



GLOBAL JOURNAL OF MANAGEMENT AND BUSINESS RESEARCH
Volume 12 Issue 8 Version 1.0 May 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

A Study of Levels and Characteristics of Innovation Activity

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Abstract - The importance of innovation in organizations' competitiveness is an undeniable fact. Innovations reflect a critical way in which organizations respond to either technological or market challenges. Small and Medium sized enterprises (SMEs) constitute 94 % of Iranian firms. According to Iran statistic website the value added of 94 % of Iranian firms is just about 10 % of the whole value added in country. This study assumes the lag of innovation is the reason of uncompetitive nature of Sistan & Baluchestan SMEs. This paper reports on the results of a study that examined barriers to firms' innovation among a sample of 86 managers of small and medium-sized enterprises (SMEs) in Sistan & Baluchestan. Findings of the study show that the most significant barriers are associated with costs, whereas the least significant are associated with lag of information. The survey results show that Sistan & Baluchestan SMSs are not collaborating with universities and higher education institutions; they do not see university as a main source of information. Then it is not a surprising point that 29.0 % unemployment rate is reported in 2009 however 50 % of studied SMEs reported lack of skilled labour as a barrier to innovation.

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GJMBR-A Classification: *FOR Code: 150307 JEL Code: O15, D03,D23*



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I. INTRODUCTION

The importance of innovation in organizations' competitiveness is an undeniable fact. Rogers defined innovation as "an idea, practice, or object that is perceived as new by an individual or unit of adoption". Innovations reflect a critical way in which organizations respond to either technological or market challenges (Brenner 1987, Comes-Casseres 1994, 1996, Smith et al, 1992, Hage, 1988). The survival and growth of business enterprises increasingly depends on their ability to respond to globalization and rapidly changing in market demands, technologies and consumer expectations. Emerging opportunities and threats forced companies to investigate and invest more on innovation to decrease risk of becoming uncompetitive.

As Debdulal Dutt'a Roy(2008) noted" innovations may be directed to change the organizational structure (the degree of complexity, formalization, and centralization), technology (introduction of new equipment, tools or methods, automation, or computerization) and human resources (changing the attitudes and behavior of organizational

members through processes of communication, decision making, and problem solving)".

With increasing global competition and quickly spreading of knowledge, the future of many businesses depends upon their ability to innovate. The ability of a company to not only keep up with its current business practices, but to exceed its own – and its competition's – expectations are critical to survival (<http://www.realinnovation.com>).

Due to the great contribution of the innovative activities to the firms' competitiveness and success, it is of great interest to identify the barriers and obstacles that limit the development of innovative activities in firms. A number of studies show that firm differences in barriers to innovation were related to cost, institutional constraints, human resources, organizational culture, flow of information and government policy (Mohen and Roller 2005; Baldwin and Lin 2002). There are many good reasons for paying attention to small and medium sized enterprises (SMEs). They constitute the 94 percent of Iranian firms (amar.org), they are a main source of employment, and they are flexible. Iran defines SMEs as independent businesses that employ less than 250 people (Iranian Commission, 2003).

This paper reports the results of a study that examined barriers to innovation among a sample of 86 SMEs in the Sistan and Baluchestan. Sistan and Baluchestan economy has not been growing in terms of GDP in compare with other provinces in Iran during the period 2006-2008. Innovation contributes to sustained long-run economic growth through industry-wide spillover (Grossman and Helpman 1990; Romer 1986). The value added of 94 % of Iranian firms is just about 10 % of the whole value added in country (amar.org). John Cantwell (2003) defined Competitiveness as the possession of the capabilities needed for sustained economic growth in an internationally competitive environment. The importance of innovation in organizations' competitiveness is an undeniable fact. This study assumes the lag of innovation is the reason of uncompetitive nature of Iranian SMEs. Finding the current innovation situation and primary obstacles to innovation in Sistan and Baluchestan province of Iran are the main goals of this study. In particular, by using empirical data, the paper sheds light on the issue: the characteristics and behaviors that distinguish innovator firms and non-innovator firms. The remaining sections of the paper are organized as follows: the second section

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presents previous research on innovation and barriers to innovation, the third section describes the methodology used in the analysis, which is discussed in the fourth section. The fifth section concludes the paper.

II. INNOVATION AND ITS IMPORTANCE FOR ENTERPRISES

"Innovation . . . is generally understood as the successful introduction of a new thing or method . . . Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services". (Luecke and Katz, 2003). Rogers defined innovation as "an idea, practice, or object that is perceived as new by an individual or unit of adoption". (Swanson, 1994). To attain the business environmental policy goals, enterprises will either have to bring about modifies in the way people do something, or changes in technology. Innovation is one of the main processes by which those changes come about.

Innovation is not fully about the development of new product (services). Enterprises can also take advantages administrative innovation (improving internal control, coordination, and structure), and technical innovations (changes to technology or work processes). Davila et al (2006) organized reasons why enterprises undertake innovation in the following way:

1. Improved quality
2. Creation of new markets
3. Extension of the product range
4. Reduced labour costs
5. Improved production processes
6. Reduced materials
7. Reduced environmental damage
8. Replacement of products/services
9. Reduced energy consumption
10. Conformance to regulations

Community innovation survey (2007) defined nine factors as motivation factors to innovation, increased range of goods or services, Entered new markets or increased market share, Improved quality of goods or services, Improved flexibility of production or service provision, Increased capacity for production or service provision, Reduced costs per unit produced or provided, reduced environmental impacts or improved health and safety, Met regulatory requirements, Increased value added. Organizations which generate and implement more good ideas about better, more efficient ways of working have a distinct advantage in a competitive environment. To achieve success over a long period of time, all organizations need to hold innovation (Andy Couchman et al, 2004). With The globalization phenomena, market expansion, and increased customers' expectations and competition among firms, innovation has become more market-driven, more rapid and intense, more closely linked to scientific progress, more widely spread throughout the

economy (OECD, 2000). Organizations may also facilitate innovation through project teams or R & D departments (Morton 1971, Zaltman, Duncan, and Holbek 1973). Services sector R&D, for example, rose from less than 5% of total business enterprise R&D for the OECD area as a whole in 1980 to more than 15% in 1995. In countries that measure services R&D well, such as Canada, it now amounts to about 30% of total business enterprise R&D (OECD, 2000). Steve Jobs defined Innovation has nothing to do with how many R&D dollars you have... It's not about money. It's about the people you have, how you're led, and how much you get it. He argued that there are no definitive metrics for innovation. Measures of innovative success vary by company and industry. He defined R&D and patent creation as the most common metrics of innovation:

- R&D – This metric assumes that the amount of money spent on research and development directly correlates to the amount of innovative products, processes and services that get to the public.
- Patent creation – Some companies create patent after patent and boast of their innovative capabilities. While this may be well and true for a few, if the numbers of patented products, processes, and services are now making it to the marketplace, then their relevance diminishes.

The propensity of countries to seek sources of innovation and knowledge wherever they are present has increased considerably in terms of patenting in the 1990s. The internationalization of patenting has not been equally rapid in all countries: the available evidence shows that US patents have a larger, and more rapidly growing, proportion of foreign co-inventors than those of Europe or Japan. An interesting point about innovation was found in Paul Windrum (2006) "Innovation begets further innovation ". He argued that Through organizational innovation, managers gain a more specific view of the different activities of the firm, and see the potential creative opportunities that arise through breaking down 'departmental silos' and creating novel synergistic activities. Rogers argue that any innovations have characteristics which explain the rate of their adoption:

- **Relative advantage:** "the degree to which an innovation is perceived as better than the idea it supersedes" ;
- **Compatibility:** "the degree to which an innovation is perceived as being consistent with existing values, past experiences, needs of potential adopters"
- **Complexity:** "the degree to which an innovation is perceived as difficult to understand and use"
- **Trial ability:** "the degree to which an innovation may be experimented with on a limited basis"
- **Observability :** "the degree to which the results of an innovation are visible to others."

Innovations are considered as a major engine to enhance their performance and to strengthen their competitive position in the market by companies (Vareska van de Vrande, 2008).

III. BARRIERS TO INNOVATION

As many studies show, innovation has positive effects on the firm; it is interesting to find out why not all firms engaged in innovation activities. Laura Palmer-Noone discussed that Most of these leaders believed that their greatest challenges to innovation were to be found inside their institution. In her findings traditional institutional culture, or institutional inertia cited as a significant barrier to innovation. A number of studies show that firm differences in barriers to innovation were related to cost, institutional constraints, human resources, organizational culture, flow of information, and government policy (Mohen and Roller 2005; Baldwin and Lin 2002). Support of employees for changes in their firms depends on the kind of innovation implemented. While changes in the organization of work that are introduced independently of investments in new machinery are encountered by resistance, investments in new machines, production sites, etc. are supported by employees (Thomas Zwick). It is not always a barrier against innovation but it may retard or change the innovation plans (Schaefer, 1998). Antonia Madrid-Guijarro ET. Al (2009) emphasized on a resource-based view of organizations. They introduced financial resources, human resources and external resources as barriers to innovation. Cost has been mentioned as one of the most important barriers to innovation. High innovation costs have a negative and significant effect on the innovation propensity (Lim et al, 2007 and Silva et. al, 2007). Arguments can arise between the need to invest in innovation and the risk aversion common among managers/owners (Hausman 2005; Frenkel 2003), with small firms being especially subject to such conflicts because of their limited financial resources. A study in Canada reveals that set up costs, rather than the running costs, are of greater concern for those that intend to engage in innovation activities (CSLS, 2005). Understanding of economic risks associated with innovation activities would have a low degree of association with firms' experience in innovation activities (Lim et al, 2007). The most financial theories such as transaction cost theory and agency theory linked risk and financial exposure, in the way that with higher risk being associated with higher financial exposure and lower risk with lower financial exposure (Brigham and Ehrhardii, 2005). Transaction cost theory analyzes the fact that the intangibility and specificity combined with investment in technology, by increasing transaction costs, may decrease the firms' propensity to financing innovation with debt. Agency theory argues that the high risk of innovative activities and the existence of information asymmetries can increase problems with

debt financing. An increase in debt may lead to an increase in conflicts between lenders and the firm. Several previous studies point to the negative influence of debt on innovation activity (Giudici and Paleari 2000). But Dr Xavier L. Comtesse et al (2002) argued that financial issues were not considered to be major barriers to innovation in Switzerland. C.C. Colton viewed the company culture and leadership as two prominent barriers to innovation. He argued that if the company's culture isn't set-up to accept new ideas and creative contributions from its staff then inventions will be unable to break through to the marketplace. Employee commitment and effort is required in adaption of innovation (Acemoglu and Pishke, 1999). Resistance to change which results from poor employee skills and inadequate training is viewed as an important organizational challenge by many researchers. It also argued that small business managers often lack the types of education and training that have been linked with a successful innovation strategy (Hausman, 2005). Shanteau and Rohrbaugh (2000) argued that Weak management support is another innovation choke point because innovation can disrupt established routines and schedules.

Barriers to innovation also included organizational inertia and structured routines that may limit the ability of incumbent firms to identify new opportunities and adapt to environmental changes (Nelson and Winter (1982); Hannan and Freeman (1984)). Obstacles that were external to the firm are clearly more important than internal ones, perhaps because most internal issues can be resolved by a firm that is committed to its innovation activity (Lim et al, 2007). Global competition, government policy, and economic uncertainty require that firms effectively communicate to managers the importance of innovation as a core firm strategy that will help maintain market competitiveness (Antonia Madrid-Guijarro et al, 2009). Because of high competitive pressures, firms are forced to adopt new technologies so as to gain a competitive advantage (Porter, 1985). Many researchers suggested that firms in more turbulent external environments have higher potential for innovation, because turbulent environments trigger firms to incorporate innovation into their business strategy in order to remain competitive and, ultimately, survive (Antonia Madrid-Guijarro et al, 2009). Lack of information about market opportunities, changes in technology, and government policy _which impact managers' adoption of innovation as a strategy to better meet customer needs and to help make the firm more competitive_ is viewed as other barriers to innovation. Lack of market information related to the potential requirement and preferences of the end-user may lead to a firm producing products that are not meeting the users' needs, and hence may lead to lack of customer responsiveness towards firms' innovative products. In other words, recognition of the requirement

of potential customers is important to ensure the success of firms' innovation process (Lim et al, 2007). Lack of government assistance was defined as the third most important barrier to innovation in European countries by Piatier (1984) research.

Maria José Silva (2007) defined nine barriers to innovation as the base of his research.

- The high economic risk
- The high cost of innovation

- The lack of financing
- The organizational rigidities
- The lack of skilled personnel
- The lack of information about technology
- The lack of information on market
- The lack of customer's responsiveness
- The government regulations

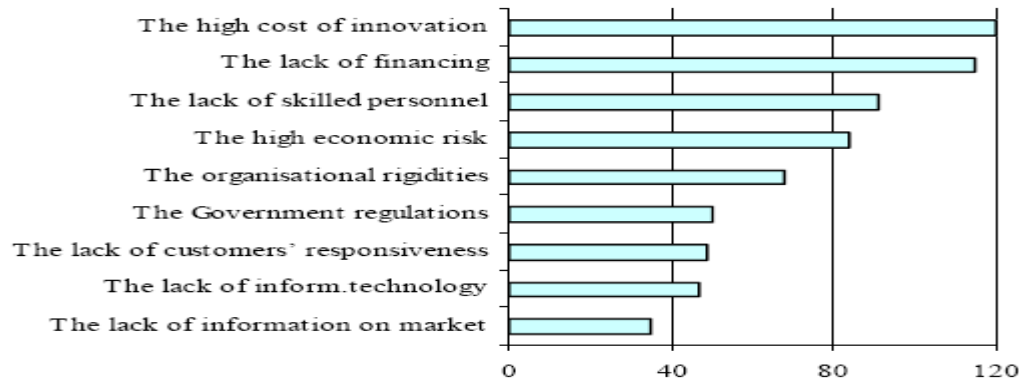


Figure 1: Barriers to innovation in Portuguese firms (Silva, Maria, Leit˜ao, Jo˜ao and Raposo, Mˆario 2007)

In what concerns the significance of each restraining factor of innovation, four significant variables are detected. The high economic risk and high cost of innovation are defined as economic factors that prevent innovation in Portuguese firms. The first important point is that the firm can't innovate and grow unless you're willing to take risks. However, in the current regulatory and tort environment, companies are more focused on risk reduction than ever before. The lack of financing sources has a negative and significant effect on the innovation propensity. For its turn, the lack of qualified personnel restrains the propensity of the firm for innovating and also for developing the innovation process. The lack of customers' responsiveness to new products has also a negative and significant impact on the propensity for innovating. The study of Lim et al (2007) investigates empirically the obstacles to innovation faced by manufacturing firms in Malaysia based on data from the Third National Survey of Innovation (NSI-3). NSI_3 defined nine obstacles to innovation same as the Portuguese research (cost of innovation, economic risks, lack of sources of finance, lack of information on markets, lack of information on technology, lack of skilled personnel, lack of customers' response, legislation and regulation and organizational rigidities).

Table 1: Barriers to innovation in Malaysian firms (Lim, Ee Shiang and Shyamala, Nagaraj 2007)

Obstacles to Innovation	All Firms			
	High Importance	Medium Importance	Low Importance	Not Relevant
Innovation costs too high	49.3	27.9	5.2	17.6
Excessive perceived economic risks	32.4	33.8	12.5	21.3
Lack of appropriate sources of finance	29.4	34.6	13.2	22.8
Lack of information on markets	30.9	30.9	19.9	18.3
Lack of information on technology	25.0	28.7	16.2	30.1
Lack of customer responsiveness to new products	24.3	30.9	19.1	25.7
Lack of skilled personnel	21.3	30.9	21.3	26.5
Insufficient flexibility of regulations and standards	14.0	35.3	12.5	38.2
Organizational rigidities	8.8	30.9	19.1	41.2

The results provide insights that high innovation costs have a negative and significant effect on the innovation propensity. The same is detected for the barrier associated with excessive perceived economic risks. For its turn, the lack of information on the market restrains the propensity of the firm for innovating and also for developing the innovation process. The lack of appropriate sources of finance has also a negative and significant impact on the propensity for innovating.

IV. RESEARCH METHODOLOGY

The data for this study was gathered from questionnaires surveyed to a sample of 86 SMEs of the Sistan and Baluchestan. The questionnaires were distributed among the managers because previous studies reported that managers' attitude significantly impacted innovation climate (Storey 2000; Lefebvre, Mason, and Lefebvre 1997; West and Anderson 1996). The questionnaire which is used is the same as the UK innovation survey questionnaire 2007. Some changes is made in questions such as Geographical locations.

order to increase confidence in the validity of the measures, the questionnaire was distributed to five managers for the purpose of pilot testing and led to modifications in some part of questions. Reliability of the inequity scale was $\alpha = 0.9$. Construct reliability hence appear adequate.

V. DESCRIPTION OF SAMPLING

From the 86 distributed questionnaires, 50 were completed and returned for the response rate 58.13 %.

Table 2: Proportion of enterprises in the population covered by the survey

Number of employees	Percentages of all respondents		
	1-9	10-50	51-250
Manufacturing and services	28.6	57.1	14.3

VI. LEVEL OF INNOVATION ACTIVITIES AMONG SMES

According to the result of questions four and eight, From 50 respondents, 64 % were innovators and the 36 % rest were non-innovators. Innovation takes place through a wide variety of business practices, and a range of indicators can be used to measure its level within the enterprise or in the economy as a whole. These include the levels of effort employed (measured through resources allocated to innovation) and of achievement (the introduction of new or improved products and processes). This section reports on the types and levels of innovation activity over the three-year period 2006 to 2008. Innovation activity is defined here as where enterprises were engaged in any of the following:

- Introduction of a new or significantly improved product (goods or service) or process
- Engagement in innovation projects not yet complete or abandoned
- expenditure in areas such as internal research and development, training, acquisition of external knowledge, or machinery and equipment linked to innovation activities.

Table 3: Innovation-active enterprises: by type of activity, 2006 to 2008

	Percentages
Innovation -activities	64
Product(good/service) innovator	50
Process innovator	64
Abandoned activities	17.6

Around 17.6 % of SMEs report abandoned projects. The proportion of enterprises having participated in some innovation-related activity (64 per cent) shows that SMEs recognize the need to assign resources to innovation. The most commonly reported activities were in marketing research, followed by a considerable investment in all form of design.

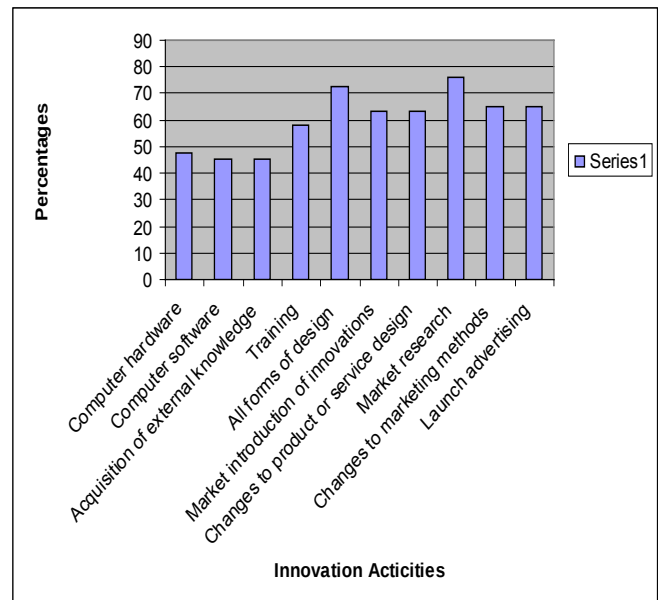


Figure 2: Breakdown of innovation activities

VII. AREA OF ACTIVITIES

The businesses surveyed were asked which markets they operated in. Figure 3 show that 80 % of Sistan and Baluchestan enterprises operate at a regional level, about 44 % at Iran level and 0 % worldwide. Just under a quarter (20 per cent) of businesses reported any exports for the years 2006_2008.

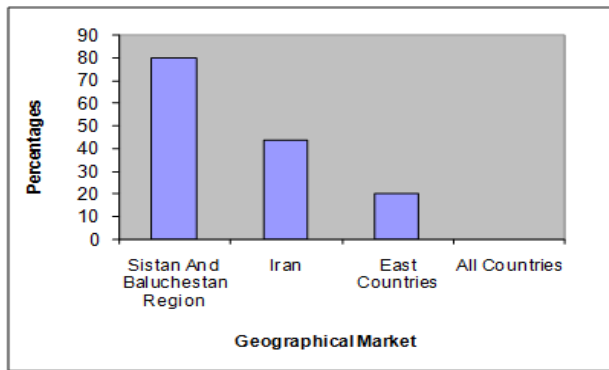


Figure 3 : Geographical markets

VIII. BARRIER TO INNOVATION

Successful and evidence-based policy interventions require an understanding of the barriers to business innovation. These barriers can be internal obstacles that the enterprise encounters while carrying out innovation activities as well as external factors preventing innovation.

The survey asked about a range of constraining factors and their effect on the ability to innovate. Table 4.3 shows the mean and standard deviation of each category of constraints.

Table 3 : Barriers to innovation

Barriers to innovation Factors	N	Mean	Std. Deviation
Excessive perceived economic risk	50	3.48	1.035
Direct innovation costs too high	50	3.28	1.051
Cost of finance	50	3.44	.951
Availability of finance	50	3.40	1.030
Lack of qualified personnel	50	3.20	.990
Lack of information on technology	50	3.12	1.043
Lack of information on markets	50	2.84	1.057
Dominated by established enterprise	50	3.20	1.069
Uncertain demand	50	3.08	1.243
Governmental regulations	50	2.64	1.306
International regulations	50	2.76	1.188

The results provide insights that high excessive perceived economic risk have a negative and significant effect on the innovation propensity. The same is detected for the barrier associated with the lack of financing sources. For its turn, uncertain demand restrains the propensity of the SMEs for innovating and also for developing the innovation process. The high innovation cost has also a negative and significant impact on the propensity for innovating.

Few enterprises felt constrained by a lack of information on market, while a lack of qualified personnel was viewed as one of the most important constraining factor by half of the SMEs.

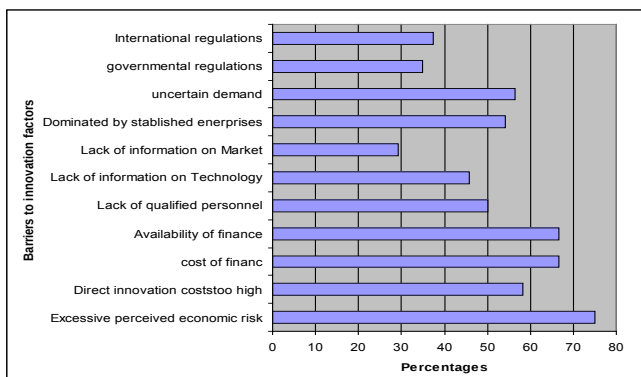


Figure 4 : Barriers to innovation

IX. WHY ENTERPRISES DID NOT INNOVATE

The survey also attempts to gain an appreciation of the possible reasons why businesses were not involved in innovation activity during the period 2006 to 2008.

Reasons why enterprises did not innovate(2006_2008)

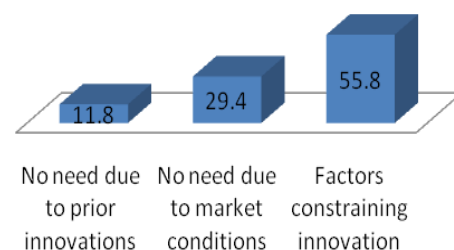


Figure 5 : Reasons why enterprises did not innovate (2006 to 2008)

As the figure 5 shows by 55.8 % of factors constraining innovation is cited as the main reason why enterprises did not innovate. No need due to market conditions is reported as important factor by 29.4 of SMEs.

X. DRIVING FORCES OF INNOVATION

On this occasion, the survey sought information about motivation factors for innovation. Respondents were asked to rank a number of drivers for innovating on a scale from no impact, through low, medium or high.

Table 4 : Innovation
One-Sample Test

Driving Factors	T	Df	Sig. (2-tailed)	Mean Difference
Increased range of goods or services	12.831	49	.000	2.680
Entered new markets or increased market share	16.202	49	.000	3.000
Improved quality of goods or services	28.253	49	.000	3.440
Improved flexibility of production or service provision	14.936	49	.000	2.680
Increased capacity for production or service provision	15.330	49	.000	2.680
Reduced costs per unit produced or provided	13.870	49	.000	2.840
Reduced environmental impacts or improved health and safety	10.549	49	.000	2.160
Met regulatory requirements	13.893	49	.000	2.880
Increased value added	15.812	49	.000	2.880

According to Table 4, from the respondents view there is a significant mean difference among driving factors of innovation. Improved quality of goods or services is reported as the main motivational factor of innovation. Entered new markets or increased market share, Met regulatory requirements and Increased value added were widely reported.

XI. METHODS TO PROTECT THE VALUE OF INNOVATION

The survey collected data on business perceptions of the relative importance of different means of protecting intellectual property, reported in table 5. These included formal intellectual property rights as well as strategic mechanisms such as being first to market. The data show that Trademarks are the most important factors and it is followed by Patents and Registration of design.

Table 5 : The mean and standard deviation of methods to protect the value of innovation

Protection Method	N	Mean	Std. Deviation
Registration of design	50	2.88	1.547
Trademarks	50	3.20	1.309
Patents	50	2.92	1.510
Copyrights	50	2.44	1.593
Secrecy	50	2.28	1.679
Complexity of design	50	2.44	1.514

XII. INFORMATION SOURCES OF INNOVATION

Respondents were asked to rank a number of potential information sources on a scale from 'no relationship' to 'high importance'. The mean and standard deviation of each category (information source) is shown in Table 4.7

These sources are:

- Internal – from within the enterprise itself or other enterprises within the enterprise group
- Market – from suppliers, customers, clients, consultants, competitors, commercial laboratories or research and development enterprises
- Institutional – from the public sector such as government research organizations and universities or private research institutes, and
- Other – from conferences, trade fairs and exhibitions; scientific journals, trade/technical publications; professional and industry associations; technical industry or service standards.

Table 6 : The mean, number and standard deviation of Information resources

Information sources	N	Mean	Std. Deviation
Within your enterprise group	50	2.88	1.547
Suppliers of equipment	50	3.40	1.143
Clients or customers	50	3.52	1.111
Competitors or other enterprises within your industry	50	3.00	1.429
Consultants, commercial labs or private R&D institutes	50	2.28	1.526
Universities or other higher education institutes	50	1.80	1.457
Government or public research institutes	50	2.04	1.603
Conferences, trade fairs, exhibitions	50	1.80	1.429
Scientific journals and trade/technical publications	50	2.32	1.477
Professional and industry associations	50	2.24	1.492
Technical, industry or service standards	50	2.64	1.613

The results show that client or customers were cited as the most important source of information by Sistan and Baluchestan SMEs and it is followed by suppliers of equipments.

XIII. CO-OPERATION AGREEMENTS (ATTITUDES OF SMES RESPECT TO TYPES OF PARTNERS)

As it is displayed in the table below (Table 7), the smaller and greater means are for Universities or

other higher education institutions and Suppliers of equipment, materials, services, or software respectively. From the information provided by table 7, this can be suggested that SMEs have fewer propensities about co-operation with universities or other higher education institutions while the most frequent partners for co-operation were suppliers of equipment.

Table 7 : the mean rank of different types of partners

Different type of partners	Mean Rank
Other business within your enterprise group	4.56
Suppliers of equipment, materials, services, or software	4.64
Clients or customers	4.40
Competitors or other businesses in your industry	4.28
Consultants, commercial labs, or private R&D institutes	3.26
Universities or other higher education institutions	2.88
Government or public research institutes.	3.98

XIV. WIDER FORMS OF INNOVATION

Innovation is not wholly about the development or use of technology or other forms of product (goods and services) and process change. Enterprises can also change their behavior or business strategies to make themselves more competitive, often in conjunction with product or process innovation, but also as independent means of improving competitiveness. Enterprises were asked whether they had made major changes to their business structure and practices in the three-year period 2004 to 2006. The findings are summarized in Table 8.

<i>Table 8 : Wider forms of innovations</i>	percentages
New organizational structure	45.5
Change in marketing strategy	58.3
Change in corporate strategy	54.5
Advanced management techniques	63.6

The results were initially summarized using statistics (means and frequencies percentages) to provide a better understanding of the respondents and characteristics of the responding companies.

From the 86 distributed questionnaires, 50 were completed and returned for the response rate 58.13 %. 80 % of Sistan and Baluchestan SMEs operate at a regional level, about 44 % at Iran level and 0 % worldwide. Just under a quarter (20 per cent) of businesses reported any exports for the years 2006_2008 (see figure 3).

Innovation takes place through a wide variety of business practices, and a range of indicators can be used to measure its level within the enterprise or in the economy as a whole. These include Internal R & D, External R & D, Acquisition of machinery equipment and software and hardware, Acquisition of external knowledge, Training, All forms of design, Changes to product or service design, Market research, Changes to marketing methods, launch advertising.

According to Table 3, overall, 64 % of enterprises were classed as being innovation-active during 2006-2008. The proportion of enterprises having participated in some innovation-related activity (64 %) shows that firms recognize the need to assign resources to innovation. The most commonly reported activities were in market research, followed by a considerable investment all forms of design. The internationalization of R&D seems to be a useful instrument to mitigate the effects of barriers to innovation often faced by SMEs (Tiwari and Buse 2007). During 2006-2009, about 45 % of enterprises participated in Internal and External R & D. Summing up; these early results seem to suggest that a larger share of enterprises is participating in just one mode of innovation behavior but the innovation which was occurred in Sistan and Baluchestan SMEs was new to the SME not to the national market..

In accordance with the total of the sample SMEs and the analysis of the Figure 4, we observe that the main barriers to innovation are economic factors namely, excessive economic risk, lack of financing, cost of financing and high cost to innovation. In what concerns the internal factors the lack of skilled personnel should be stressed. The factors associated with the lack of information on markets and governmental regulations are less restraining to innovation.

Among all obstacles, 'Excessive perceived economic risks' seems to be the foremost important obstacle faced by all SMEs. The Excessive perceived economic risk was cited being of 'high' importance by 75 per cent of the SMEs. On the other hand, only about 4.2 per cent of SMEs perceived this obstacle as 'not relevant' to their innovation activities.

'Lack of appropriate sources of finance' was cited as being of high importance by about 66.7 per cent of the SMEs and not relevant by about 4.2 per cent of them. These findings are consistent with the findings of Baldwin and Lin (2001) who in their study of impediments to advance technology adoption found cost-related problems being the most frequently reported by the Canadian manufacturing firms.

As recently as 2003 a report from the prestigious Gartner Research and Consulting Group suggested that 25 per cent of IT projects were not producing a realistic return on investment. In the same year, the UK Ministry of Defence was criticized for wasting £120m on a failed inventory project. For this reason Iranian SMEs are not interested in investment in costly projects (such as IT/IS) as the survey shows it. Worsening financial position of the firm suggests that when companies increase debt and reduce liquidity, then innovation activities decrease. This result is consistent with those of Freel (2000) and Chiao (2002). Additionally, because of higher risk exposure, firms may opt against using debt to finance innovation. Lenders who are risk averse may also be averse to funding risky innovation initiatives. As a result, SMEs might pursue relatively safe and non-innovative projects through use of internal capital (Galende and De la Fuente, 2003).

The lack of financial resources hinders many SMEs from initiating or – even worse – completing their innovative ideas. As reported in Table 3, 17.6 % of SMEs had abounded innovation activities. SMEs have problems to acquire loans because financial institutions are often reluctant to (co-)finance risky innovation projects. Another financial constraint refers to the problem of getting access to public funding for innovative ideas and bureaucratic application procedures associated with them. Further, it was pointed out that innovation projects must be delayed owing to regulatory reasons until the application has been approved.

However due to limited resources SMEs, in contrast to larger ones, rarely have the chance to establish the relationships needed.

'Innovation costs too high' was cited as being of 'high' importance by about 58.3 per cent of the SMEs and 'not relevant' by about 4.2 per cent of them.

Shifting from an inward to a more outward orientation was raised because the costs and risks of innovation have increased and firms have become more specialized. The role played by research in firms' commercial strategies has also changed. As the range of technologies necessitated for innovation has spread out and technologies have become more complex, companies can no longer cover all relevant disciplines. Many key developments draw on a wide range of scientific and commercial knowledge, so that the need for co-operation among participants in different fields of expertise has become greater in order to reduce uncertainty, share costs and knowledge and bring innovative products and services to the market (OECD, 2000). According to table 7, The results of the survey on Sistan and Baluchestan province of Iran shows that in Iranian SMEs the most frequent partners for co-operation were suppliers (76 per cent of enterprises with co-operation agreements) and other business in their enterprise (72 per cent). Around 44 per cent of collaborators included universities amongst their partners.

SMEs that perceive "lack of customer's responsiveness to new products" show fewer propensities to innovate. This result is in accordance with the interactive model of innovation, with the market-pull approach and the Porter model. These approaches demonstrate that the satisfaction of the market requires the incorporation of innovations. Therefore, if the SMEs believe the market is not accepting the new products, it has no incentive to innovate, and then this consciousness ends up creating a barrier to innovation.

The business Dominated by established enterprise was cited as being of high importance by about 58 % of the SMEs.

In many cases, ICT significantly reduced the costs of outsourcing and co-operation with entities outside the firm. It has helped go down the natural monopoly character of services such as telecommunications; it is a key technology for speeding up the innovation process and reducing cycle times. It has played an important role in making science more efficient and linking it more closely to business When 58 % of the SMEs see the monopoly as a barrier to innovation, it shows that in the area of study, SMEs do not use ICT as much as they should.

The lack of qualified personnel was viewed as one of the most important constraining factor by about half of the SMEs. The study of Hoffman et al. (1998) supports these results, when defending the thesis that lack of qualified staff can be a serious constraint to the

development of the innovation process.

The study of Tiwari and Buse October (2007) indicated two reasons for scarcity of skilled labour:

- Demographic developments ("aging population") (Reinberg & Hummel, 2004)
- Lack of student interest in engineering and natural sciences (IWD (2007))

But the condition is different in Sistan and Baluchestan. Unemployment rate was reported 13.8 % in Spring 2009 and unemployment rate of people between 15_24 years old was reported 29.0 % in Spring 2009 (see www.amar.org.ir).

Lack of information on market, governmental and international regulations were reported as the least important obstacles o innovation.

The survey sought information about motivation factors for innovation (Table 4). Respondents were asked to rank a number of drivers for innovating on a scale from no impact, through low, medium or high. Improved quality of products or services was cited as the main motivation factor by 64 % of SMEs and Improved flexibility of production or service provision and Reduced environmental impacts or improved health and safety are seen as important by almost 30 % of SMEs. The objectives of Reduced costs per unit produced or provided (61 %) and meeting regulatory requirements (by 59 %) were also widely reported.

Successful innovations often generate intellectual property that businesses will try to protect. The survey collected data on business perceptions of the relative importance of different means of protecting intellectual property such as registration of design, trademark, patent, copyright, secrecy, and complexity of design. Registration of design is cited as the most important way of protecting innovation by 71.4 % of Sistan and Baluchestan SMEs. Patent and Trademark are viewed as high important by 68.2 and 66.7 % of SMEs (see table 5).

Table 6 can show the overall status of each of Information resources more clearly. By a quick look at the table, it becomes obvious that the main Information source for Sistan and Baluchestan SMEs is clients or customers and followed by suppliers of equipment.

In the United States, the Bayh-Dole Act (1980) helped to strengthen the role of science in the innovation process and facilitate industry-university collaboration. But there is evidence that Universities and other higher education and Conferences, trade fairs, exhibitions are cited as important information resource to just about 20 % of studied SMEs. Also as it is cited before Sistan and Baluchestan SMEs have the least partnership with universities.

Innovation is not wholly about the development or use of technology or other forms of product (goods and services) and process change. Enterprises can also change their organizational structure, marketing strategy, corporate strategy, and advanced

management techniques to make themselves more competitive. As reported in table 8, 63.6 % of Iranian SMEs made changes to their management strategy during 2006-2008. As would be expected, great proportion of SMEs engaged in one or more of these changes. Advanced management techniques was most commonly reported, with the introduction implementing new organizational structures being least frequent.

XV. CONCLUSION

Innovation affects firms' ability to compete successfully in an increasingly global market. This paper examines forces to innovation, and product, process, and management innovation activities and barriers to innovation among a sample of 88 Sistan and Baluchestan manufacturing SMEs located in the Sistan and Baluchestan province of Iran. The Sistan and Baluchestan province economic situation is interesting due to the need to increase the investment in innovation by manufacturing SMEs. This need is because recent regional GDP has not been growth in compare with three years ago.

In the selected case (Sistan and Baluchestan SMEs), an in-depth study of eleven barriers to innovation were done through distributing questionnaire. The research results revealed that the economic factors such as excessive economic risk, lack of financial resources, lack of availability of finance, and high cost of innovation have determined the propensity of SMEs about innovation. However, Lack of customer responsiveness and lack of qualified personnel were viewed as other important constraints to innovation.

The survey results indicate that innovation is also becoming increasingly popular among SMEs. After all, small SMEs often lack resources to develop and commercialize new product in house and as a result are more often inclined to collaborate with other enterprises in their own business. There is growing evidence that innovation in areas such as ICT or biotechnology draws increasingly and more directly on scientific progress. The idea of facilitating industry-university collaboration strengthens. The survey results show that Iranian SMEs are not collaborating with universities and higher education institutions nevertheless we expected based on the literature. Van de Ven (1986) argues that as individuals have access to more information about available innovations and are more globally informed about the implications of innovative ideas, they are better able to relate the "parts to the whole." In general, individuals with a broader awareness of the consequences and implications of innovative ideas facilitate the process of organizational innovation.

The survey results indicate that Sistan and Baluchestan SMEs prefer to engage more in market research, followed by a considerable investment in changes all forms of design. According to Morton (1971), Zaltman, Duncan, and Holbek(1973)

Organizations facilitate innovation through project teams or R & D departments. But there is evidence that Sistan and Baluchestan SMEs do not concentrate on R & D investment as one of the main innovation activities.

Enterprises reported market and internal sources as most important for information on innovation. This suggests that enterprises tend to rely on their own experience and knowledge coupled with information from customers and clients, suppliers.

The survey discovered that improved quality of goods/services increase the propensity of SMEs to innovate. And Also in the field of protection of innovation, Registration of design and Trademark were viewed as important ways of protecting innovation in Sistan and Baluchestan SMEs.

The results of the study may be useful for both government and SMEs. The finding can be used in the development of public policy aimed at supporting and encouraging innovation among SMEs in Sistan and Baluchestan.

When conducting a research, occurrences of some obstacle are inevitable and in fact it is difficult to find a research that has been carried out easily without facing any problem. This study is not an exception and some problems came up as well. The expectation about the response rate was not met. And also, there were financial questions about the amount of investment in innovation activities but none of the SMEs answered these kinds of questions.

It took more time than the estimated time (3 week), for the respondents to return the questionnaires. This alone resulted in change in the plans and the study fell a few days behind the schedule. The size of the sample is such that it is difficult to generate the finding of this study to the whole population of SMEs in Iran.

For further research it would be interesting to examine why Lack of unskilled labour is cited as an important barrier to innovation by 50 % of SMEs; however the unemployment of educated people is reported 29.0 % in Spring 2009. It would be also helpful to conduct researches which examine and compare barriers to innovation between SMEs in other countries and Iranian SMEs.

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