“Innovation and Quality Management in Small and medium enterprises”

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Abstract:

Obviously, SME sector is seen as the engine of growth for economies, mainly for the reason that SMEs employ the largest percentage of the workforce population all over the world. Although, the trend towards global market orientation and trade liberalization, SMEs are moving towards implementing innovation and quality systems in ways that help them achieving a competitive advantage and ensuring a steady place in the marketplace. This work aims to explore the implementation of innovation and quality systems in SMEs in order to understand and measure the impact on the economic success of SMEs of both; Innovation and quality Management tools and especially that this impact has been well studied but not, well understood, yet. The findings of our empirical study show that the majority of the surveyed Firms have not given a sufficient attention for developing their innovative activities as well as their quality systems. The results of our study might be interesting for local SMEs in their attempts to enhance their innovation and quality systems.

Key Words: Innovation, Quality Management, SMEs, Algeria.

Introduction:

I.1. Innovation and firm size:

The relationship between Innovation and firm size has been included and studied on the Schumpeterian works and empirical literature which relate some measures of Innovation activity to a measure of firm size, through applying it on firms from one or several countries and regions. **Scherer** (1992) declared that firm size is exogenous, and that it is clear that Innovation affects firm growth and market share and then, the firm size in period t is influenced by the innovative activity of that firm in the period t-1. Several factors, however

affect the innovative activity, and these factors are correlated to the firm size in year t, so a regression of innovative activity on size will produce biased estimates of the size coefficient.[1] But we argue that the effect of the innovative activity on firm size occurs only after a gap of some years. **Cohen and Levin** (1989) confirm that *there would be found another problem with the empirical studies of the firm size and its relationship with the innovative activity, which is due to the need to control for industry effects, mainly because firm size is likely to be related to several industry factors such as technological opportunities, the industry structure and so on, and then it is so important to control for industry effects on firms to avoid taking biased estimates of firm size coefficient while using a sample covering different firm sizes from different industries*. Several other studies have focused on the same issue but each in its way, **Scherer's** influential studies for example focused mainly on R&D employment intensity which is the R&D employment relative to the total employment, on sales, and number of patents on sales both for the whole sample and for several sub-samples for particular sectors. **Kamien** and **Schwartz** (1982) in their survey concluded that *with an exception of the chemical sector, there was a little support for the hypothesis of a positive effect of firm size on the innovative activity*.[2] **Pavitt, Robson** and **Townsend** (1987) have also examined the relationship between firm size and innovative output. The broad picture they present offers little support for the Schumpeterian hypothesis of a positive effect of size on Innovation.[3]

In his study about the US firms, **Schmookler** (1966) found that smaller US firms have a higher propensity to patent their Innovations than larger ones, and proposed that this may somehow explain why smaller firms account for a huge number of patents which is disproportionate to their size and their R&D expenditures. In the other hand, these studies included both firms that perform formal R&D activities and those which do not perform any of these activities; and it's obvious that smaller firms with less than 100 employees do not perform any formal R&D activity, this fact can lead also to the same line of the Schumpeterian hypothesis. It was recognized that once the huge majority of firms that perform no formal R&D are excluded from the analysis, the relationship between the firm size and the R&D activity, or the innovative activity is weak, nonexistent or even negative.[4]

Other studies such as **Acs and Audretsch's** emphasized on average innovative intensities that is the number of Innovations divided by the total number of employees found a

[1] Scherer F.M (1992), "Schumpeter and Plausible Capitalism", Journal of Economic Literature 30, pp. 1416-1433.
[2] Kamien, M.I. and Schwartz N.L. (1982), "Market Structure and Innovation", Cambridge: Cambridge University Press.
[3] Pavitt, K., M. Robson and J. Townsend (1987), "The Size Distribution of Innovating Firms in the UK: 1945-1983", Journal of Industrial Economics, 35, pp. 297-316.
[4] Schmookler, J. (1972), "The Size of Firm and the Growth of Knowledge", in J. Schmookler, Patents, Innovation and Economic Change, Cambridge, Mass.: Harvard University Press.

negative relationship between firm size and Innovations or innovative activity, mainly because the number of Innovations is divided by an increasing number of employees and while the number of employees is getting higher and higher, Innovations are increasing but not with the same speed, for example we take two firms A and B, and if we propose that the firm "A" size is 10 employees, while the firm "B" size is 500 employees, and that the numbers of Innovations realized in the period "t" for the two firms are: 1 Innovation for the firm "A" and 30 for the firm "B", then we get the innovative intensity average for the firm "A" is 1/10=0.1 while it is 30/500=0.06 for firm "B"; from here we can find that the innovative intensity for firm A is much higher than firm B innovative intensity, even if the firm B is innovative much more than firm A. therefore, it is however, hard to compare the innovative intensities averages between firms with deferent sizes and deferent industries. So it's much better if the comparison is made within the same sample according to their size. **Acs** and **Audretsch** concluded also that "*there exist a deference between firms from different industries even if they have the same size, because the innovative activity relies also on the industry characteristics, so the debate was on which industry characteristics favor either small or large firms*". [5]

Several studies that emphasized on the relationship between the firm size and R&D intensity such as **Bound et al** (1984) study, where they found a U relationship between the two variables (the R&D intensity first decreased and then increased with size) it means that both small and large firms were more R&D intensive than medium-sized firms. The same Authors took the fact that many firms do not report their R&D will bias results based only on firms which do. And their findings through using Ordinary Least Squares (OLS) regression were not different in both cases (when they included firms which report their R&D, and when they excluded them from the sample), and non linear econometric techniques were applied in an attempt to correct for possible selectivity bias.

Cohen et al. (1987) also ran OLS regressions of R&D intensity on both firm and business unit size for a sub-sample of R&D performing business units, using either fixed effects or variables related to appropriablity conditions and technological opportunity to control for industry characteristics. Recognising the possibility of selectivity bias in samples excluding business units not engaged in R&D, they also analysed the whole sample using Tobit techniques. On the whole, neither size variable had a statistically significant effect on R&D intensity when a very small number of outliers, namely seven very large firms with very high reported R&D intensity relative to their size, were removed.

[5] Acs, Z.J. and Audretsch D.B. (1990), "Innovation and Small Firms", Cambridge, Mass.: MIT Press.

Appropriability and technological opportunity at the industry level explained much of the variance in R&D intensity between firms. On the other hand, a threshold effect was identified, using a probit model to explain the decision of the business unit to do R&D: the size of the business unit, but not the overall size of the firm, had a positive and significant effect on the probability of conducting R&D. Finally, the authors also found that the exclusion of business units not engaged in R&D resulted in a modest upward bias in the (typically insignificant) firm size coefficient, i.e. the effect of firm size on R&D intensity was overstated in the OLS regressions. However, since the qualitative results were identical in the two specifications, Cohen et al (1987), they also concluded that selectivity bias is probably not a major problem in studies of the firm size-R&D intensity relationship.[6]

Finally, **Patel** and **Pavitt** (1992) examined the relationships between firm size and R&D expenditure, on the one hand, and firm size and number of US patents, on the other, and they found for a great majority of those firms increases in R&D expenditure with firm size were not significantly different from proportional, while in some particular sectors such as chemicals, mining and motor vehicles they were more than proportional.[7]

We can see that there exist several limitations in the studies that emphasized on the relationship between firm size and the innovative activity such as the problems with measuring innovative activity, the potential endogeneity of firm size, the difficulty to control properly for industry effects, the specific mechanisms, such as scale economies, financial constraints, appropriability conditions etc, that presumably relate Innovation to firm size, and the undereporting of R&D by small firms. **Cohen** and **Levin** (1989) argue that "*a great majority of the literature paid attention to firm size as a main characteristic that determines the innovative activity, while only some of the studies highlighted some firm specific characteristics other than size*".[8]

In his study, **Symeonidis** (1996a) summarized that "*what is then the compromise, if any, on the relationship between firm size and innovative activity?*

First, the large majority of very small firms do not engage in R&D, although the extent to which some small firms do informal R&D is difficult to assess. Second, above a certain threshold firm size, R&D

[6] Cohen, W.M., R.C. Levin and D.C. Mowery (1987), "Firm Size and R&D Intensity: A Re-examination", Journal of Industrial Economics, 35, pp. 543-563. cited in G. Symeonidis, (1996) "Innovation, firm size and market structure: Schumpeterian hypotheses and some new themes" economics department, working papers no. 161, the OECD; Paris, France, p 10.
[7] Patel. P. and K. Pavitt (1992), "The Innovative Performance of the World's Largest Firms: Some New Evidence", Economics of Innovation and New Technology, 2, pp. 91-102.
[8] Cohen, W.M. and R.C. Levin (1989), "Empirical Studies of Innovation and Market Structure", in R. Schmalensee and R.D. Willig (eds), Handbook of Industrial Organization, Vol. II, Amsterdam: North-Holland.

seems to rise more or less proportionally, on the whole, with firm size, although there are variations of this pattern across industries, time periods and countries. Third, the evidence on the relationship between innovative output and size is inconclusive"; most authors would probably agree that innovative output tends to rise less than proportionately with firm size, although other patterns have also been suggested for particular industries, periods or countries. Fourth, smaller firms seem to produce more Innovations or obtain more patents relative to their formal R&D spending than larger firms.[9] But we believe also that more attention must be paid for some other characteristics such as technological opportunity, strategic interaction, the characteristics of demand, and even chance play an important role to enhance the innovative activity within the firm, either if it's a large or a small firm.

Small and middle sized firms play an important role in advancing economic growth and that trublence and change in the economic system accompanies this growth so that it is reasonable that small and middle sized firms play an important role in the innovation perspective of the economy.

In the global economy, three central long-term paradigms for successful organizations can be recognized, which requires a comprehensive holistic and integrated management that takes all three paradigms into consideration. For that process-oriented quality management offers a disposition that aims at the long-term sustainable and continuous improvement and optimization of the complete organization:

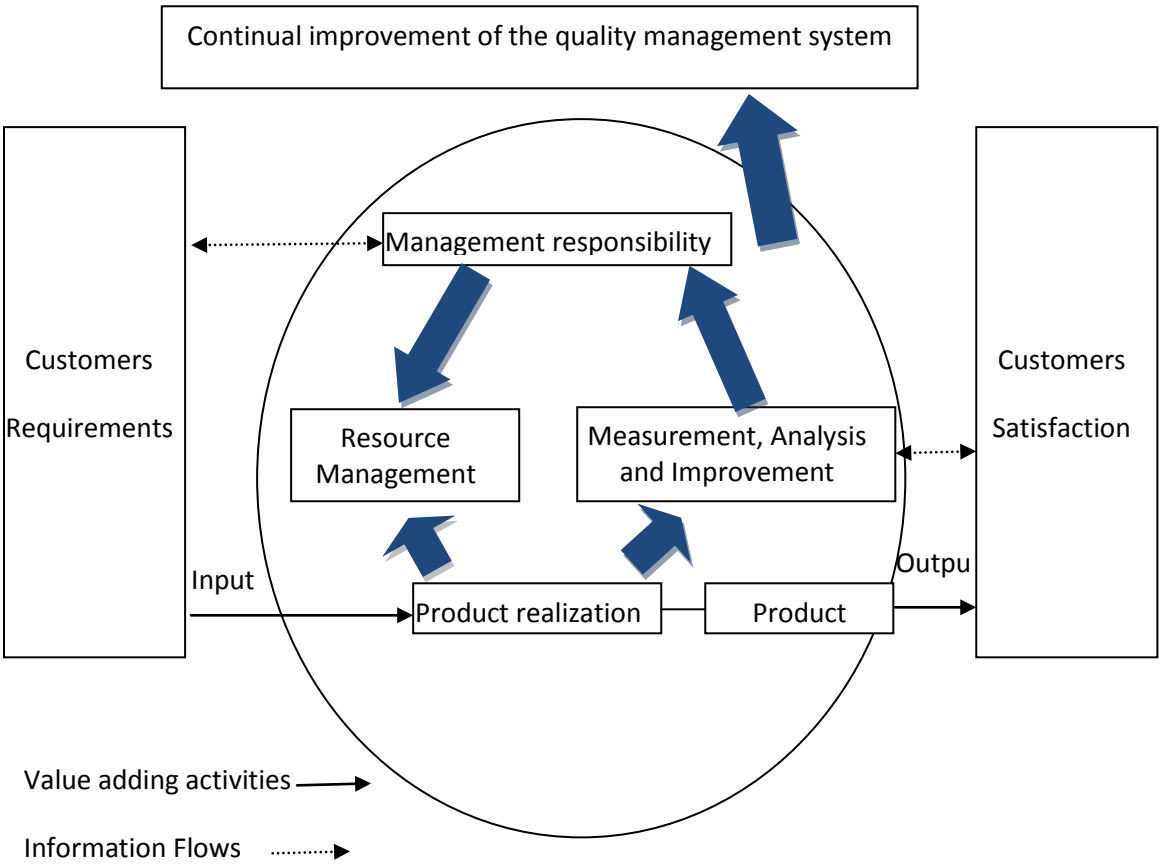
1. Customer orientation: Instead of the provider/ prducer view and the fixation on products, the customers more and more come to the fore.

2. Process orientation: Instead of the functions and rigid hierarchies in organisations, overlapping processes become more important.

3. Quality orientation: Instead of quantity and the mere sales volume, quality becomes more decisive for the customer relationship and the business success. (Ch. Stracke; 2006) [10]

[9] G. Symeonidis, (1996) "Innovation, firm size and market structure: Schumpeterian hypotheses and some new themes" economics department, working papers no. 161, the OECD; Paris, France, p 11.

[10] Stracke Ch.; 2006; Process-oriented quality management, Handbook on Quality and Standardisation in E-Learning , Part A:, 79-96, DOI: 10.1007/3-540-32788-6_6



Source: Stracke Ch.; 2006; Process-oriented quality management, Handbook on Quality and Standardisation in E-Learning , Part A:, 79-96,

New Product development Barriers

There exist so many barriers to New products, including economic, organizational, and cultural barriers, but in our research we are going to take the example of marketing barriers to Innovation. Marketing barriers to Innovation include some kinds of the other barriers too, so we will try to make it as short but clear as we can; however according to several researches in this domain, marketing barriers to Innovation can be classified into two types:

- Barriers to reach the market, and
- Barriers to build a customer base

I.1.a. Market barriers:

This type of marketing barriers faced by firms includes all the barriers that make it hard for firms to convert their ideas into viable and valuable Innovations (products and/or services). The firms then face four barriers while trying to successfully commercialize their Innovations to several adopters within the marketplace. These four barriers can be

denoted by the acronym RAMP, which means 1) Regulatory barriers, 2) access (to market) barriers, 3) money (or capital) barriers, and Product development barriers.

I.1.b. Regulatory barriers:

More than large enterprises; small and medium enterprises generally have to deal with the laws and regulations designer for them by government organizations, furthermore they (SMEs) need to cope with all the environmental factors that minimize the freedom of the firms to make their own decision, enterprises must know then that a "free enterprise" does not mean a "free ride"; *the lack of legal knowledge may well be the biggest constrain of the entrepreneur*[11] (Brown and Colborre 1987).

I.1.c. Access (to market) barriers:

Every company which is developing a new Innovation (product and/or service) is in need to get into the market where it aims to commercialize its Innovation; subsequently entrepreneurs must plan the physical distribution channels of their products from the production unit to the point-of purchase where products become available to the customer. However, a successful new Innovation may fail owing to inadequate reach in the market.

I.1.d. Money (or capital) barriers:

Firms are often aiming to raise their capital, but they almost all the time do not know how to get more financial supports from the available financiers in the market where they work, not only because financiers does not want to offer them their support, but mainly because those firms does not know how to catch the attention of the financiers; firms in fact have to market their ideas newness in their products and/or services to those financiers, to do that firms are often unable to create a good marketing plan for their new Innovations which is vital to attract the financiers.

I.1.e. Product development barriers:

Firms all over the world may face difficulties in transforming their ideas into prototypes and then their prototypes into useful products that might be commercialized into the marketplace, but sometimes product development barriers may be a good competitive advantage mainly because as much as other firms encounter that kind of barriers they become less innovative and especially that they cannot even imitate the new product.

[11] Brown, C A, and Colborne C.H (1987), "legal issues in the new venture development", in proceedings of the seventh annual Babson College Entrepreneurship Research Conference.

I.1.f. Barriers to build a customer base:

This type of marketing barriers to Innovation take account of all the barriers that are encountered by the firms at the customer level, such as 1) performance value barriers, 2) Image barriers, 3) Compatibility barriers, 4) Trading barriers, and 5)Risk barriers. One, however, can denote those barriers by the acronym PICTR which can be highlighted as follows:

I.1.g. Performance value barriers:

This kind of barriers is created if the customer fails to see and understand an adequate performance to price in the new Innovation (product or service), or if the firm fails in its segmentation, targeting or positioning for the new product, this might happen when firm doesn't have a good knowledge of its market or of its customers. And this barrier can be solved via doing more market research and analysis.

I.1.h. Image Barriers:

This kind of barriers is found due to the complex consumers' belief systems, and especially when customers rely on previous knowledge or ideas when they think of some products or services, names, brands or companies. For instance, we can find customers this that they should never buy from a small, unknown store or company, when they can do so from a larger, well-known one)

I.1.i. Compatibility barriers:

Compatibility barriers can be found, if the new product or service is either incompatible with the standards, or if it does not fit well with the customers' environment, the major limitation that a firm has to overcome is the lack of market orientation in its activities.

I.1.j. Traditional and Cultural Barriers:

Several conflicts with the cultural norms and values of the customers might be confronted by a firm and they are likely to create such a complex barrier for firms (especially for new ones); then firms are obliged to respect and adopt their policies and objectives with the customers' cultural and traditional values.

I.1.k. Risk Barriers:

Customers everywhere want to maintain their health, wealth and peace of mind, but they however cannot do anything without calculating the risk taking, in any step they take, and especially when it comes to product purchasing. They in fact ask several questions before they make the purchasing decision in order to avoid several kinds of risk, such as physical risk (will the new product harm me or my family?), functional risk (will it perform properly?) economic risk (is it too expensive?), social risk (what will others think of me if I buy it?) and psychological risk (am I good enough to manage it? By the way, since customers know that product is risky, many of them do not purchase it. Firms who are trying to create a new product are somehow obliged to know all the risks that a customer may confront by the new product, and they must minimize those risks as best as they can.

Innovation, Quality and competitive advantage:

There is no doubt that the development of a competitive advantage is a very important business policy issue which makes almost all firms globally in the same position and which necessitates them to work hardly to gain some profits in ways that benefit the organization and its stakeholder, this problem creates a need for policy makers all around the world to develop their economies in order to be competitive within a broader economic system, in fact, there are so many ways to gain competitive advantages (OECD 1995)[12] just like Innovation which is cited as the primary source of competitive advantage (Porter, 1990)[13] and central to marketing strategy (Varadarajan & Jayachandran, 1999)[14]. Innovation is theoretically proved to be the best way to gain a competitive advantage through using both technical (product, service) and non-technical innovations (management, marketing) in a firm's competitive strategy. Innovation is, very often, defined as a source of factors which lead to improving the productivity as well as increasing the profits of any firm, it includes so many factors of value creation, and that's why it became one of the most important ingredients for firms' competitiveness; moreover, Innovation is considered also as one of the most important factors of growth for firms and especially that it helps firms to differentiate their products and services, in order to fulfill their customers' needs and expectations. Innovation may help firms to avoid the price competitiveness through creating such a new

[12] Geroski P.A. (1995), "Innovation and competitive advantage"; Economic department working paper, OECD, Paris.
[13] Porter (1990) Op Cited.
[14] Varadarajan, P. R. and Jayachandran, S., (1999). Marketing strategy: An assessment of the state of the field and outlook. Journal of the Academy of Marketing Science.

criterion by which customers make the difference between substitute products, instead of Price. However, Innovation is one of the ways used to improve the image of any firm or product. And in fact; Total Quality Management (TQM) reinforces the idea that improvements in quality lead to improvements[15]

in productivity

Nowadays, with the economic crisis, innovation seems to be the right solution and lever to escape from the current situation, it may help raising consumption again, and may renew the existing products and services, and moreover it can help improving the lives of employees and customers as well, through using the aspects of technical and non-technical innovations.

in 2002 the World Bank analysed the technological ability of firms to innovate and their internal willingness to change in Korea. Firms in the following figure are distributed into four groups based on the grade to which they are conscious of the need to change and the degree to which management is aware of what should be changed and how to go about changing it. At the lowest level are firms without any capacity for technological change and which do not feel any need for change. That is exactly the case of many firms in a country like Algeria.

Figure 1: **Classification of firms by their technological capability and motivation to change.**

Source: the World Bank, 2002.

[15] Diego Prior; 2006; Efficiency and total quality management in health care organizations: A dynamic frontier approach; the annals of operational research; 283.

The task of innovation system in this case should be able to move firms up the ladder described in Figure 1. It requires activities in two dimensions. Firstly, to push firms to develop their capacity to absorb technologies from abroad and innovate by providing access to different sources of technologies. Secondly, to improve the internal motivation of firms to change, this requires providing data for firms about their relative position comparing with the best practises in the world. There is also another approach known as Total Quality Management approach (TQM), and which has for a goal to reinforce the relationship between productivity and quality, and especially that it is obvious that improvements in quality lead to improvements in productivity.

1. Measuring innovation

There exist several ways to measure innovation, but the most used measures are known as the traditional measures of innovation which are R&D expenditures[16] and patents[17]. Following many studies in this domain since the 1950s, R&D expenditures can be regularly collected, usually on an annual basis, in several countries, while patent data have been collected since an earlier period of the 19th century, in the case of Algeria, patent data are available electronically on the INAPI web site[18]; in this work we are going to discuss the measures of innovation from a theoretical perspective while in the next chapter we will take both of them from data analysis and discussion. In this section we are going to analyse some statistics and tables which have been taken from several organizations such as the WIPO and the INAPI, in ways that allow us understanding more the stage in which the Algerian firms are, concerning inventions, patents, trade marks, and industrial property rights.

As it is widely known, a patent provides protection for the invention to the owner of the patent, thereby, the invention cannot be commercially made, used, distributed or sold without the patent owner's permission, this protection is required in today's market and especially with all the emitted products and services that are found in the market, generally this protection is granted for a limited period, which is 20 years in almost all the cases, and sometimes less; in this period, only the patent owner has the rights to give permission to or licence other parties to use the invention on mutual agreed terms, he may also sell the rights to someone else, as he may give them to that new owner; for free. Once a patent expires, the protection ends and then the invention becomes available to commercial exploitation by the others, and the owner no longer holds exclusive rights to the invention. In fact Patented inventions have, in fact, pervaded every aspect of human life, from electric lighting (patents held by Edison and Swan) and plastic (patents held by Baekeland), to ballpoint pens (patents held by Biro) and microprocessors (patents held by Intel, for example) All patent owners are obliged, in return for patent protection, to publicly disclose information on their invention in order to enrich the total body of technical knowledge in the world. Such an ever-increasing body of public knowledge promotes further creativity and innovation in others. Empirical evidence has shown that there was no relation between a country's score on this index and its economic growth. Increasing IP rights tend to be correlated with R&D spending, but it turns out the causality goes the other way: first a country starts spending more on R&D, and then later they increase IP rights strength. In fact the total number of patent applications grew three

[16] Expenditure on research and development (R&D) is a key indicator of government and private sector efforts to obtain competitive advantage in science and technology. In 2005, research and development amounted to 2.3% of GDP for the OECD as a whole. (OECD (2007), Main Science and Technology Indicators, OECD, Paris.)

[17] A patent is an exclusive right granted for an invention, which is a product or a process that provides, in general, a new way of doing something, or offers a new technical solution to a problem. In order to be patentable, the invention must fulfill certain conditions (source www.wipo.int)

[18] http://www.inapi.org/site/statistiques.php

times as much over the period from 1991 to 2001 as they did over the previous decade (1981-1991); moreover, real exports of OECD countries, also, grew by three times and the GDP growth over the period from 1993 to 2000 (OECD Economic Outlook, 2004)[19], so that and according to empirical studies there exist a strong relationship between innovation, patenting, exports, GDP and then economic growth.

In this way, patents provide not only protection for the owner but valuable information and inspiration for future generations of researchers and inventors.[20] In Algeria a patent may be granted from the INAPI *(Institut National Algérien de la Propriété Industrielle),* which first of all requires the person who asks for the patent to fill up a patent application which contains the name or the title of the invention its self, the indications of its technical field, the background and the description of the invention as well as the drawings, plans, or the diagrams to better describe the invention.

In 2006 the INAPI received 477 patent demands from national companies, while the whole demand for patents was 514 demands, which is really limited comparing with other countries, and even though for that raise in patents demand, from a year to another in the last decade,(see Table 3 indexed to this work, and which illustrates the patents' demand in Algeria since 1980) patenting is still need to accelerate further; the case was the same for trade marks demand from the INAPI office because it was only 2682 demands in September 2006; with a raise of 244 demands comparing with 2005. the same organization received 2875 trade mark demand to extend into the Algerian market from foreign companies, while the number of these demands was counted by 3665 demands, 31 patents was the number of the accepted patenting demands in 2006 by the INAPI, from the whole 477 demands, sometimes the rejection of these demands was because of the missing files or the uselessness of the invention its self, while some of theme was because of the policy of the INAPI, and the wasted time concerning each of the preparation and the patents' demands studies, and so on…through some interviews with local firms from which have already asked for their patents as well as the local commerce chamber, there was obviously a huge gap in time between the demands and the acceptance/rejection of the files, which is counted as a main problem and obstacle for firms to get the industrial property rights of their invention. (See table 1, index).

Foreign companies have asked for patents in algeria throgh the INAPI office, such as France who was and still is the leading country in trade marks registration in the INAPI office in 2006 the most by the number of 559 registrations and 752 renewals, while Germany came second with 338 registrations and 567 renewals, Italy was third by 254 registrations and 360 renewals, Switzerland was fourth by 198 registrations and 295 renewals and china came fifth by the number of 193 registrations and 13 renewals, the sixth place was for Spain by 103 registrations and 123 renewals; other countries have registered less numbers of trade marks in the Algerian office of patents and industrial property rights, including morocco with 54 registrations, and Egypt by 15 registrations, other countries are considered to be less interested by the Algerian market and some others do not have any interests to the Algerian patents and patents' offices. (See table 4; in the indexes) .

The next Table (Table 1) illustrates the patents' demands, registrations and renewals for national trade marks in the INAPI office in the first three trimesters of 2006(the period between 01/01/06 and 30/09/06) concerning national and foreign companies, this table shows

[19] OECD (2004) Economic Outlook, OECD, Paris. Cited in Jakob B. Madsen (2008); Innovations and manufacturing export performance in the OECD countries, Oxford Economic Papers, 60, 143–167.
[20] www.wipo.int; March 2010.

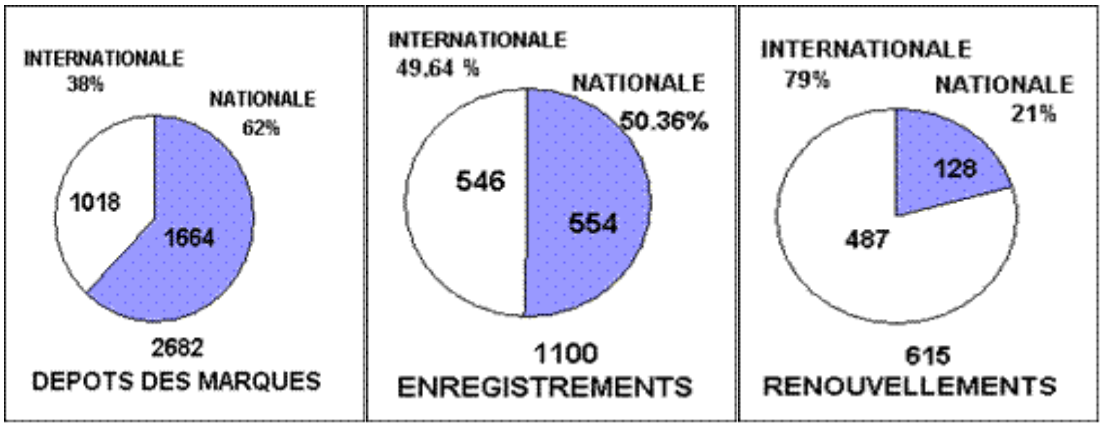
that 554 demands was accepted from the number of 1664 demands of trade marks from national companies, while 546 trade mark was registered from 1018 foreign demands, while only 128 national trade mark have renewed their patents in that period in addition to 487 foreign ones have been renewed in the same period of 2006.

In 2007, the WIPO received 84 Patent applications from the Algerian office of patents, while it was 58 applications only in 2006 and in 2008 the number was planned to be extended but data are not available neither at the WIPO's nor at the INAPI's official web sites. It was 59 in 2005 and 58 applications in 2004. (See the WIPO Statistics Database, December 2009)[21]

Table 1: Dépôt, renouvellement et enregistrement des marques nationales du 01/01/06 au 30/09/06 :

Pays d'origine du déposant	Dépôts	Enregistrements	Renouvellements
Nationales	1664	554	128
Etrangers	1018	546	487
Total	2682	1100	615

Figure 2: Dépôt, renouvellement et enregistrement des marques nationales du 01/01/06 au 30/09/06 :



Source: the INAPI web site.

Table 7 which is bellow demonstrate some statistics of patents taken from the INAPI offices, and web site, it illustrates the number of Patents delivered for national firms by the INAPI, and the number of patents demanded in the period between 1988 and 2007, we have asked the INAPI offices for recent statistics of this kind, but each time we called they kept saying that it is still confidential and that they cannot offer us such information, because they do not concern the INAPI itself but also the local firms which have asked about the patents of their products and services, as well as the ministry of the industry, anyway; was 214 in the date of 2007, while it was 590 patents in 2006 and 550 in 2005, with the exception of the drop of the number of patents in 2007, comparing with the previous year, patents number was raising by time in the last decade, while it was not steady in the 1990s; mainly because of the social, political and economic situations in that period. Algeria now is in the right way to strengthen

[21] www.WIPO.org

the patents policies within the local market, with so many laws and texts through which companies will be able and sometimes obliged to register their inventions and marks.

Table 2: Statistics of the Algerian patents until 31/12/2007

Année de dépôt	Total de dépôt	Certificats d'addition	Dépôts non résidents		Dépôts nationaux	Brevets délivrés	Brevets en vigueur
			Voie Nationale	PCT			
1988	206	01	201	/	05	/	00
1989	204	00	200	/	04	/	10
1990	235	00	229	/	06	/	12
1991	176	01	170	/	06	/	11
1992	174	00	164	/	10	/	14
1993	146	01	138	/	08	/	07
1994	145	00	118	/	27	/	16
1995	162	00	134	/	28	/	15
1996	200	02	150	/	50	91	32
1997	241	01	207	/	34	121	52
1998	309	03	267	/	42	184	106
1999	284	06	248	/	36	143	96
2000	159	02	127	/	32	78	42
2001	147	07	38	56	51	69	61
2002	334	04	41	250	43	119	167
2003	328	02	16	280	30	250	200
2004	393	01	30	304	58	290	322
2005	514	01	34	431	59	550	498
2006	669	04	47	564	58	590	669
2007	852	03	31	734	84	214	852
Total	5876	39	2590	2619	671	2699	3553

Source: the INAPI web site.

Comparing with other African countries the Algerian Resident patent filings per $billion of Gross Domestic Product in the period between 1995 and 2007 seem to be very much low than these of the other countries in the table even the countries which have the same and even a lower income, such as Zambia, Kenya, Madagascar, and even Tunisia, the less than 0.35 billion from the GDP is considered to be law comparing with Egypt which gives more than 1.35 billion for the same year (2007), while Tunisia gave 0.87 $Billion in 2005 for resident patent filings, that may be because of the reason that in Algeria this kind of expenditures is financed by public sector only, which is the case in Saudi Arabia, and Morocco.

Table 3: Resident patent filings per $billion Gross Domestic Product (1995-2007)

Country of Origin	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Algeria	0,18	0,30	0,20	0,24	0,20	0,17	0,27	0,22	0,14	0,26	0,25	0,24	0,34
Egypt	1,88	2,21		1,97	2,02	1,91	1,60	2,11	1,61	1,20	1,29		1,35
Kenya		0,40	0,58	0,69	0,63							0,74	
Madagascar	1,83	0,60			0,68	0,50		0,31	0,21	1,08		0,25	
Malawi	0,15	0,28	0,27	0,26	0,12	0,37							
Saudi Arabia	0,08	0,07	0,15	0,12	0,19	0,19	0,11	0,15	0,13	0,17	0,24	0,24	0,24
Tunisia	0,78	1,06	0,92	0,81	1,35	0,90	0,40	0,81	0,60	0,74	0,87		
Zambia	0,43	0,60			0,48		0,53						

Source: WIPO Statistics Database and World Bank (World Development Indicators), June 2009

Note: Gross Domestic Product (GDP) data are in billions of US dollars, based on 2005 purchasing power parities.

Compared with world's leader, US, whose equivalent proportion is 20%. Potential researchers in the Arab World were about 60,000 in year 2001. Research output per faculty varieties from 0.5 papers annually to less than one publication per 10 "potential researcher". An analytical study indicated that, on average, only 5 percent of university teachers' load in the Arab is utilized for research related activities while this percentage tops to 40% in advanced countries.

The majority of foreign-invested companies in advanced countries, even in medium- and high-tech industries, engage in manufacturing activities and perform little R&D in those countries. In the last decade, many governments worldwide just like the Chinese government have adopted policies to improve the quality of the R&D personnel and at the same time to reduce the number of government research institutes and employees. The higher education sector in advanced countries is one of the key pillars of the NIS and especially that it plays a significant role in Science and Technology diffusion, moreover as a supplier of S&T human resources, and particularly while the linkage between academia and industry is getting increasingly strong.

Algeria is facing quite a lot of structural challenges concerning the national innovation system; here we count for example the Knowledge and technology diffusion through industrialization of S&T products. In fact the knowledge and technology barriers are associated with poor innovation abilities within the country and an inefficient market mechanism with a lesser amount of moral rights properties' and brands' protection. There exists also the gap between national and foreign actors which makes the innovation processes much difficult.

Moreover; there are also the gaps between regions which are getting wider, with large regional inequalities in R&D activities as well. This could be a serious challenge, which is evident in other areas such as human resources, high-technology industries and the openness of regional economies. In the last decade, some advanced countries have launched various strategies designed at energising less developed regions and accelerating union through a combination of regional, financial and S&T policies, and so the African governments including the Algerian one should plan to do the same and especially that these strategies have brought a really massive profit for those countries. Algeria needs also to reward through the

international standards of S&T; actually China for instance has made so many reforms and institutional changes, in the 1990s, these reforms can be cited as follows:

- Restructuring of government research institutes through downsizing, and organisational reforms and re-orientation of governmental support towards basic and applied research.
- Expansion of the higher education sector by increasing the number of new entrants at both the undergraduate- and the graduate level, and stronger, but more concentrated financial support to the key research-intensive universities.
- Strengthening the innovation capacity of enterprises.
- Increasing openness of the market by introducing advanced technology and by generating spill-over effects in various forms at the intra- and inter-sector level.
- Creation of a technology market to facilitate the interaction among key performers.
- Encouraging science-industry linkage among key performers.

Measuring Quality:

Firms all around the world have recently invested time and money to obtain the highly valued ISO certificates from the International Organization for Standardization (ISO). As the ISO certification provides several external and internal benefits such as improving product quality, operational efficiency and productivity, competitive advantage, and market share (ISO 9000 Survey 1996 in Eurico J. Ferreira et al. 2008),[22] while in Algeria, firms are still looking for good ways to improve their products and services, and almost all firms which have already undertaken ISO certificates are either medium to large enterprises with more than 500 employees and which have a productive system better than those of medium-size businesses.

Conclusion:

For the reason that it has been theoretically and empirically accepted that Quality and innovation approaches are well related in several ways, and especially in the technical and productive aspects, Firms, all over the world, are trying their best to improve their quality and innovation skills and competencies and mainly because they know the impact that they can get from applying such a good quality and innovation strategies, and techniques, while the Algerian enterprises are still trying to measure their abilities to be quality and innovation oriented organizations, they are still facing frequent obstacles; (either internal or external ones); those obstacles which need to be diminished in the short-term period and totally removed in the long-term period; using all what it takes from both, the public and private sectors.

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