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The Dynamicity of Knowledge in Maintaining Sustainable Development “The United State of America as an example”

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Abstract: Throughout the course of the human history, the destiny of humankind after [Allah’s (swt) will] was and still based on three main sources of power. These sources of power according to some historians and sociologists are wealth, force and knowledge. However, a revolution is sweeping today's post-Baconworld. When no Machiavelli not Bacon himself could have imagined today's deepest shift of power. According to the resent socio-historical analyses of the Western World, today both force and wealth, themselves have come to depend on knowledge. In other words, the main source of power in the West is Knowledge. Therefore, by taking the United State of America as a model; the author attempted in this paper to focus on three chief points. Firstly, why knowledge can be a tool for sustainability? Secondly to scrutinize how knowledge is being used in the Western World in order to maintain the sustainability. And finally, how the Muslim world in general and Algeria in particular can be able to indigenize and benefit from the Western experience of the dynamicity of knowledge for sustainability.

Key Words: Sustainable development, Knowledge, Knowledge transfer. Algeria, USA.

Introduction

From the time when it first emerged in 1987 by the Brundtland Commission, the concept of Sustainable Development (SD) which refers in its general meaning to: “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p43); SD was and still a subject of discussion among experts. As a concept, its malleability allows it to remain an open, dynamic, and evolving idea that can be adapted to fit these very different situations and contexts across space and time (Kates, Parris, & Leiserowitz 2005). Similarly, according to Kates et al., (2005) its openness to interpretation enables professionals at multiple levels, from local to global, within and across activity sectors, and in institutions of governance, business, and civil society to redefine and reinterpret its meaning to fit their own situation. Basically, those attempts of redefining and reinterpreting the concept of SD have so much to do with the attempts of describing its indicators and then finding means and approaches to put into work.

One of the key means to sustainable long-term development is applying knowledge (Chen & Dahlman 2004). According to Chen and Dahlman (2004), there has been a growing interest in the contribution of knowledge to total factor productivity growth, and consequently to sustainable long-term economic development. However, although the importance of knowledge for sustainable development which cannot be ignored, it is very essential for any society or country to have the skill to adopt and apply this knowledge, in other words, the ability to harness the power of knowledge and research to create new jobs, new industries and solutions to age-old problems.

Consequently, it is the aim of this paper to investigate the following points: stressing the importance of knowledge for sustainability, looking at the significance of knowledge transfer for sustainability, evaluating sustainable development in Algeria, and lastly, lesson to learn from the US experience of development. However, before moving ahead discussing the prior mentioned points, it is essential to share some observations regarding the concept of sustainable development.

The concept of Sustainable Development, a word to say

One of the few concepts which appear to have captured the public and political imagination is that of 'Sustainable Development' (SD). In general the concept is intended to embrace the idea of ensuring that future generations should inherit an Earth which will support their livelihoods in such a way that they are no worse off than today's generations. This meaning, is imbedded in the most celebrated formulation of the concept, it is that given by the World Commission on Environment and Development (the Brundtland Commission) in 1987:

“... development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (WCED, 1987, p43).

This most widely accepted definition however, is creatively ambiguous (Kates, Parris, & Leiserowitz 2005); this ambiguously definition urged some institutions and governments to re-define or elucidate the concept of SD. Referring to Kates et al., (2005) looking at the goals, indicators, values, and practice follows, is one of the best ways which helps to explain what is meant by sustainable development. As it was mentioned in the introduction, redefining the concept of SD is not a goal of this paper; however, it is significant to take into account the following point regarding the SD definition.

The concept of Sustainable Development is a Western term. It was defined by them. Consequently, the definition is reflecting their goals, indicators, values and the practice follows. Certainly, this Western definition of SD can be accepted when the people's common goals and values are considered. However, there are special goals, values and even means of practice which differ from a group of people to another, regarding their culture, religion and their way of life. Therefore, redefining the concept of SD to costume our geographical location (nationally as Algerians, regionally as Africans and globally as human beings) from one side, and our cultural and ideological perspectives from the other side, is the first and the necessary step for achieving SD. For instance, based on the facts that, first, as Algerians, our culture is a religious based culture which means, it is difficult to separate between the two of them (Zohar & Marshall 2004); and secondly, as Muslims, the fundamental concept of how Islam sees the world and deals with the academic and life issues is *Tawheed*, which is normally translated as “the unity of God.” Thus, and based on these two realities (religious based culture, and

Tawheed concept) Muslims in general and Algerian in particular, should be motivated to redefine the concept of Sustainable Development with the consideration of the concept of *Tawheed*, or even replace it with the Islamic concept of "*Istikhlaf*".

Redefining the concept of SD is not the only challenge for Muslims, finding the effective means to achieve that, however, is one of the chief challenges. One important mean to achieve SD is by using knowledge. Why knowledge can be an important mean to achieve sustainability? And how it can be used to achieve that? This is what will be discussed in the following paragraphs.

Knowledge and Sustainable Development; the Why and the How

The importance of knowledge as a tool of sustainability cannot be over emphasized; knowledge is of a decisive importance in economic development of countries (Kefela 2010). This fact has been emphasized and proved by numerous researchers and institutions in the field of SD.

In the 2005 United Nations (UN) Millennium Project's report, titled "*Innovation: Applying Knowledge in Development*", underscores the critical importance of knowledge and innovation for development in every country. According to the report, it became clearer that responding to challenges in areas such as economic productivity, agriculture, education, gender inequity, health, water, sanitation, environment, and participation in the global economy will require increased use of scientific and technical knowledge. Likewise, the World Bank has reiterated its focus on knowledge and learning, naming it among its six strategic directions for sustainability (World Bank 2008).

In a study conducted by Chen and Dahlman (2004), using an array of indicators, each of which represents an aspect of knowledge, as independent variables in cross-section regressions that span 92 countries for the period 1960 to 2000; the study shows that knowledge is a significant determinant of long-term economic growth. The researchers found that the stock of human capital, the level of domestic innovation and technological adaptation, and the level of information and communications technologies (ICT) infrastructure all exert statistically significant positive effects on long-term economic growth.

A vital example of how knowledge could be a great foundation of sustainability of a nation is that of the United States of America (USA). The fact that the economic growth has largely been driven by the pursuit of scientific understanding and continual technological innovation, are key features throughout the history of the United States as much, if not more, than that of any other developed economy (Pro Ton Europe 2007). The USA got its start right from its first step of sustainability. According to Mowery (1997) the foundations of the structure of the postwar U.S. "national innovation systems" –which were based on knowledge–, were largely put in place during the 1945-50 period, as demobilization for peace was replaced by Cold War rearmament. Mowery also noticed that the federal government assumed a role as a financial supporter that dwarfed its pre-1940 presence, as the federal share of national R&D spending rose from roughly 20% in 1939 to more than 50% by 1962. Federal spending supported R&D activity in industry and universities, rather than being concentrated in federal government laboratories; as of 1980, 12.2% of R&D performance was located in the public sector, 13.2% took place in universities, and 71.1% was located in industry as of 1980. Accordingly, it is clear that, the policy makers in the USA place a great deal to improving their human capital, by mean of increasing the role the universities; where the experts were provided with all the necessary means to generate new knowledge. And now as technologies and new industries are becoming more sophisticated in the US, universities are playing an ever more important role in the processes of invention, innovation and commercialization (Pro Ton Europe 2007).

Actually, tangible evidences suggest that knowledge and information are capable of helping nations to achieve developmental goals (Kefela 2010), however, the question which can be raised in this case, is why all this stress and emphasis on the importance of knowledge for sustainability?

Knowledge as a Tool for Sustainability, the “Why”

Before proceeding the why question, it is important to clarify what knowledge means, and how it can be defined. There are two main principles that should be put into account regarding any attempt of defining knowledge are: Firstly, there are as many definitions of knowledge as there are people who regard themselves as knowledgeable (Toffler 1991); secondly, There is no single, universally agreed definition of knowledge, nor any prospect of one (Woodend and Painting 2009). Thus, all the attempts of defining knowledge are illuminations which can help to understand what knowledge really means. Davenport and Prusak (2000) provide a comprehensive definition of knowledge. They see knowledge as: *“a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers.”* Although the previous definition is a comprehensive one, however, it can be regarded as a speculative definition; therefore, a more practical definition will be adopted in this paper. The adopted definition in fact, is a combination of two different definitions. The first one is that by Toffler (1991), who defined Knowledge as:

“Information that has been further refined into more general statements.” (p35).

The second is Chen and Dahlman's (2004) definition, which is:

“...-all what can be achieved from- the stock of human capital, the level of domestic innovation and technological adaptation, and the level of information and communications technologies (ICT) infrastructure.” (p1).

A close look to the two previous definitions will make the reader notice that:

- 1- Toffler's definition is too general, and somehow ambiguous.
- 2- Chen and Dahlman's definition is a sort of precisising the sources of knowledge.
- 3- Both of them don't fit the Muslims worldview; by disregarding the religion as a source of knowledge, because it is as a non-refined subject (because when can experience Allah's existence but they cannot examine it).

Therefore, knowledge can be defined as: *“All the tacit and explicit religious truths that derived from the revealed sources, and all the tacit and explicit information which was derived from the stock of human capital, the level of domestic innovation and technological adaptation, and the level of information and communications technologies (ICT) infrastructure that has been further refined into more general statements.”*

This new attempt of conceptualizing knowledge is actually an effort to bring back the consideration to the revealed knowledge as a momentous source of knowledge (as one of the crucial differences between the secular Western and the Islamic worldview concerning knowledge). In short, knowledge means all the accepted religious truths and the refined scientific information which allowed humankind to wisely utilize the blessings of the universe for their benefit and their success in this world and in the hereafter.

After this attempt of conceptualizing the concept of knowledge, it is time to turn back to answer the Why question (why Knowledge is an important tool for sustainability?). In his delightful book titled *“Powershift”*, Toffler (1991), thoroughly discussed the earlier question. According to him, today the world mainly based on three sources of power, which are: force, wealth and knowledge. Among these sources of power (or sources of development), knowledge is the crux of development and power, and this because of its unique characteristics. Toffler (1991) considered the following to be the most important characteristics of knowledge:

- 1- **Knowledge is a high quality power:** in order to see how knowledge is flexible, the following comparison was illustrated between the three sources of developments. The threat of official violence (force) in society helps keep the system operating, making ordinary business contracts enforceable, reducing crime, providing machinery for the peaceful settlement of disputes. In this paradoxical sense, it is the veiled threat of violence that helps make daily life nonviolent. But violence in general suffers from important drawbacks. To begin with, it encourages us to turn up to an arms race that increases risks to everyone. Even when it "works," its victims or their survivors look for the first chance to strike back. Therefore, force or violence is inflexible. Wealth, by contrast, is a far better tool of power. A fat wallet is much more versatile. Instead of just threatening or delivering punishment, it can also offer finely graded rewards. Wealth can be used in either a positive or a negative way. It is, therefore, much more flexible than force. Wealth yields medium-quality power.

The highest-quality power, however, comes from the application of knowledge. High-quality (flexible) power (according to Toffler) is not simply clout. Not merely the ability to get one's way, to make others do what you want, though they might prefer otherwise. High quality implies much more. It implies efficiency—using up the fewest power resources to achieve a goal. Knowledge can often be used to make the other party *like* your agenda for action. It can even persuade the person that she or he originated it. Of the three root sources of social control, therefore, it is knowledge, the most versatile, that produces what Pentagon brass like to call "the biggest bang for the buck." It can be used to punish, reward, persuade, and even transform. It can transform enemy into ally. Best of all, with the right knowledge one can circumvent nasty situations in the first place, so as to avoid wasting force or wealth altogether. Knowledge also serves as a wealth and force multiplier. It can be used to augment the available force or wealth or, alternatively, to reduce the amount needed to achieve any given purpose. In either case, it increases efficiency, permitting one to spend fewer power "chips" in any showdown.

- 2- **Knowledge is an ultimate amplifier:** knowledge itself turns out to be not only the source of the highest-quality and flexible power, but also the most important ingredient of force and wealth. But differently, knowledge has gone from being an adjunct or assistant of money power and muscle power, to being their very essence. It is, in fact, the ultimate amplifier. This is the key to the *power shift* that lies ahead, and it explains why the battle for control of knowledge and the means of communication is heating up all over the world. An example for that, all the military weapons are based on knowledge; and the same thing can be said when we talk about business, in all supermarkets nowadays, bar coding is becoming near universal, with fully 95 percent of all food items marked with the "Universal Product Code" (UPC), which is in fact, a computer system.
- 3- **Infinity:** force, for all practical concerns, is finite. There is a limit to how much force can be employed before we destroy what we wish to capture or defend. The same is true for wealth. Money cannot buy everything, and at some point even the fattest wallet empties out. By contrast, knowledge does not. We can always generate more.
- 4- **Simultaneously usage:** Knowledge is also inherently different from both muscle and money, because, as a rule, if I use a gun, you cannot simultaneously use the same gun. If you use a dollar, I can't use the same dollar at the same time. By contrast, both of us can use the same knowledge either for or against each other, and in that very process knowledge may even still be produced more and more.
- 5- **Sources of fairness and equality:** a last, even more crucial difference sets violence and wealth apart from knowledge as we race into what has been called an information age, by definition,

both force and wealth are the property of the strong and the rich. It is the truly revolutionary characteristic of knowledge that it can be grasped by the weak and the poor as well. Thus, Knowledge is the most democratic source of power.

Those were some of the characteristics that qualified knowledge to be the crux of development and power in the modern age. Therefore, if this is the case, when all people accept the fact that, knowledge is the ultimate tool of development; and with the massive development of the ICT, where almost everyone is capable to access to knowledge, why there are still failure states and undeveloped countries? This question will lead the discussion to the “How” question. So, how knowledge can be used for sustainable development?

Using Knowledge for Sustainability, the “How”

After all the previous important introductions, now it is significant to give a sufficient answer for the How question. Subsequently, how knowledge can be used to improve and develop a nation? Before answering this question, it is important to know the following fact. Economic change in fact, is largely a process by which knowledge is transformed into goods and services; therefore, creating links between knowledge generation and enterprise development is thus one of the greatest challenges facing developing countries (UN, Millennium Project 2005). This process of linking knowledge and development is called in the Western World: “Knowledge Transfer”, or the “third mission” of the university.

Basically, the knowledge transfer system is an efficient mechanism to turn scientific discovery into new and exciting products and services in the marketplace and generate added value, wealth and jobs (Pro Ton Europe 2007). In all the developed countries where knowledge based development was established, (most of those countries have made investment in science, technology, and innovation a national priority for more than 50 years, in some cases for more than 100 years), the knowledge transfer professionals and centers are crux of sustainability process. For instance, Knowledge transfer professionals have been organized through a professional body in the USA, it is called the American University Technology Managers Association (AUTMA), in the 1960s. Since then, the AUTMA has watched over the interest of knowledge transfer professionals in the US and Canada, providing training and facilitating their professional development, as well as giving them a voice in policy making (Pro Ton Europe 2007). In the following illustration it is possible to see how the US policy makers are bolstered by those professionals (see Figure, 1). The illustration shows that, the US policy makers are well supported by knowledge makers and knowledge transfer professionals.

When the policy makers need to take a decision regarding a political, economic or social issue, a systematic process will be followed:

- 1- The universities and the research centers will take the first step by conducting studies concerning the issue under discussion.
- 2- The studies will be financed via different sources, banks, corporation... etc.
- 3- The researchers will submit the results of their studies to the policy planning groups in order to make the final reports.
- 4- The final report will be submitted to the policy makers. Whom then they make their decision, on the base of that final report.
- 5- The report and the decision will be passed to the public opinion makers, to prepare people to receive the decision.
- 6- The same report will be passed to the law makers to support the decision with laws.
- 7- Then lastly, the order will be given to people in charge to apply the decision of the policy makers.

This was an example illustrating how knowledge can be used to make a policy of a nation. It is clear how the universities and the institutions are contributing in the development process in the developed countries. Actually, Knowledge transfer and innovation are fields which have been increasingly attracting the attention of policy-makers and governments in US in recently (Pro Ton Europe 2007).

Creating links between universities and industry in the US started after World War II through the federal research funding. However, this relationship between knowledge generation and enterprise development took a serious manner after so called The *Bayh-Dole Act*. In December 1980 the US Congress enacted the 'University and Small Business Patent Procedure Act', co-sponsored by senators Bayh and Dole. The Act created the first uniform federal patent policy and essentially changed the whole approach to intellectual property derived from federally-funded research, as it brought with it **rights and obligations** for institutions receiving such funds. So, in short linking the two sectors in the US was a political will at first.

In order to suggest some solutions regarding the issue of sustainability in Algeria, it is important to have an idea about the condition over there. As long as this paper is trying to highlight the importance of knowledge as a tool of sustainability, however, the Algerian policy of higher education and scientific research will only be discussed.

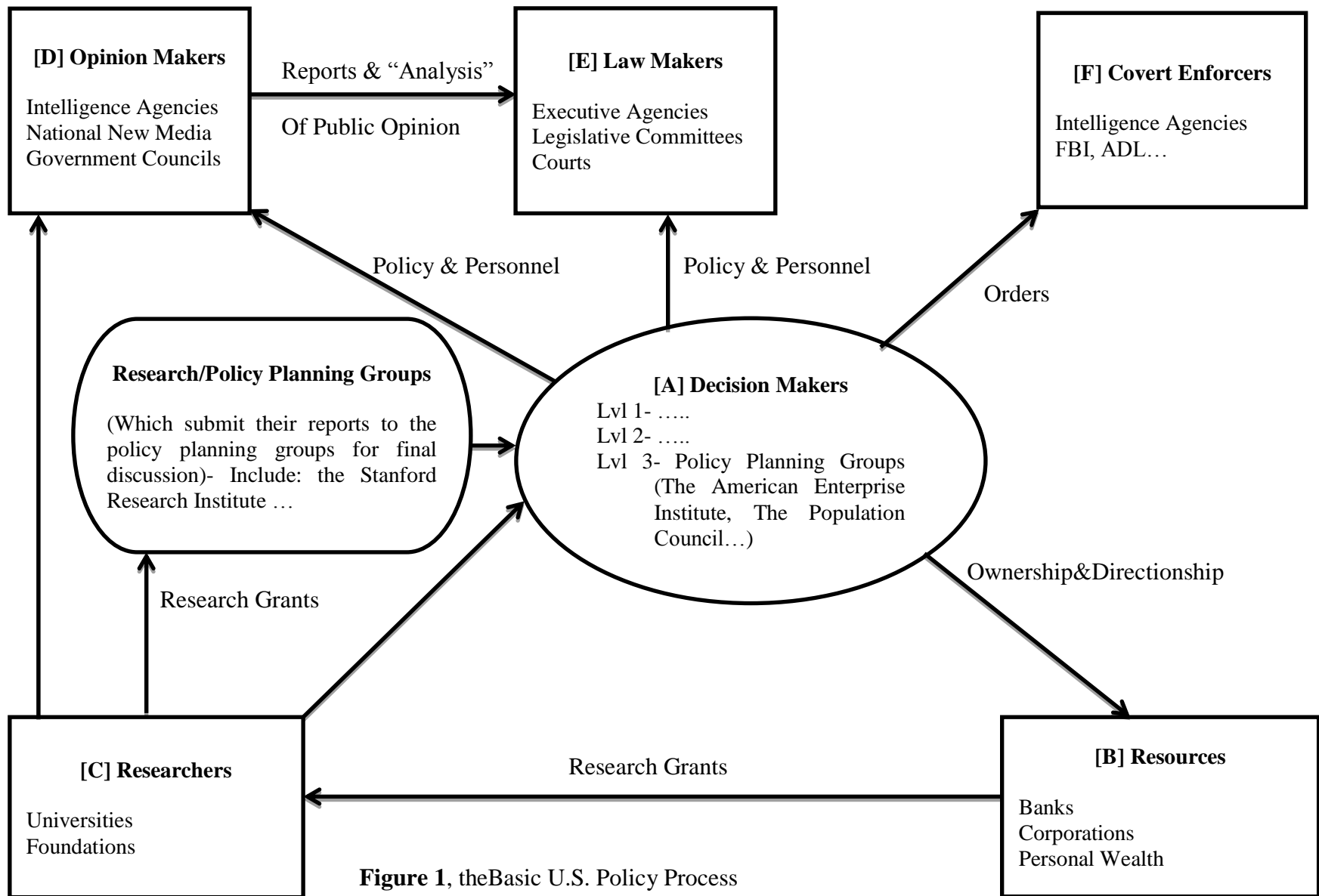


Figure 1, the Basic U.S. Policy Process
Source: Springmeier, 1991.

Knowledge and Sustainability in Algeria, Realities and Prospects

1- Realities

In its 2012 report, the Bertelsmann Stiftung's Transformation Index (BTI) [which is a global assessment of transition processes in which the state of democracy and market economy as well as the quality of political management in 128 transformation and developing countries are evaluated] the Algerian education policy and R & D, was rated 4 out of 10 in its measuring scale (from 1 (lowest) to 10 (highest)), which reflect according to the report, the low quality of the education policy and scientific research in Algeria. The report discussed many social, economic, environmental and political issues. Based on the Bertelsmann Stiftung's report (2012), however, a summary will be given regarding the education and scientific research policy in Algeria.

In general, the country ranks only 127th out of 179 countries according to the 2009 UN Education Index. While Algeria ranks respectably with regard to primary education enrollment (58th out of 139 countries), and even for secondary and tertiary (university) enrollment rates (ranks 80 and 87 respectively), it ranks frustratingly low (96th) in terms of its primary education, and even worse in terms of the overall quality of secondary and tertiary level education (117th for each). It also does not rank well (103rd) in terms of staff training. According to the report, these findings highlight serious flaws that have plagued the Algerian education system for decades.

In addition, the report said, with 28% of the population under the age of 14, Algeria's demography contributes considerably to infrastructural challenges in the educational system (i.e., the number of students doubled from 1998 to 2008). As a result, the Algerian state faces serious challenges in terms of educating its young population. Schools and universities, on average, have yet to provide quality education (though mathematics and the natural sciences seem to be improving). Teaching strategies rely all too often on mere repetition and do not provide students with the skills needed by the labor market. In fact, according to the World Economic Forum, an inadequately educated workforce is one of the most negative factors cited by foreign businessmen active in the country. Especially outside urban centers, schools and universities continue to languish under the effects of past investment deficits (e.g., overcrowded classes, deficient internet access).

The report stated that, as a result of some economic and social reasons, an estimated 500,000 of a total 8 million students drop out of school annually (figures include both primary and secondary systems). Private high schools, which allow taking the French and Arab baccalaureate in parallel (thus allowing easier access to French universities) have come into existence, but remain out of reach for most families. Algeria suffers considerably from a brain drain by which promising Algerian graduates of universities abroad (e.g., engineers, doctors and scholarly researchers) often feel the draw of better pay in their host countries and do not return to Algeria. According to the Oxford Business Group, the emigration of researchers and specialists in recent years has meant an estimated loss of \$40 billion for the country. The government has responded by tightening the system of students' scholarships.

Relying on World Bank Data, the report mentioned that, Algeria spent 4.3% of its GDP on education in 2008. In 2007, state expenditure on education and professional training was 10.7% of the total budget, compared to 2005, when 13.5% of the state budget was directed towards education. Yet, according to government plans, the share allocated to education will increase, primarily due to ambitious development programs. The budget for 2011 foresees a budget share of more than DZD800 billion out of DZD3.4 trillion (23% of budget share) for

primary, secondary and higher education, research and vocational training, against DZD234 billion in 2009. Around DZD212 billion (6.2% of the state budget), are being allocated to higher education and R&D. While it is difficult to separate higher education and R&D in the Algerian budget, it can nevertheless be stated that in 2011, Algeria is allocating more than 7% of its GDP to education in general and less than 1.78% of GDP to R&D. R&D in private companies, according to the report, does not seem relevant for the time being.

In short, the report concluded that, Algeria must be considered educational underachiever compared to its overall human development level. The country ranks only 127th out of 179 countries according to the 2009 UN Education Index. The education sector has been plagued by strained relations between the teaching staff and the ministries of education and higher education due to inadequate pay scales for educators and the hesitant recognition of autonomous unions. Throughout the period under observation, several teacher strikes have taken place to demand better working conditions and higher salaries.

It is true that what was mentioned previously were shocking and dreadful facts. However, this does not mean the conditions are hopeless in Algeria; in fact the country has all the human and material qualifications to be a leading country regionally and internationally. Thus, how Algeria can be able to achieve this aim?

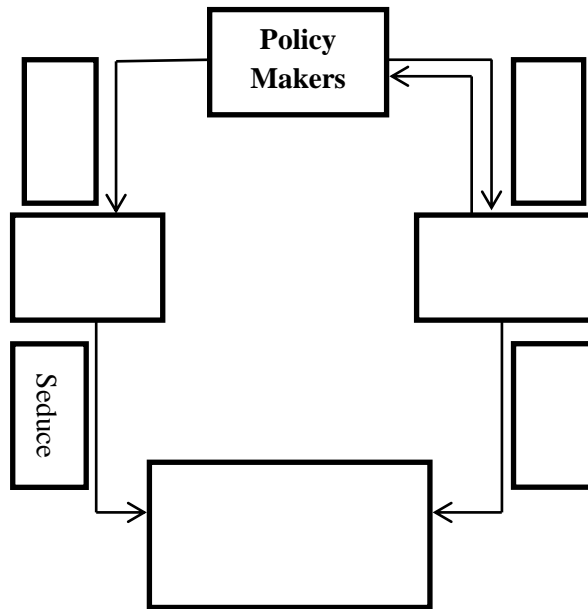
2- The prospects

In the following, few suggestions regarding the usage of knowledge for development will be shared. In fact is it just an attempt of adding the author's voice to the voices which have been already raised, to make use of knowledge for sustainability. The suggestions are as follow:

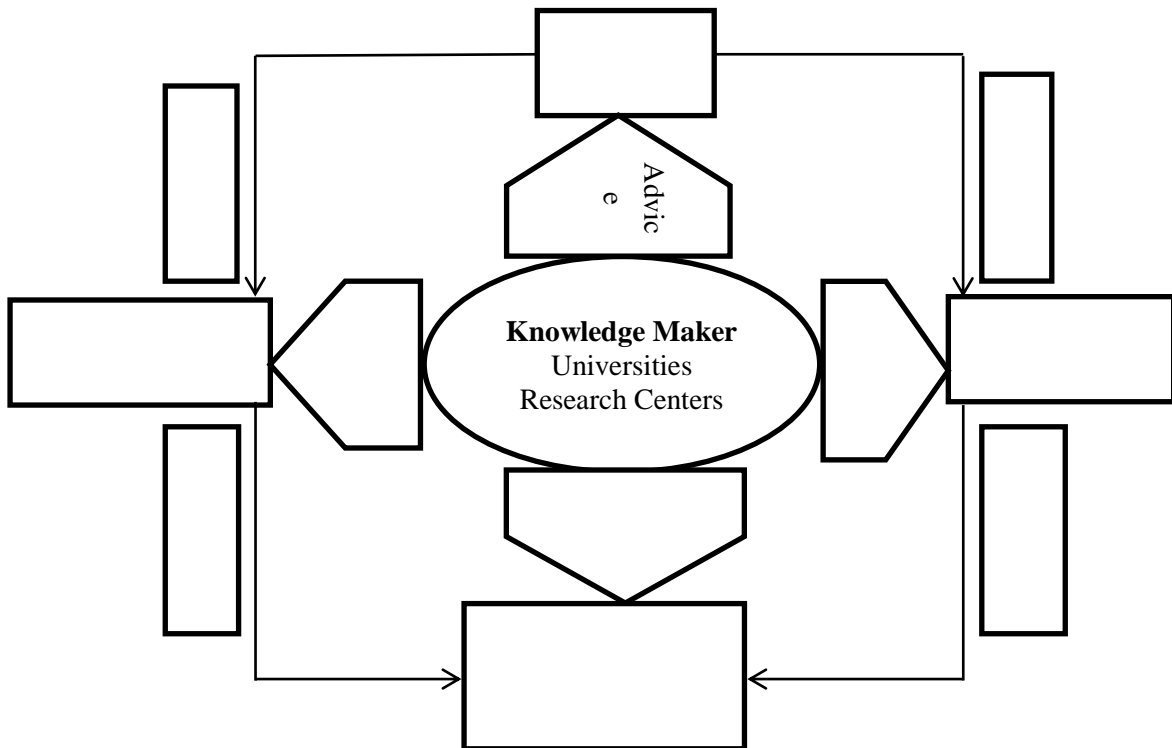
- 1- The first challenge the Algerian policy makers must overcome, is finding means to reinstate social and political peace in the country. This time,neither using force nor seducing citizens with the oil wealth; both of them are low quality power, they may silent people for sometimes, but the problems will start all over again.The Algerian policy makers must use the power of knowledge this time. They need to seek the help of universities and research centers, and they have to offerall the material and the financial supportto them,in order to find real solutions and ways to achieve the aimed social and political peace. In the below illustrations, the author explained how the wealth, force and knowledge can be used. (see Figure 2).

Figure 2,Force, Wealth and Knowledge and Restoring the Social and Political Peace (by the Author)

a- The Use of Wealth & Force for Restoring Social and Political Peace

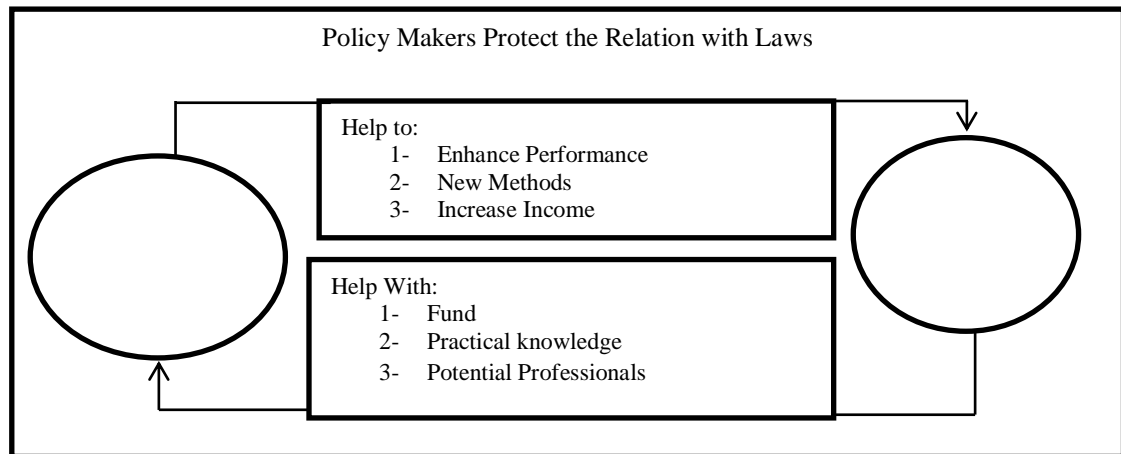


b- The Use of Knowledge for Social and Political Peace



- 2- The Algerian policy makers have to linking the universities and the research centers with service and industrial sectors, and enforce it with laws to protect both sides. This action will help both sides. From one side, the universities and the research centers will: a- find new sources of funds, b- in addition to the theoretical knowledge that students and lecturers have, they will gain practical knowledge as well, and c- universities will prepare potential knowledge transfer professionals. From the other side, the industrial and the service sectors will: a- enhancing their workers' performance, b- finding new methods to make things done, c- increasing their incomes. (See Figure, 3).

Figure 3, Linking Knowledge Makers with Industry (by the Author).



- 3- Relying on the fact that, Algeria has a religious based culture; the author suggests using the term “*Isitkhlaf*” instead or interchangeably with the term SD. The concept of *Isitkhlaf* has a strong religious, social and even academic motivational power. The concept reflects a deep meaning in the (conscious and unconscious) Muslims' minds.

In general, this is the author's point of view regarding the importance of knowledge and knowledge shafting in the process of *Isitkhlaf*, or what is called now Sustainable Development.

Conclusion

This paper was mainly attempting to stress the importance of knowledge as a tool of sustainability. A number of justifications were given to support this claim. The USA experience of knowledge based sustainability was mentioned in this paper; the reason of that is not a result of the inferiority complex toward the West in general and the US in particular, rather, is a critical learning from an experience of a developed nation. Therefore, the author believes that, it is a wise act to benefit from the good ideas of the West, and through away what is harmful for us. The paper also highlighted the importance of using the concept of *Isitkhlaf*, rather than sustainable development, regarding religious, cultural and academic value among Muslims in general. In the end some suggestions were shared in order to restore social and political peace and sustainability in Algeria, and this by relying on the power of knowledge rather than wealth or power only.

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