terrain	0.0%	0.0%	0.0%	0.0%	0.0%
Storage	100.0%	84.7%	84.7%	84.7%	84.7%
Construction	0.0%	22.0%	22.0%	22.0%	22.0%
Engineering	100.0%	100.0%	100.0%	100.0%	100.0%
Contingencies	0.0%	0.0%	0.0%	0.0%	0.0%
National (Morocco) (K€)					
Solar Field	0.0	547.1	431.6	390.4	366.4
Power block	0.0	106.2	101.5	99.6	98.4
Terrain	24.2	24.2	24.2	24.2	24.2
Storage	0.0	59.9	49.6	45.8	43.6
Construction	531.7	414.8	414.8	414.8	414.8
Engineering	0.0	0.0	0.0	0.0	0.0
Contingencies	256.8	159.1	48.4	24.1	11.6
Total	**812.7**	**1311.3**	**1070.2**	**999.0**	**959.0**

INVESTMENT FOR 1MW OF INSTALLED POWER USING WIND POWER TECHNOLOGY

	2010	2020	2030	2040	2050
Investment (K€)					
Electric Installation + Net Conne	85.3	83.6	82.7	82.2	81.9
Tower (Steel)	103.4	101.3	100.2	99.6	99.2
Turbine	583.8	469.6	418.4	392.0	377.5
Land (terrain)	54.3	36.2	16.1	10.7	7.2
Storage	0.0	0.0	0.0	0.0	0.0
Construction	38.6	31.9	28.9	27.4	26.5
Engineering	14.5	12.0	7.1	5.0	3.4
Transports	14.5	12.0	7.1	5.0	3.4
Total	**894.5**	**746.6**	**660.5**	**621.9**	**599.1**
% Import					
Electric Installation + Net Conne	50.0%	37.0%	27.4%	20.3%	15.0%
Tower (Steel)	0.0%	0.0%	0.0%	0.0%	0.0%
Turbine	50.0%	37.0%	27.4%	20.3%	15.0%
Land (terrain)	0.0%	0.0%	0.0%	0.0%	0.0%
Storage	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	50.0%	42.0%	35.4%	29.7%	25.0%
Engineering	0.0%	0.0%	0.0%	0.0%	0.0%
Transports	0.0%	0.0%	0.0%	0.0%	0.0%
National (Morocco) (K€)					
Electric Installation + Net Conne	42.7	52.7	60.0	65.5	69.6
Tower (Steel)	103.4	101.3	100.2	99.6	99.2
Turbine	291.9	295.8	303.8	312.6	320.9
Land (terrain)	54.3	36.2	16.1	10.7	7.2
Storage	0.0	0.0	0.0	0.0	0.0
Construction	19.3	18.5	18.7	19.2	19.9
Engineering	14.5	12.0	7.1	5.0	3.4
Transports	14.5	12.0	7.1	5.0	3.4
Total	**540.6**	**528.5**	**513.0**	**517.6**	**523.6**

INVESTMENT FOR 1MW OF INSTALLED POWER USING PHOTOVOLTAIC TECH.

	2010	2020	2030	2040	2050

Investment (K€)					
Solar Cell	1618.4	849.4	523.4	404.8	355.2
Other components	247.6	129.9	80.1	61.9	54.3
Electrical Connections	14.2	7.5	4.6	3.6	3.1
BOS	805.8	422.9	260.6	201.5	176.9
LAND	0.4	0.4	0.4	0.4	0.4
CONSTRUCTION & ENGINERING	975.2	975.2	975.2	975.2	975.2
Total	**3661.6**	**2385.3**	**1844.2**	**1647.3**	**1565.1**

% Import					
Solar Cell	100.0%	84.1%	70.7%	59.5%	50.0%
Other components	50.0%	42.0%	35.4%	29.7%	25.0%
Electrical Connections	0.0%	0.0%	0.0%	0.0%	0.0%
BOS	100.0%	84.1%	70.7%	59.5%	50.0%
LAND	0.0%	0.0%	0.0%	0.0%	0.0%
CONSTRUCTION & ENGINERING	0.0%	0.0%	0.0%	0.0%	0.0%

National (Morocco) (K€)					
Solar Cell	0.0	135.1	153.3	164.1	177.6
Other components	123.8	75.3	51.8	43.5	40.8
Electrical Connections	14.2	7.5	4.6	3.6	3.1
BOS	0.0	67.3	76.3	81.7	88.4
LAND	0.4	0.4	0.4	0.4	0.4
CONSTRUCTION & ENGINERING	975.2	975.2	975.2	975.2	975.2
Total	**1113.6**	**1260.8**	**1261.6**	**1268.4**	**1285.5**

RESULTS FOR DIFFERENT IMPORT DEPENDENCY SCENARIOS

(1) BUSINESS AS USUAL

	2010	**2020**	**2030**	**2040**	**2050**

Direct Effect					
Production (K €)	529,766	935,178	2,766,990	4,717,634	3,864,870
Added Value (K €)	73,572	186,601	595,919	1,114,642	1,040,939
Employment (employees)	11,127	41,296	111,899	177,715	158,986
Indirect Effect					
Production (K €)	258,903	558,945	1,788,553	3,342,566	3,000,262
Added Value (K €)	64,364	163,714	527,835	1,017,984	986,016
Employment (employees)	25,155	47,351	140,384	241,295	195,864
Total Effect					
Production (K €)	788,669	1,494,124	4,555,543	8,060,201	6,865,132
Added Value (K €)	137,936	350,315	1,123,754	2,132,626	2,026,956
Employment (employees)	35,989	85,790	247,045	409,245	342,448

PRO-MEMORIAM	**2010**	**2011-2020**	**2021-2030**	**2031-2040**	**2041-2050**
GDP Morocco (K €) (*)	76,694,200	92,033,040	110,439,648	132,527,578	159,033,093
Total Effect (A.V.) / GDP	**0.18%**	**0.38%**	**1.02%**	**1.61%**	**1.27%**
Employment (personnes)	10,551,306	10,656,819	10,763,387	10,871,021	10,979,731

(2) MORE LIKELIHOOD SCENARIO (MINOR OR MODERATE CHANGE)

	2010	**2020**	**2030**	**2040**	**2050**
Direct Effect					
Production (K €)	529,766	977,591	3,181,256	5,427,892	4,676,915
Added Value (K €)	73,572	194,493	677,099	1,266,938	1,235,846
Employment (employees)	11,127	44,557	142,457	227,761	211,851
Indirect Effect					
Production (K €)	258,903	580,415	2,014,437	3,769,169	3,545,013
Added Value (K €)	64,364	170,384	598,169	1,154,916	1,169,590
Employment (employees)	25,155	48,763	153,894	264,963	225,314
Total Effect					
Production (K €)	788,669	1,558,006	5,195,693	9,197,062	8,221,928
Added Value (K €)	137,936	364,877	1,275,268	2,421,853	2,405,436
Employment (employees)	35,989	90,463	291,114	482,959	424,764

PRO-MEMORIAM	**2010**	**2011-2020**	**2021-2030**	**2031-2040**	**2041-2050**
GDP Morocco (K €) (*)	76,694,200	92,033,040	110,439,648	132,527,578	159,033,093
Total Effect (A.V.) / GDP	**0.18%**	**0.40%**	**1.15%**	**1.83%**	**1.51%**
Employment (personnes)	10,551,306	10,656,819	10,763,387	10,871,021	10,979,731

(3) SIGNIFICANT CHANGES SCENARIO

	2010	**2020**	**2030**	**2040**	**2050**
Direct Effect					

Production (K €)	529,766	1,035,060	3,648,612	6,209,366	5,557,751
Added Value (K €)	73,572	205,578	768,269	1,434,141	1,447,083
Employment (employees)	11,127	48,208	175,511	281,599	268,549
Indirect Effect					
Production (K €)	258,903	612,250	2,270,199	4,239,482	4,136,517
Added Value (K €)	64,364	179,903	677,392	1,305,429	1,368,611
Employment (employees)	25,155	51,139	169,261	291,097	257,280
Total Effect					
Production (K €)	788,669	1,647,310	5,918,811	10,448,849	9,694,268
Added Value (K €)	137,936	385,481	1,445,661	2,739,569	2,815,694
Employment (employees)	35,989	96,491	339,535	562,931	513,427

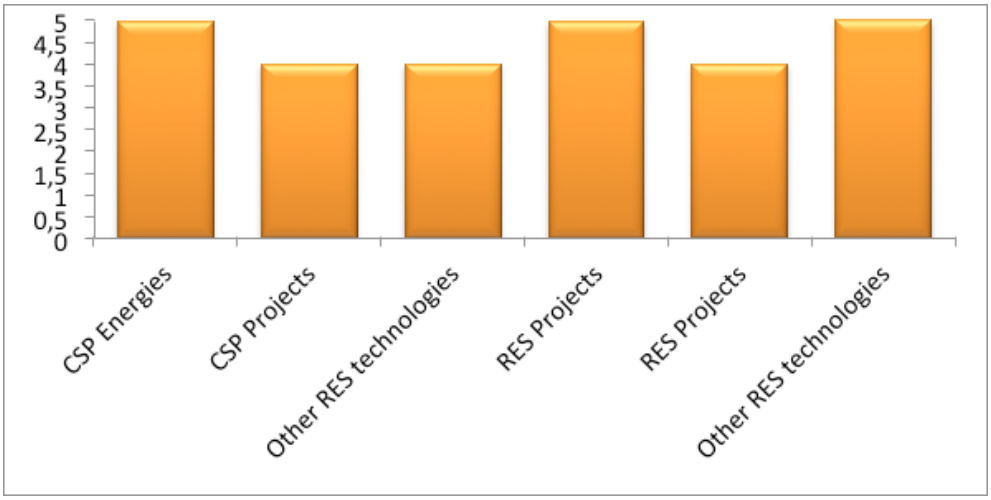
PRO-MEMORIAM	**2010**	**2011-2020**	**2021-2030**	**2031-2040**	**2041-2050**
GDP Morocco (K €) (*)	76,694,200	92,033,040	110,439,648	132,527,578	159,033,093
Total Effect (A.V.) / GDP	**0.18%**	**0.42%**	**1.31%**	**2.07%**	**1.77%**
Employment (personnes)	10,551,306	10,656,819	10,763,387	10,871,021	10,979,731

RÉSULTATS DES ENQUÊTES SUR LE FUTUR DE L'ENERGIES SOLAIRES AU MAROC. QUESTIONNAIRES DESTINÉS AUX EXPERTS MAROCAINS.

Prof. Lahcen Oulhaj et Prof. Idriss Elabbassi

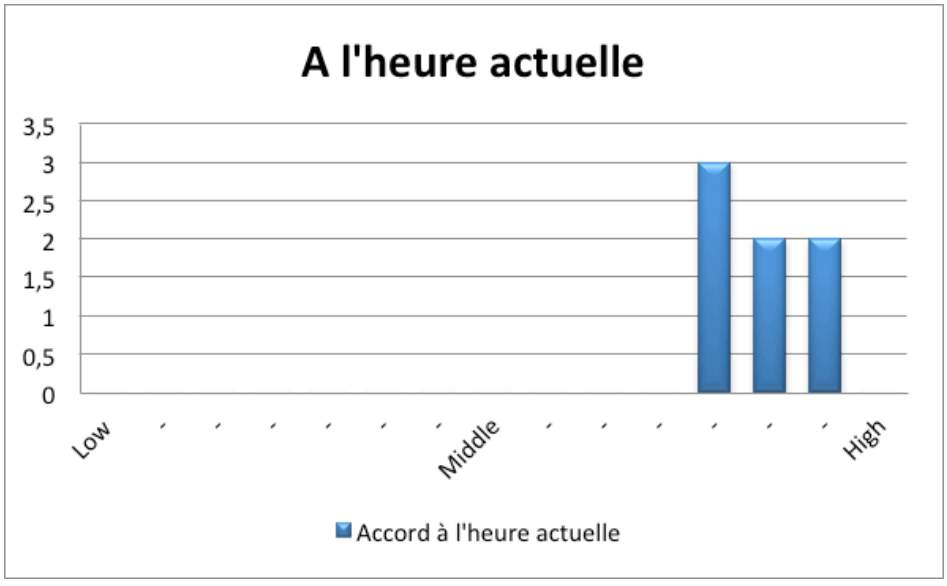
DÉVELOPPEMENT AU MAROC D'UN SECTEUR INDUSTRIEL LIE A L'ENERGIE EOLIENNE: PERSPECTIVES, OBSTACLES ET AVANTAGES: Questionnaire destiné aux experts marocains

1. **Présentation de la personne interviewée** *(décrire avec précision la position de l'expert, son organisation et sa relation avec les secteurs de l'énergie éolienne / des énergies Renouvelables):*



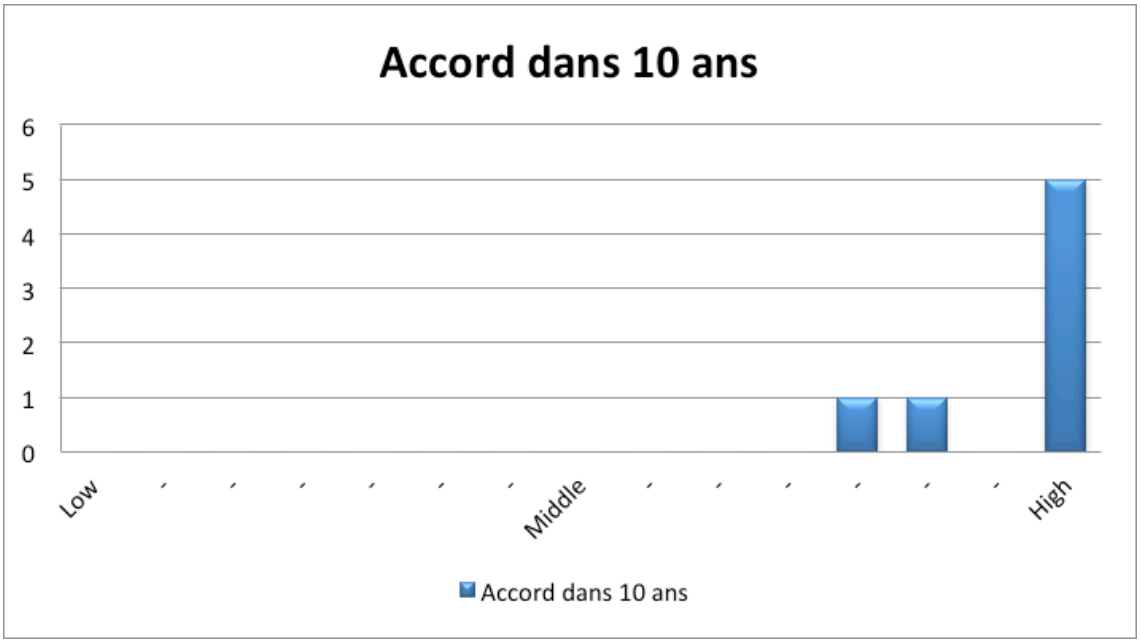
2. **Indiquez votre degré d'accord:**

" Les entreprises déjà installées au Maroc sont prêtes A L'HEURE ACTUELLE pour la production locale de composants et la fourniture de services liés à l'énergie éolienne."

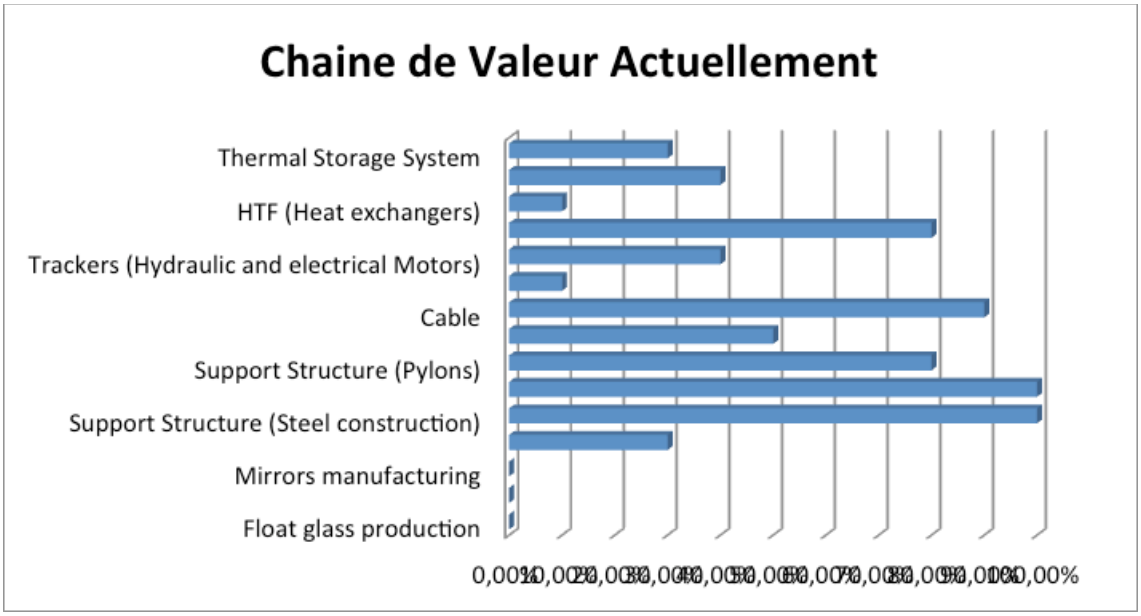


3. **Indiquez votre degré d'accord:**

" Dans la prochaine décennie, sous certaines conditions, et compte tenu de modifications appropriées, mais réalisables au Maroc: les industries marocaines conjointement avec des initiatives internationales seront adaptées pour la production et la fourniture de composants et de services liés à l'énergie éolienne."

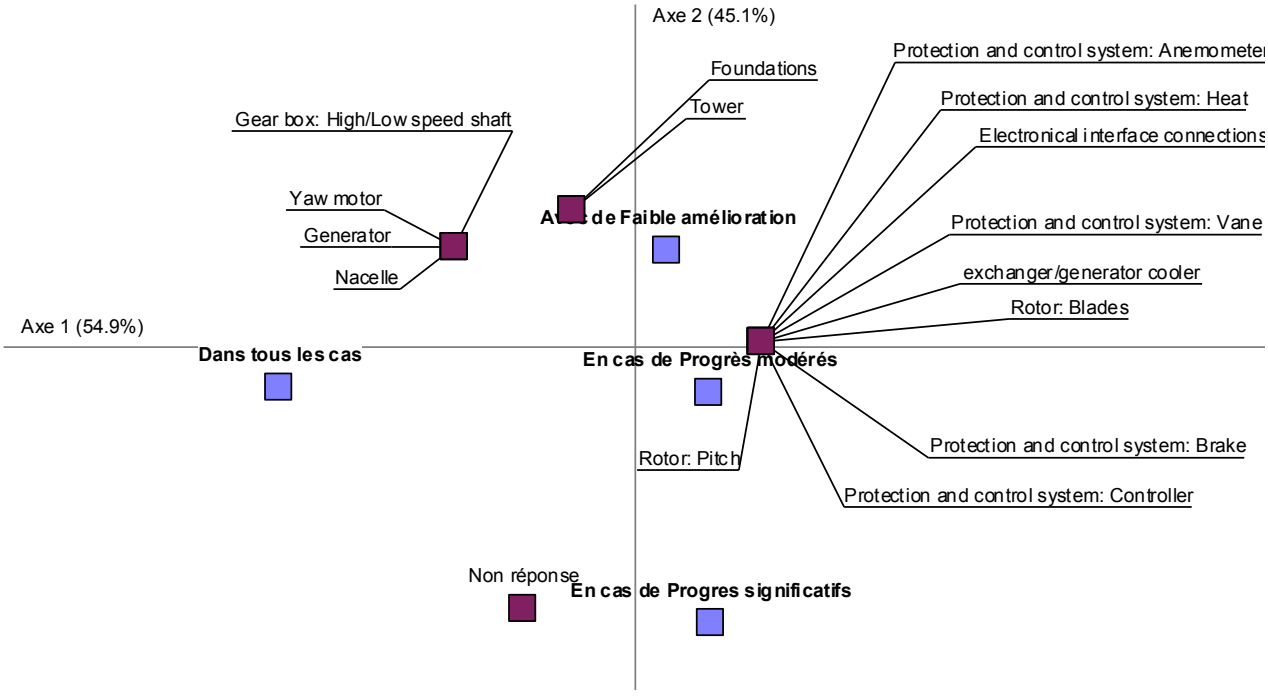


4. **Quelles sont les parties de la chaîne de valeur des technologies éoliennes qui peuvent faire l'objet, à l'heure actuelle, d'une fabrication/production locale?**

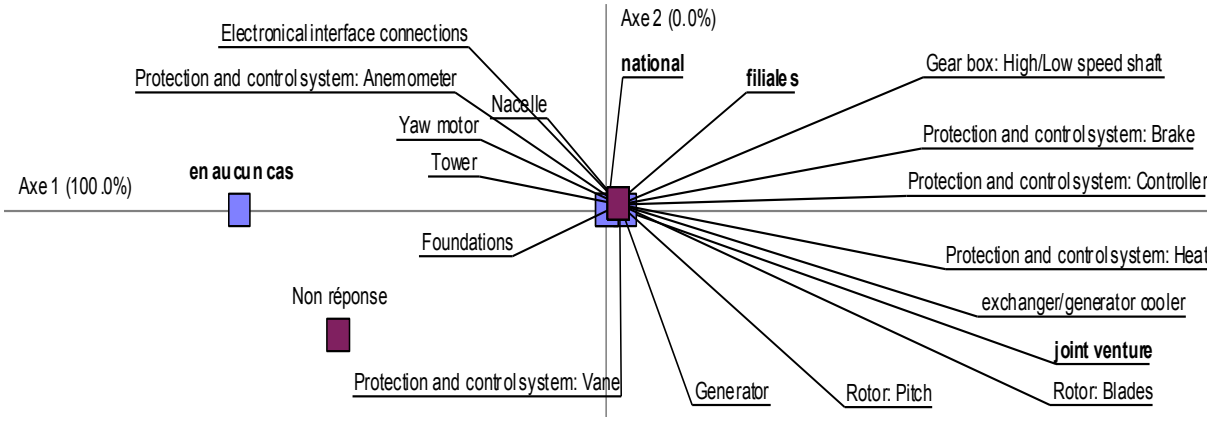


5. **Quelles sont les parties de la chaîne de valeur de la technologie éolienne qui seraient appropriées, dans la prochaine décennie, pour une production locale ET DANS QUELLES**

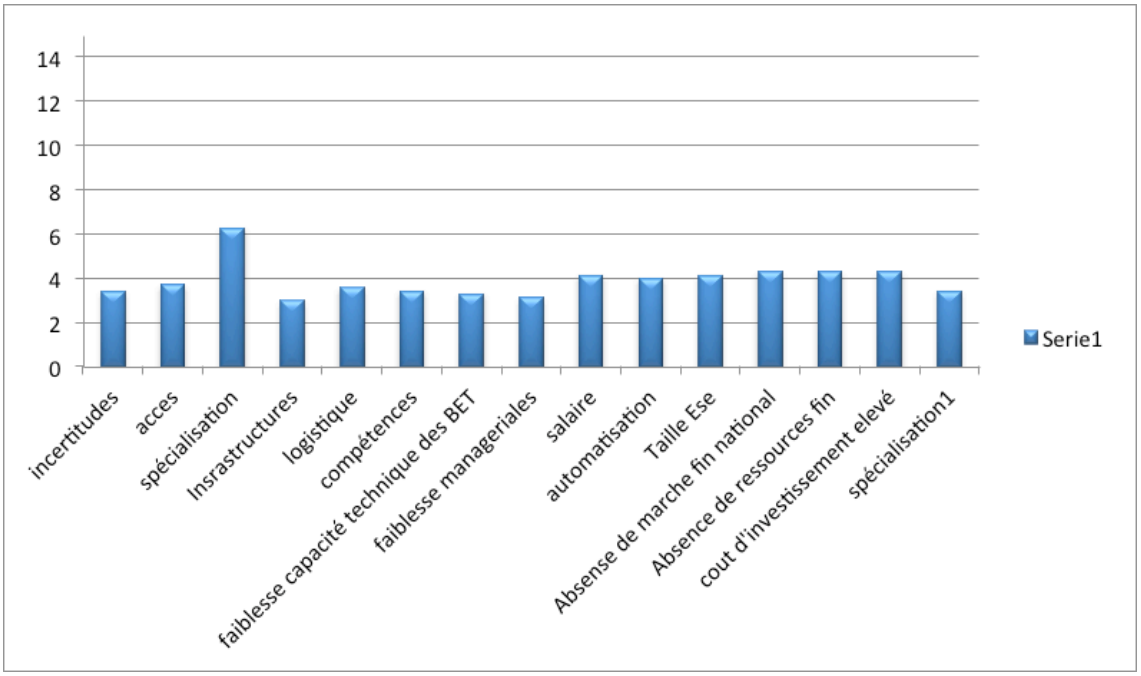
SCÉNARIO D'EVOLUTION / DE CHANGEMENTS de l'environnement économique / politique / social?



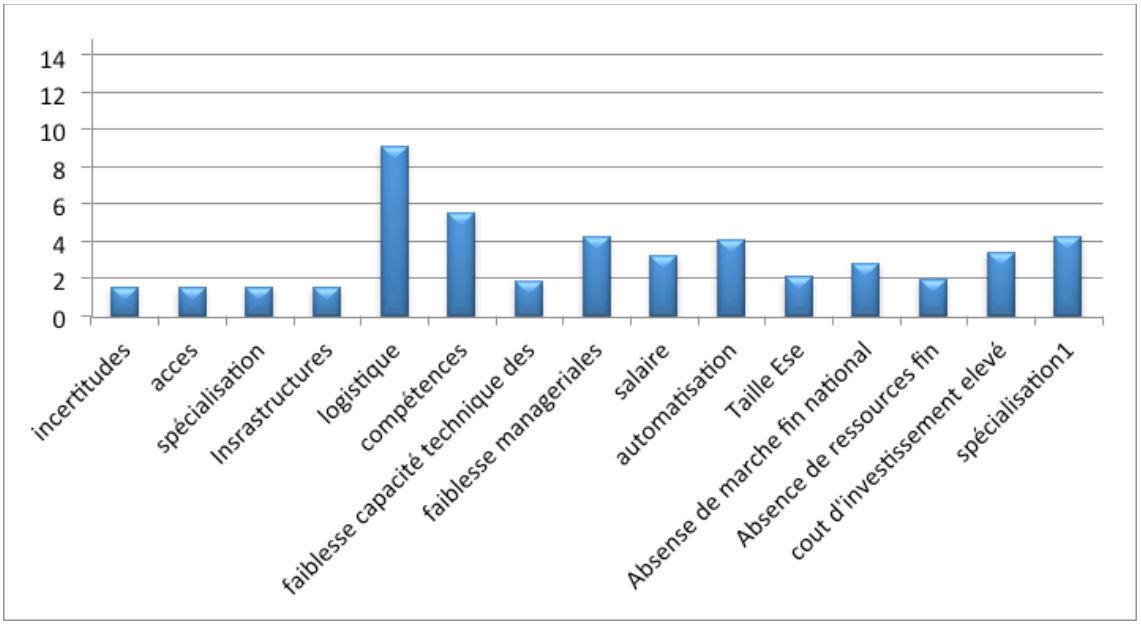
6. **Quel modèle d'affaires (business model) serait le plus plausible pour le développement d'une industrie locale à moyen terme (dix ans)? *Plusieurs options peuvent être choisies.***



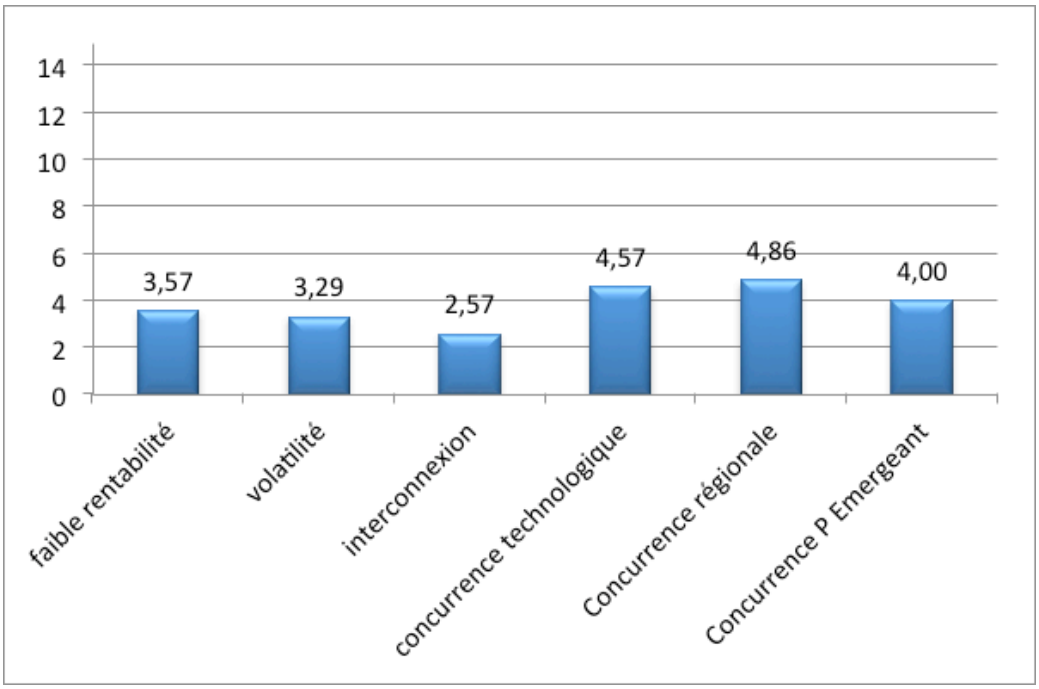
7. **Quelle est l'importance relative des obstacles entrepreneuriaux/managériaux suivants pour la mise en place d'une initiative conjointe locaux et internationaux pour le développement de l'industrie éolienne dans la prochaine décennie?** *(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



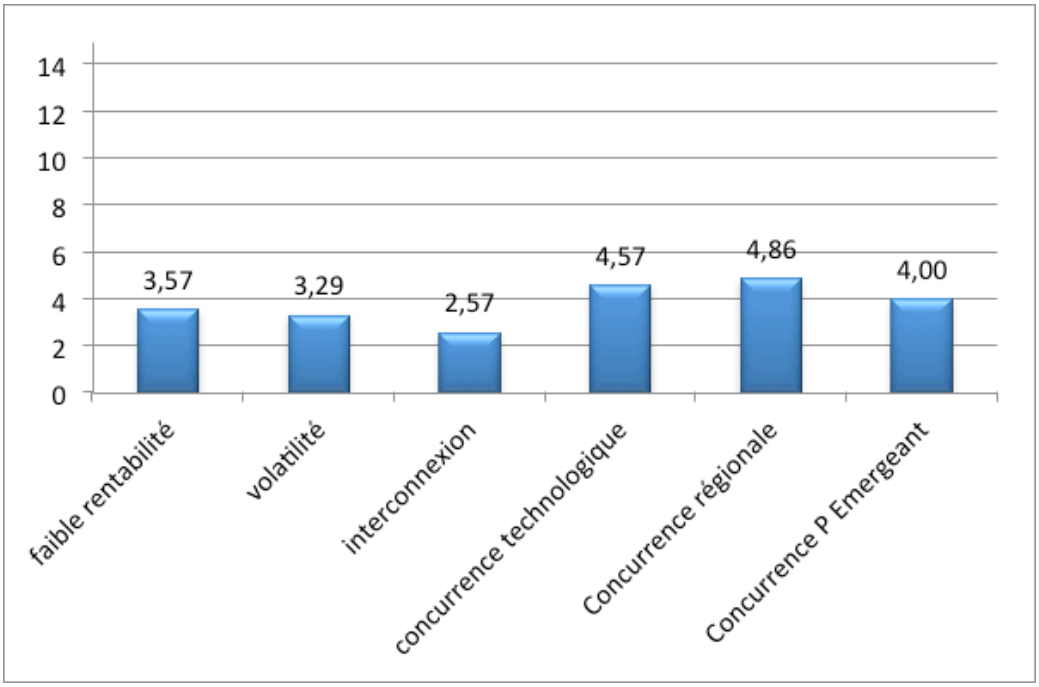
8. **Quelle est l'importance relative des obstacles listés ci-dessous qui entravent le développement d'une industrie éolienne conjointement entre nationaux et internationaux dans la prochaine décennie?** *(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



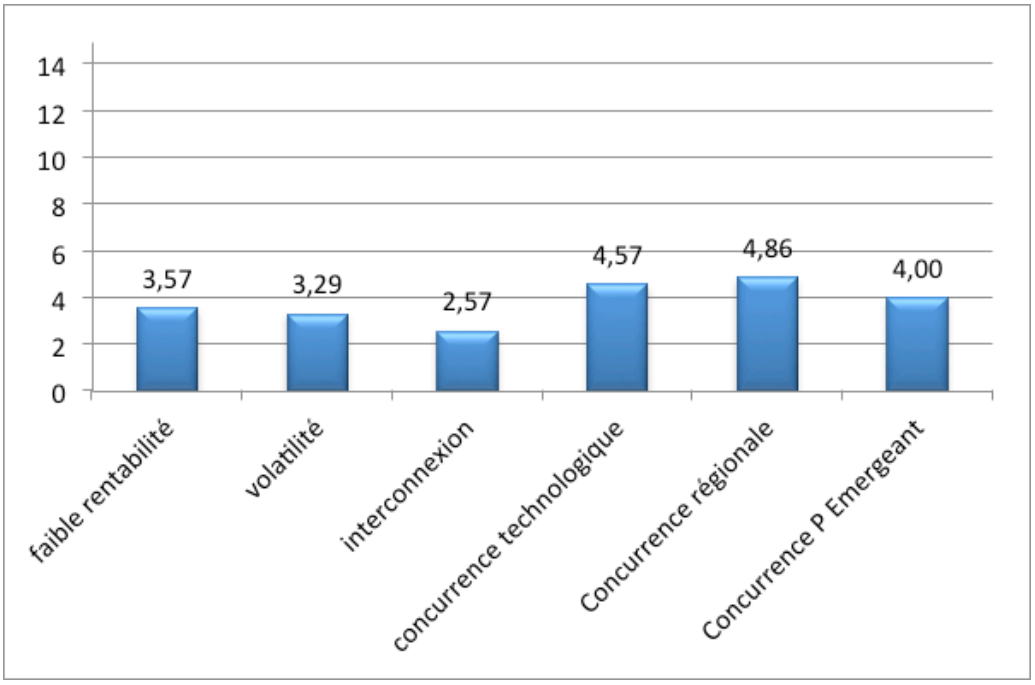
9. **Quelle est l'importance relative des entraves citées ci-dessous au marché pour l'élaboration d'une initiative industrielle éolienne conjointe entre nationaux et internationaux dans la prochaine décennie?** *(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



10. **Laquelle parmi les OPPORTUNITES/ AVANTAGESRELATIFS listés ci-dessous pourrait être perçue comme une opportunité pour les initiatives d'énergie éolienne dans la région au cours de la prochaine décennie?***(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



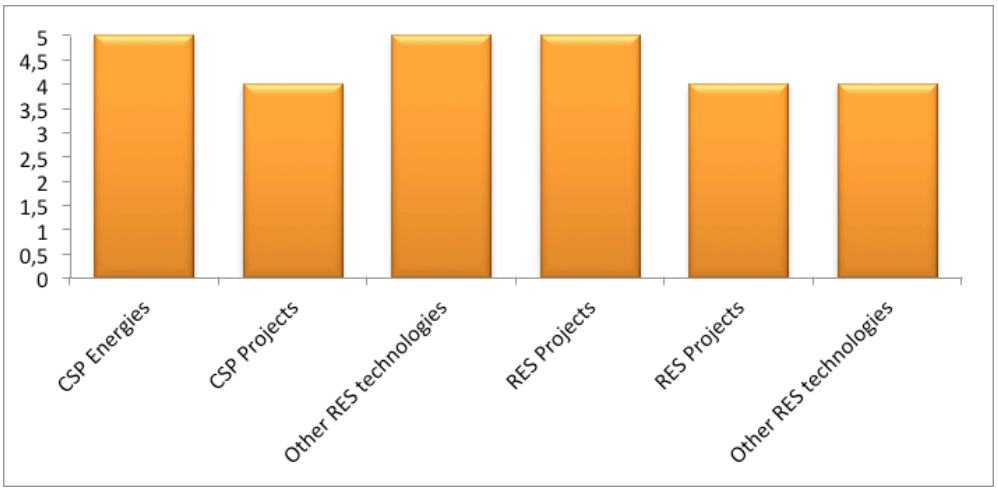
11. Dans quelle mesure pensez-vous que le développement d'un PARC INDUSTRIEL EOLIEN AU MAROC peut-il contribuer à l'expansion et au développement internationaux des affaires dans le pays?



High

DÉVELOPPEMENT AU MAROC D'UN CLUSTER INDUSTRIEL EN RELATION AVEC LE MSP: PERSPECTIVES, OBSTACLES ET AVANTAGES : Questionnaire destiné aux experts marocains

1- **Présentation de la personne interviewée** *(décrire avec précision la position de l'expert, son organisation et sa relation avec le MSP / secteur des énergies Renouvelables):*
(Niveau de Qualification des questionnés)

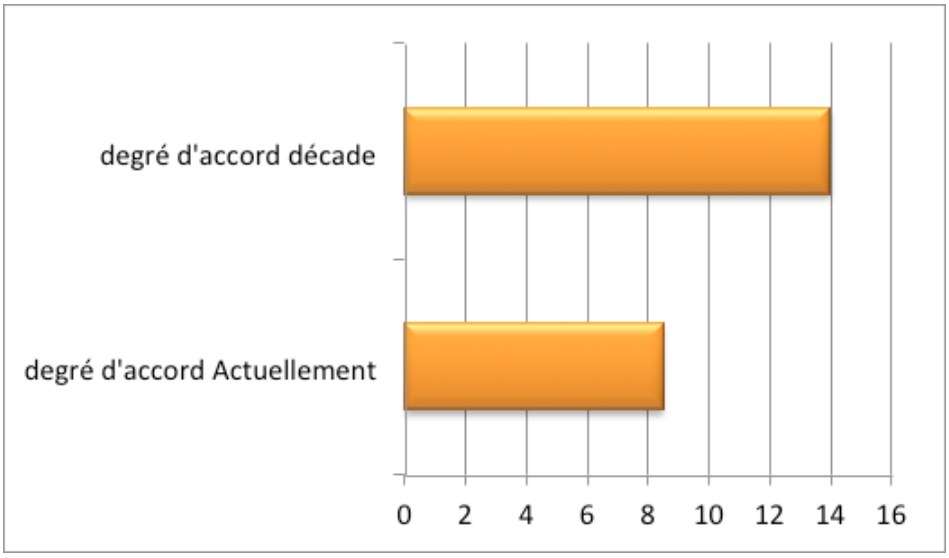


2. Indiquez votre degré d'accord:

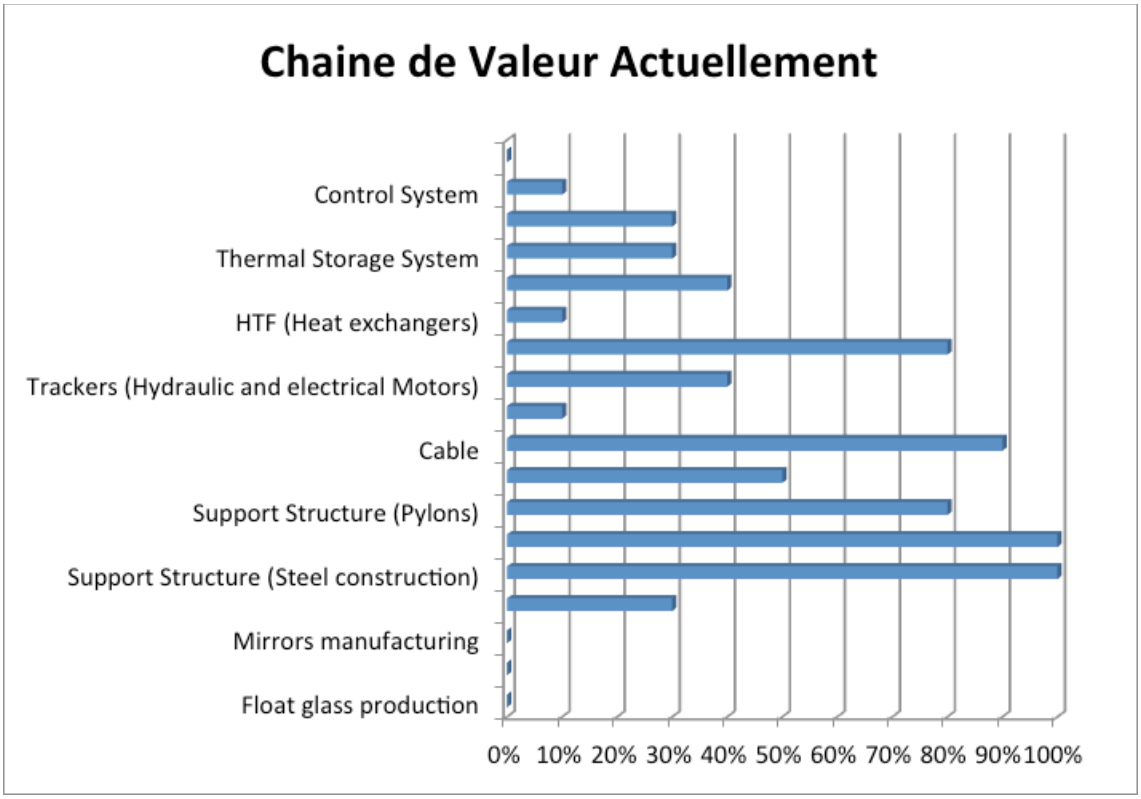
" Les entreprises déjà installées au Maroc sont adaptées MAINTENANT pour la production locale de composants CSP et la fourniture de services liés au CSP."

Indiquez votre degré d'accord:

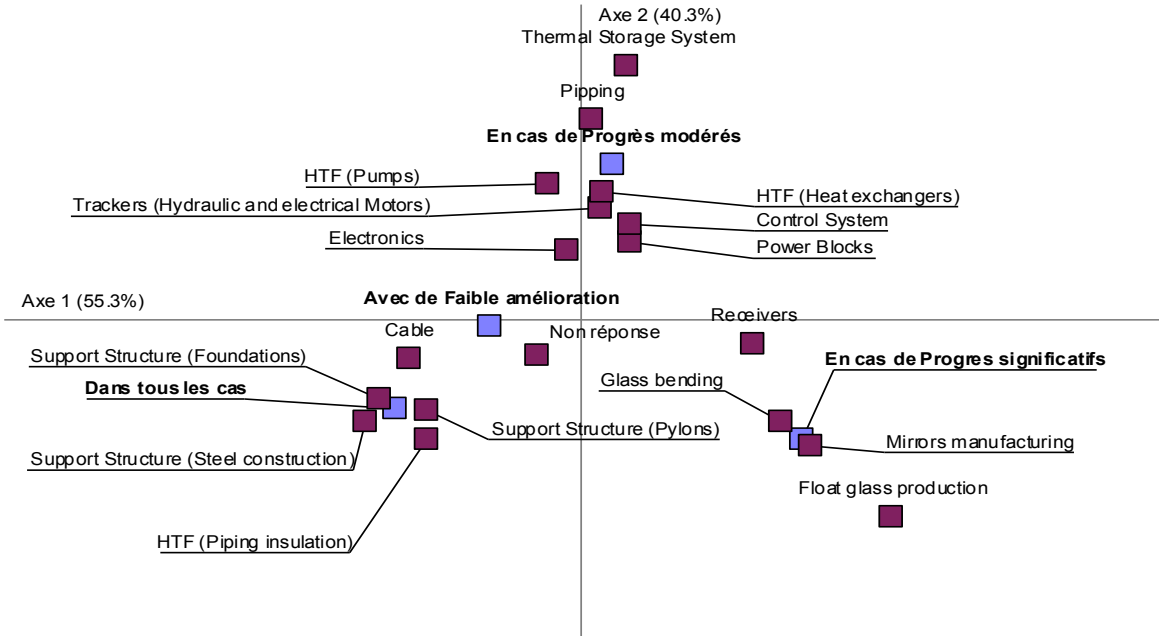
" Dans la prochaine décennie, sous certaines conditions, et compte tenu de modifications appropriées, mais réalisables au Maroc: les industries marocaines conjointement avec des initiatives internationales seront adaptées pour la fabrication locale de composants CSP et la fourniture de services liés au CSP."



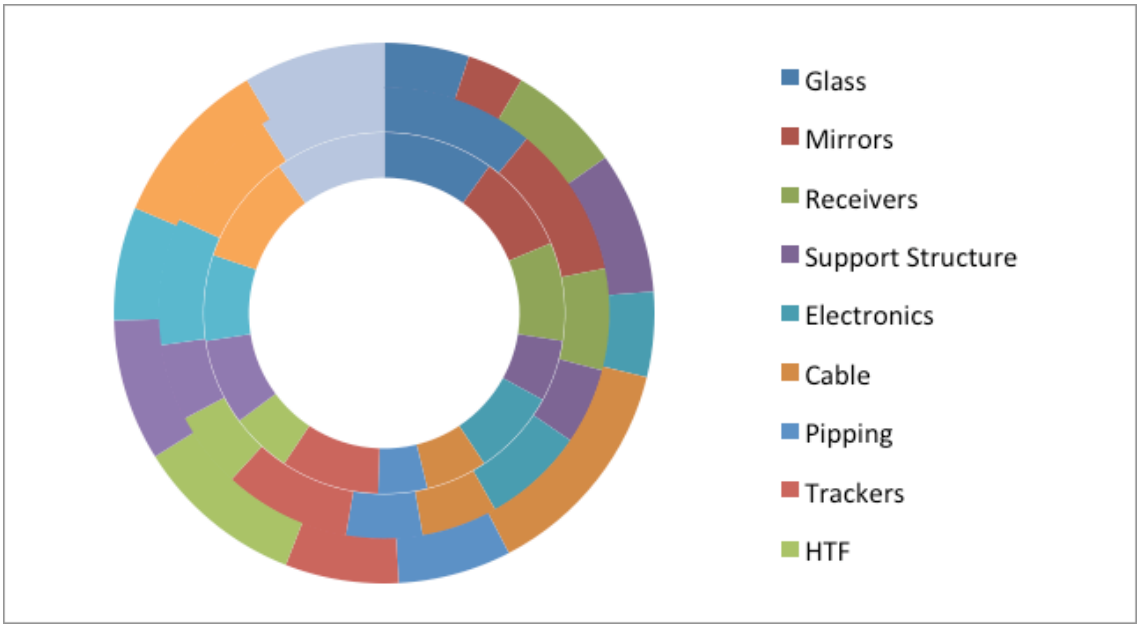
4. **Quelles sont les parties de la chaîne de valeur des technologies CSP qui peuvent faire l'objet, <u>à l'heure actuelle</u>, d'une fabrication/production locale?**



5. **Quelles sont les parties de la chaîne de valeur de la technologie CSP qui seraient appropriées, dans la prochaine décennie, pour une production locale ET DANS QUELLES SCÉNARIO D'EVOLUTION / DE CHANGEMENTS de l'environnement économique / politique / social?**

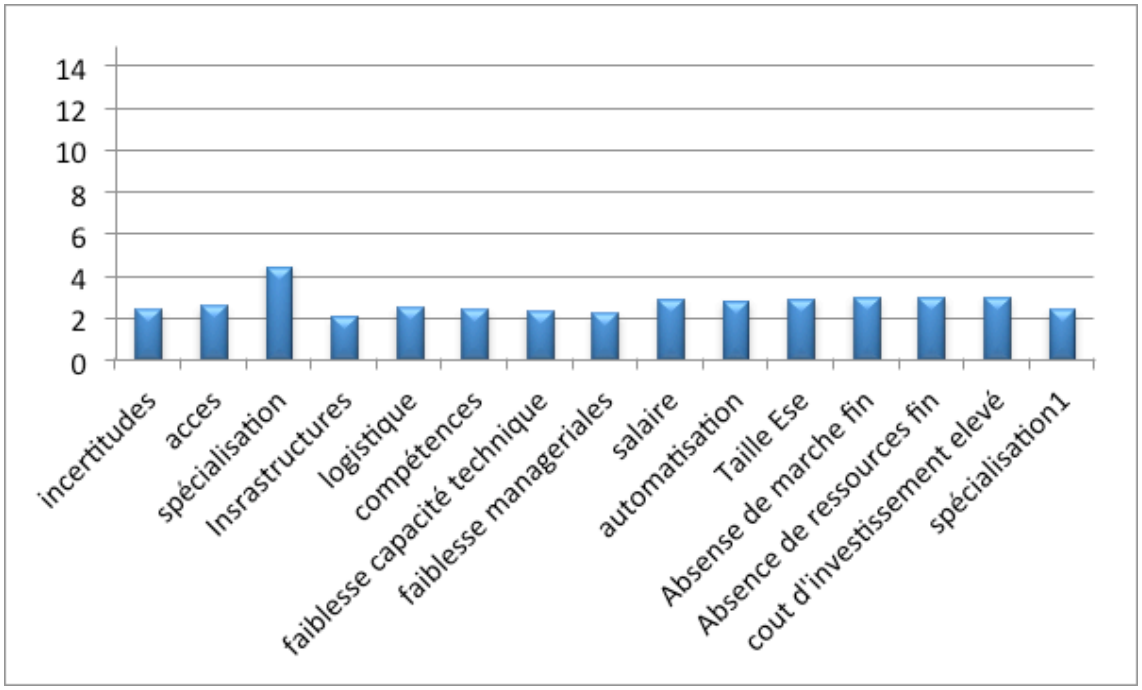


6. **Quel modèle d'affaires (business model) serait le plus plausible pour le développement d'une industrie locale à moyen terme (dix ans)? *Plusieurs options peuvent être choisies.***

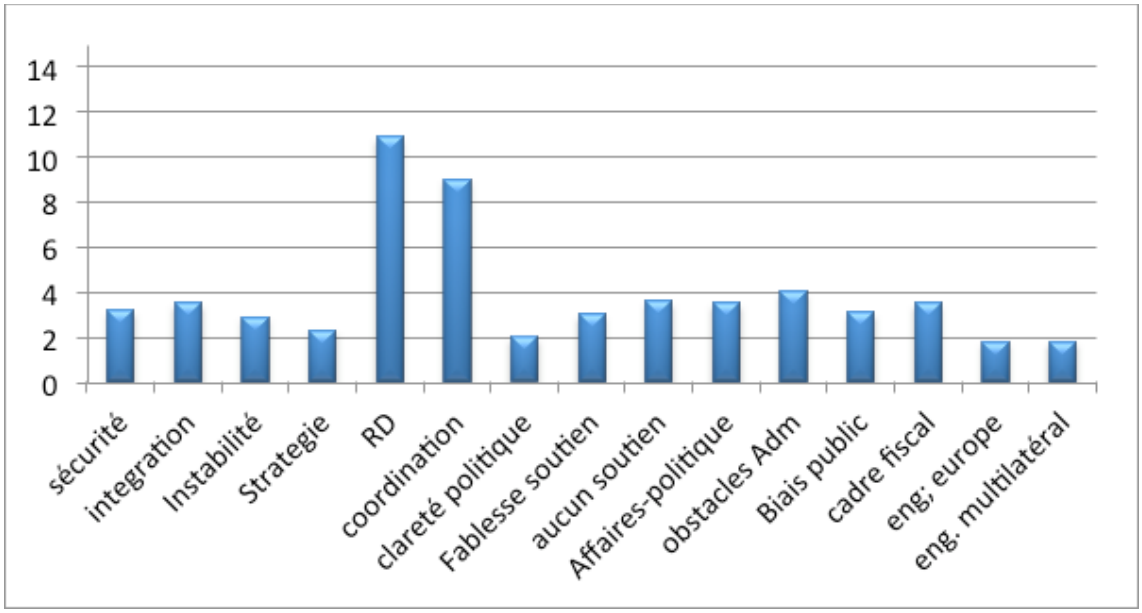


Aucune tendance ne s'est dégagée de cette analyste étant donné que les technologies ont été évoquées équitablement pour l'ensemble des business model ;, exception faite pour « aucun cas »

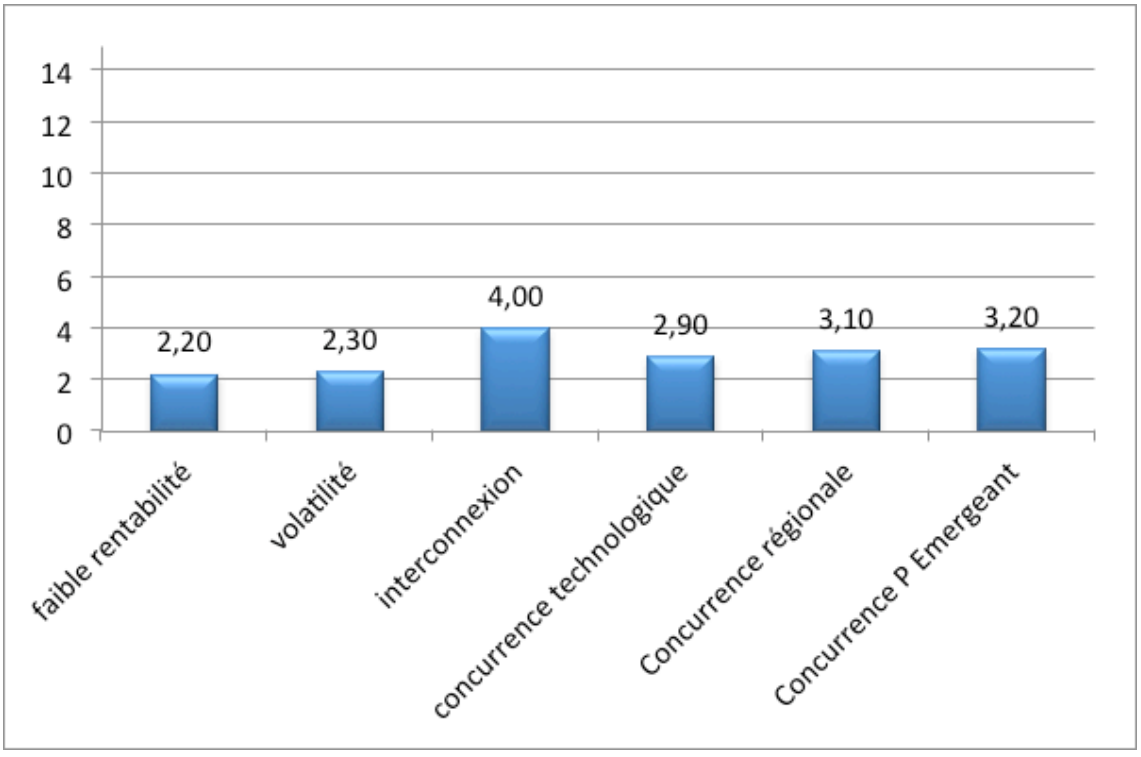
7. **Quelle est l'importance relative des obstacles entrepreneuriaux/managériaux suivants pour la mise en place d'une initiative conjointe locaux et internationaux pour le développement de l'industrie CSP dans la prochaine décennie? *(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).***



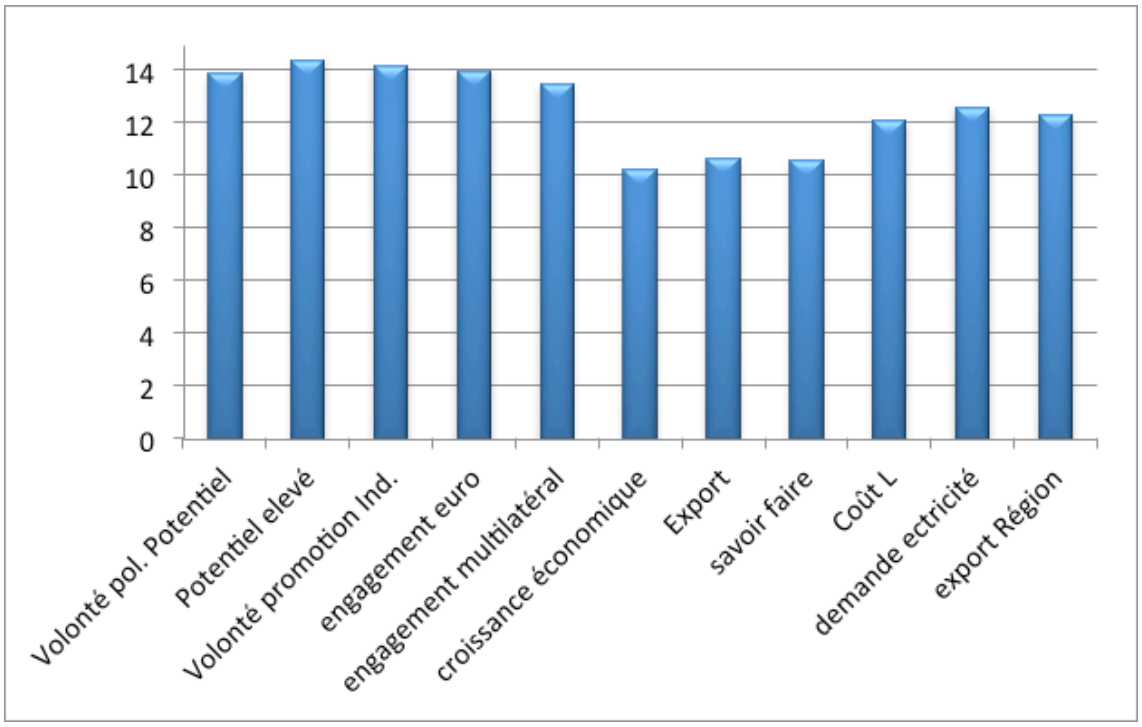
8. **Quelle est l'importance relative des obstacles listés ci-dessous qui entravent le développement d'une initiative industrielle (CSP) conjointe nationaux et internationaux dans la prochaine décennie?** *(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



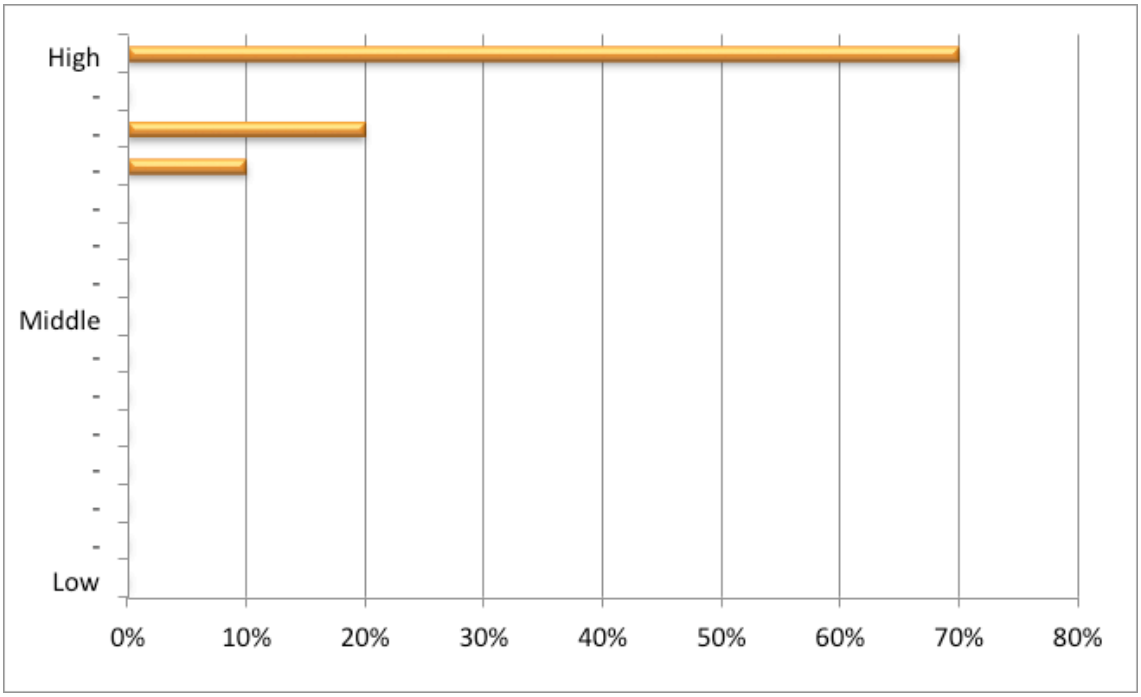
9. **Quelle est l'importance relative des entraves citées ci-dessous au marché pour l'élaboration d'une initiative industrielle CSP conjointe nationaux et internationaux dans la prochaine décennie?***Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



10. **Laquelle parmi les OPPORTUNITES/AVANTAGES RELATIFS listés ci-dessous pourrait être perçue comme une opportunité pour les initiatives de CSP dans la région au cours de la prochaine décennie?***(Ces obstacles ont déjà été mentionnés par des investisseurs étrangers).*



11. Dans quelle mesurepensez-vous quele développement d'unPARC INDUSTRIEL THERMOSOLAIRE AU MAROC peut-il contribuer à l'expansion et au développement internationaux des affaires dans le pays?



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