The Level of Using the Technological Innovations of Enterprises and R&D Activities: The Case of Iron-Steel Enterprises in Turkey

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Abstract

The main goal of this study is to get information about the R&D process and technical innovations of the iron-steel enterprises and to determine to the ways to improve their current status. This study focuses on 49 SMEs enterprises chosen at random, which are among the total 74 enterprises in Iskenderun. The results of this study are that the middle scale enterprises in the sector have been working for domestic/abroad for a long time and that they are present in R&D studies and innovations in order to protect their market shares and their rivalries and that they give importance to produce in a certain level of standard and quality. 10 out of 49 enterprises in the region have R&D unit and there are very few workers in these units, therefore it has been interpreted that the enterprises are insufficient in R&D.

Keywords: The technological innovation, Innovation of product, Production technologies, R&D

1. Introduction

The dynamics emerged from globalization has caused many changes on the environment in which the organizations are active. It is natural that the organizations have been influenced by these changes and they have had to continuously renew their products, structures, systems and strategies in order to be adapted to this change. It is obvious that the business enterprises are luckier than their rivals which can benefit from the opportunities by giving importance to innovations and creativeness and which acquire new costumers and which create new values innovations sees the environment as the source of struggle and it works to understand the change, to make innovation, to apply new ideas and to risk in order to control the environmental changes. For this reason, the innovation is the main method to create opportunity to be a leader business and to develop the performance (Naktiyok, 2007).

The indefinite environment in the market caused by structural change requires a change which needs to use rapidly new technologies. Using new technology will bring innovation of product, service and process for an organization. As a result of this, the organizations will have important advantages by producing products and service different than their rivals (Tekin et al., 2007). But in our time, the rivalry is so that even the innovations made for the necessities of customers are seen as insufficient. The business enterprises wanting to make more innovations than their rivals also investigate the probable necessities if their customers. Besides, they also compete to discover the innovations which increase the wealth of customers (Durna, 2002). In order to realize the innovation activities effectively, there should be a systematic substructure of information in a firm. The two elements of innovation are the importance valued for information and the education level (Topal and Kurt, 2008).

Firms, by creating better values for customers in markets, try to be further on than their rivals. For this, they apply one of these strategies; focusing on cost, cost leadership, focusing on difference (Porter, 1985). At this point, innovation enables the firm to be different from its rivals and it enables the firm to have lesser cost and so the firm catches the rivalry superiority (Higgins, 1996). In other words, competing strategies are important sources which present the firms the opportunity to use two strategies at the same time. They are to be different from the rivals and have a leadership of cost (Bulbul, 2007).

The technological innovation is generally defined as the activities of discovery, improvement and presenting to markets which provide new products, processes or services to be shown in markets. The technological innovation begins as a discovery. If a technological innovation emerges as a result of a will of technical progress, it is called as technological compel; if a technological innovation realizes to meet the necessity of a special market it is called as market pulling. A successful innovation consisted of market pulling or technological compels, should both provide technique superiority in the market and it should produce products which have competing and high quality prices (Simsek and Akin, 2003).

The technological innovation emerges when an organization makes some changes in its producing a product or service. Innovation is related to both new products and production processes. The aim is to create a value for consumers or customers as a result of the innovation by reducing costs or making different products (Tekin and Omurbek, 2004). The technological innovations are the changes which increase the quality and quantity of products and services and which provide new industry fields and new employment fields. For this reason, the technological innovations directly influence the improvement of economy, the increase in the level of wealth of the society (Roger, 1998). After the technological innovation, investigation, improvement and invention, the business becomes more effective than old technology and methods. Then the technological innovation is used in the economy field. In another words, the first field the technological innovation is used is economic process (Acar, 1992).

The indicator of technological innovation is the developments in the production technologies. If a business enterprise wants to be productive in production, it should renew its production technologies in accordance with the technological innovations (Tekin et al., 2004). The technological innovations are the important vehicles which contribute developing economies to realize their aims (Attaran, 1996).

One of the important results of globalization is the increase in the alternatives of consumers and the markets which require investigation and improvement. One of the main elements which determine the power of rivalry is to make innovations related to R&D and to shorten the period between demand and production, conception and market (Mucuk, 2001). Today, none of the business enterprises or international economies leaves their progresses to coincidence. So, countries and business have to give importance to R&D. R&D function is very important for business because they need to solve their problems, to find new production methods and to improve existing production methods (Simsek and Akin, 2003).

R&D is generally defined as using scientific and technical information in new applications. R&D has two main elements. The first one is investigation. Whereas main investigation is used for the aims, practical investigation is used by industrial business enterprises fort he aims they valve. R&D‘s second element is improvement. It aims to get better results in application and to use know things. In another words, in improvement there is not a discovery; it just involves activities done to trans-form the results of both two investigations into products, systems, production processes and services. So, improvement activities serve as a bridge between investigation activities and production activities (Mucuk, 2001).

New product improvement which has a strategic importance for growth and development of business enterprises is a complex field related to both production and marketing. R&D activities for new product improvement are not only related to creating a new original product. Attracting the consumers by making an existing product better and more useful is also a method used widely. In this way, a partly change in a product with little cost can be in the quality, elegance, packing, store and use conditions (Mucuk, 2001).

R&D works can be regional, local and global which are done to reach innovation. In fact, innovation itself is a universal fact and for this reason it is necessary to look at both R&D works and the factors influencing the innovation with international points of view in order to estimate the innovation. If we want the ice in the poles not to melt, we have to move together with the world by making sacrifices all we have. For this we should know all we have and also know what we can do in how much time. This means that international data are needed to estimate the innovation and R&D and that the estimation of these data at the same standard is also needed (Arsan, 2008).

The expenditures made for the R&D activities are important investments. They are related to the growth of the business enterprise. Financial sources required for the activities in the field of R&D can be met from the profits obtained from technological innovations. And also, R&D activities influence profits. Therefore, to increase the demand for investment in the field of R&D is accepted as a strategy. Applying the technological information to industry and the increase of value of product, increase the power of rivalry of product. For this reason, profit is higher than the investment made for R&D (Tekin and Omurbek, 2004).

The dimensions of the activities of R&D are examined by profiting from the signs of R&D expenditures and R&D human resources. In the developed economies approximately %3 of gross national products is left for R&D expenditures. Besides, this doesn’t reach at even %1 in the countries which haven’t completed the development process because in these countries sources are primarily used for necessity needs. This situation causes the information gap between the developed and developing countries increase. In the developed countries, R&D activities are made by private sector which is open to innovations and which has a power of rivalry in the international markets. In the developing countries, these activities are mostly supported by universities and public sectors. The reason of this is that private sectors don’t have fund to support these activities. And also, in the developing countries, private sector firms don’t have the conscious about this subject (Atik, 2005).

R&D activities cause not only education but also information production. Whereas education is important for training people who can produce information, R&D is important for people’s reach to new information. R&D is necessary for getting theoretical information and for the technological developments based on theoretic information. Countries give importance to the increase of R&D activities as well as education. In the developed societies, power of people joined to R&D expenditures and AR-GE activities has been increasing continuously (Atik, 2007).

What can be done in Turkey about R&D is to spend efforts in skill building and innovation for the aim of catching the customers’ technologies. R&D is a complex issue. For people who don’t know exactly R&D, it is a dangerous field. R&D is a cumulative learning process and its probable results are based on past accumulation. Old experiences and existing power of person are the signs of what kind of R&D can be made later. In our time, R&D needed for the firms

in Turkey is a kind of activity to catch up existing technology and to produce cheaper (Kırım, 2007). In Turkey, the industry regions go on living in a global rivalry environment if they improve R&D studies (Koroglu, 2005).

2. Materials and methods

The aim of the study is to determine the states in the R&D works and the technological innovation of the enterprises in the iron-steel sector in Iskenderun and to determine these enterprises development potential. There are total 74 enterprises registered in trade association in the iron-steel sector in Iskenderun. In this study, 49 example enterprises have been chosen and these represent all the iron-steel enterprises.

The face to face survey method has been chosen as a means to get data in the study. Some surveys used in the previous studies have been examined (Durna, 2002; Taymaz, 2004; Bulbul, 2007; Naktiyok, 2007 and TUIK, 2008) and "The technological innovation and R&D investigation survey form" has been developed. This survey has three sections. These are; a. The demographic features of the enterprises joined to the investigation, b. The states of the use technological innovations of the enterprises, c. The information about R&D studies.

There are total 67 questions in the survey. The Alpha reliability coefficient is 0.71 of these questions. According to this result, it can say that our survey is reliable. At the end of the survey application, data obtained from 49 enterprises have been transferred to SPSS pocket program and statistical evaluation of them has been made.

3. Results and discussions

In this section, in sequence, the demographic features of the business in the research, the levels of use the technological innovations of the business, the ideas of enterprises, about R&D studies and the findings about determining, R&D studies have been evaluated.

3.1 Demographic profiles

People's positions in the enterprises who answered the questions in the poll;12%(6) of people are factory manager, 6%(3) are product manager, 6%(3) are R&D manager, 4%(2) are data processing manager, 8%(4) are marketing managers and 55%(27) are others. So, it can be said that the majority of people who answered the questions in the survey are other managers (business owner, engineer, head workman etc.).

The enterprises sectors in the survey; almost total are metal products sector and machine industry sector 94%(46). Only 6%(3) have marked the others alternative but it is known that they are also the enterprises in the by-industry of the iron-steel sector. So, it can be said that all the enterprises in the research are in the iron-steel sector in Iskenderun.

The number of workers in the enterprises; between 10-49 are 39 % (19), between 50-99 are 20 % (10), 100 and above 100 are 41 % (20). According to this, it can be concluded that the majority of the workers in Iskenderun iron-steel sector enterprises are 100 and above 100 people and that most of the enterprises in the iron-steel sector are small and middle scale enterprises (SME).

6 %(3) of the enterprises have been active for 0-2 years, 12(6)% of them has been active for 3-5 year, 12%(6) of them for 6-8 years, 16%(8) of them for 9-11 years and 53%(26) of them for 12 years and above. It can be said that mast of the business enterprises in the iron-steel sector in Iskenderun have been active for 12 years and above and they are experienced in that sector.

39%(19) of the enterprises joined the investigation only address to domestic markets, 6%(3) of them addresses to only abroad markets and 55%(27) of them address to both domestic and abroad markets. So, it can be said that the majority of these business enterprises in Iskenderun addresses to both domestic and abroad markets.

10%(5) of the enterprises in the research have the patent of ideal property right, 2%(1) of them have industrial conception, 43%(21) of them have trademark, 2%(1) have copyright, and 43%(21) of them haven't any trademark. So, it can be concluded that the majority of these enterprises in Iskenderun has at least one trademark right and that nearly half of them has no ideal property right.

61 % (30) of the enterprises in the research have the ISO 9000 quality certificate, 24 % (12) of them haven't this certificate and 14 % (7) of them have the application for this certificate. 84 % (41) of these enterprises have the TSE quality certificate, 12 % (6) of them haven't this certificate and 4 % (2) of them have the application for this certificate. It can be said that the majority of these business enterprises in the iron-steel sector in Iskenderun has the ISO 9000 and TSE quality certificates.

3.2 The findings about the levels of use the technological innovations of the enterprises

In this section, some findings have been evaluated about the rates of making innovations of the iron-steel enterprises in Iskenderun, their innovation kinds they made, their reasons for making innovations, the factors which encouraging innovations and commercial using the products. As it is seen in the Table 1, some questions have been asked to enterprises about the innovations they have made in the last five years.

In the first section, it has been observed that about 43% (21) of the enterprises in the investigation have used new technologies, 39% (19) of them have used old technologies and 12% (06) have used old technologies. *This situation can be interpreted as they renew their technologies in time and they have new technologies although they are old enterprises.*

In the second section, the enterprises states of developing new products have been examined. 47% (23) of them have made product innovation at middle level, 16% (08) of them have made very much product innovation and 14% (07) of them have made little product innovation. *According to this, the majority of these enterprises have*

made production innovation.

In the third section, the states of process innovation of the enterprises have been asked. 47% (23) of them have made process innovation at middle level, 39% (19) very much, 10% (05) very little. *According to these results, the majority of the enterprises have made process innovation in the last five years.*

In the fourth section, vain results of the technological innovation activities of the enterprises that they have made in the last five years have been examined. According to the results, 78% (38) of the enterprises didn't experience this situation, 16% (08) of them had a few vain results and 4% (2) of them experienced many vain results. *According to this, the majority of them didn't experience any negativity in the process of innovation.*

In the fifth section, the enterprises which continue the innovation activities have been examined. 35 % (17) of them usually continue these activities, 31% (15) continue at middle level, 18 % (9) of them continue these activities at advanced level. *According to this, the majority of the enterprises go on these activities at advanced level.*

In the sixth section, the states of making organization changes of the business enterprises have been investigated. According to the results, 37% (18) of the business enterprises have made organization changes at middle level, 26 % (13) of them have made very few changes and 24% (12) of them have made many organization changes. *According to this, it can be said that the majority of them have made organization changes at middle and advanced levels.*

In the seventh section, the states of making changes in marketing of the enterprises. According to the data, 33% (16) of them have made great marketing changes, 29% (14) of them have made changes at middle level, 26% (13) of them have made changes at advanced level. *According to this, the majority of them have made organization changes at advanced level.*

In the eighth section, the states of making changes in input procuring and in the distribution canals of the business enterprises. According to the data, 39 % (19) of them have made these changes at middle level, 33 % (16) of them have made many changes, 20% (10) have made few changes in input procuring and in distribution canals. *According to this, the majority of the business enterprises in the investigation have made changes in input procuring and in distribution canals.*

As it is seen in Table 2, the kinds of changes the business enterprises have made in the last five years has been asked. In the first section, according to the data, 29% (14) of the business enterprises have made product change at middle level, 29% (14) of them have made few changes and 24% (12) of them have made many changes. In the second section, 43% (21) of the business enterprises have expressed that they have made service innovation at middle level, 33 % (16) of them have made many innovations and 16% (8) of them have made innovation at advanced level. In the third section, it is seen that 39% (19) of the enterprises have made great innovations in the process of production, 22 % (11) of them have made innovation at middle level, 20% (10) of them have made innovation at advanced level. In the fourth section, it can be said that 41% (20) of the enterprises have made innovations in the process of logistic, distribution and delivering at middle level, 26 % (13) of them have made many innovations, 20% (10) of them have made few innovations. In the fifth section, 49 % (24) of the business enterprises have made innovations related to the processes of supporting activities at middle level, 29 % (14) of them have made many innovations and 12 % (6) of them have made innovations at advanced level. The Table 2 generally shows that the kinds of innovations the business enterprises have made are generally the innovations of production process and then the innovations of supporting activities.

As it is seen in the Table 3, the reasons of why the business enterprises have made innovations have been asked them. In the first section, 35 % (17) of the business enterprises have stated that the rival firms have forced them too much to make innovations, 31 % (15) of them have been forced much and 26%(13) of them have been forced at middle level. In the second section, 35%(17) of the business enterprises have made too many innovations because of changing needs and demands of customers,35%(17) of them have made many innovations and 26%(13)of them have made innovations at middle level. In the third section, it is stated that 35% (17) of the enterprises have made innovations at middle level because of changing technologies, 33% (16) of them have made innovations at advanced level and 26%(13) has made innovations at extremely advanced levels. In the fourth section, it is stated that 41% (20) of the business enterprises have made innovations at middle level because of changes in the structure or casts of inputs,31%(15) have made innovations at advanced level and 18% (9) have made many innovations. In the fifth section, 37% (18) of the business enterprises have made innovations at middle level because of the decrease in demands of old products, 24% (12) have made innovations at great amount and 20% (10) have made innovations at advanced level. In the sixth section, it is stated that 41%(20) of the business enterprises have made innovations at advanced level in order to enter new markets, 31% (15) of them have made many innovations and 24%(12) of them have made innovations at middle level. In the seventh section, it is seen that 47% (13) of the business enterprises have made many innovations to use the sources productive, 33%(16) of them have made innovations at advanced level,16%(8) have made innovations at middle level. The Table 3 generally shows that the reasons of the enterprises in the research making innovations are generally using the sources productively and then entering the new markets.

As it is seen in the Table 4, the question by which the innovations have been realized has been asked to the business enterprises. In the first section, 63% (31) of the enterprises have stated that the innovations have been realized today by themselves, in the second section, 37% (18) of them have stated that the innovations have been

realized in the last three years by them and other firms, in the third section, 75% (37) of them have stated that they have realized innovations without any help of other firms and institutions. Generally the Table 4 shows that most of the business enterprises in the research have realized the innovations themselves and without any help from outside.

As it is seen in the Table 5, the importance degree of the factors which encourage the enterprises to make innovations has been asked to them. In the first section, most of the enterprises have expressed that they give importance to meet the demands and needs of customers, in the second section, the enterprises have stated that they give importance to answer the attacks of their rivals back at advanced level, in the third section, the business enterprises have stated that they give importance to their prestige and image, in the fourth section, the business enterprises have stated that they give importance to the decrease in the demands of existing products, in the fifth section, they have stated that they are give importance to improve their production skills. The Table 5 generally shows that the importance that the business enterprises give to the factors which encourage them to make innovations can be arranged in a row as firstly answering the attacks of rivals back and secondly meeting the demands and needs of customers.

As it is seen in the Table 6, business enterprises have determined the degrees of their successes in developing new products and commercializing them. The Table 6 generally shows that the enterprises aren't good enough at developing new products and commercializing them and that they are more successful in developing new products but they aren't successful enough in commercializing these products.

3.3 The findings related to R&D studies of the enterprises

In the study, it has been observed that 20 % (10) of the 49 iron-steel enterprises chosen as sample have R&D unit, 80% (39) of them haven't this unit. In this ten business enterprises, the number of workers are as; between 1-4 are 8% (2) people, between 5-9 are 4%(2) people, between 10-49 are 4%(2) people, between 50-99 are 4%(2) people. The questions below have been asked to these ten enterprises which have R&D units and the findings have been shown in the tables below.

As it is seen the Table 7 the reasons of establishing R&D units have been asked to the enterprises in the research. The Table 7 shows that most of enterprises have established R&D units in order to meet the demands and needs of customers. The following reason is the attitudes of rivals and the general strategies of the firm.

In the Table 8, the activities done in R&D units have been asked to the enterprises in the research. The Table 8 shows that most of the activities in R&D units of the enterprises are improving the existing technologies. Following activities are operational investigation activities.

In the Table 9 what R&D units do from the point of view of innovation has been asked to the enterprises. The table 9 generally shows that the activities of R&D units of the enterprises are generally improving the existing production technologies, new product developing and making products different.

In the Table 10 what R&D units of the enterprises contributed to administrating has been examined. The table 10 shows that most of the contributions of R&D units to administrating are the increase of quality, the decrease of costs, and flexibility.

4. Conclusions

The enterprises should find their own innovation strategies in order to survive successfully in the environment of rivalry in today's world. The factors such as circumstances of the environment, the rivalry strategy of the enterprises and the sources they have play an important role in determining the innovation strategies. One of the factors influencing the innovation is also the organizational structure of the enterprises. The enterprises which have innovative organizational structure will also have innovative strategies (Durna, 2002).

Innovations realizes in the environments in which people can express their ideas and thoughts freely. Innovative enterprises, managers should regard a new idea, suggestion or an application as a rich source and they should say "why not" for an original idea. The communication should be perfect in enterprises to benefit from innovations effectively. Innovations should be realized in free environments because they are risky. They may be seen as a challenge for the status quo because they can cause big changes. They require tolerance because they can criticize existing applications.

Workers should be motivated in order not to give up after many fault trials because innovations require a long time for studies. For this reason, workers should be rewarded in all processes to make innovations continuous. Workers in innovative business enterprises should be made conscious and educated about administrating strategy and the organizational structure should be flexible and dynamic.

Since the middle scale enterprises in iron-steel sector in Iskenderun have been active for a long time in domestic and world markets, their making innovations and R&D studies are important for them to produce in a definite standard and quality degree to maintain their market shares and their skills of competing. In this point, whereas it is a positive situation that the majority of them have the ISO 9000 and TSE certificates, it is a negative situation that they are insufficient in transforming their products to trademarks and getting patents.

It can be said that the enterprises in the investigation have made great process innovations in order to use their sources productively and to enter new markets. It is in seen that the enterprises have made innovations usually themselves without any help. This result shows that the enterprises in the region aren't open to outside. But today's circumstances require that they should improve their abroad and domestic collaborations with other

enterprises in the sector in order to enter new markets and to get rivalry superiority. Improving new strategies is very important for them to extend their administrating process.

It is accepted as a contradiction that the majority of the business enterprises give priority to answer the rival's attacks back which encourages them to make innovations but they don't give enough importance to make collaboration with domestic and abroad enterprises. They should have close relationships with other enterprises sector activities and their customers in order to answer their rivals' attacks back and to meet the demands of their customers in time.

It can be said that the enterprises aren't successful in producing new products because they don't give enough importance to R&D studies. The business enterprises may have the markets snatched to their rivals if they don't renew and make difference in their existing products. The theories "Creating worth" of Doyle (2003), "Priorities of rivalry" of Porter (2008) and "Sur petition" of De Bono (1996), reevaluate their strategies by thinking these theories.

The evidence of the inadequate of the enterprises in R&D is that 10 of the 49 enterprises don't have R&D units and that there are not enough workers in these units. But it depends on R&D studies of the enterprises to renew their products, to develop new products and to compete with their rivals. The enterprises don't collaborate enough with domestic and abroad institutions in R&D studies as well as in making innovations and this will make them have difficulty in today's rivalry environment. However, as it is known from abroad enterprise examples, although the enterprises don't find it economical to establish their own R&D units, they can compensate for this need collaborating with other people institutions. Today, even the enterprises regarded as the leaders of markets of the worldwide sometimes need help of other institutions which are professional in their R&D studies and they sometimes have self interest collaborations with their rivals. So, they have profits in economy and also they have the opportunity to ideal with their own profession fields.

The enterprises give priority to developing activities among R&D activities and this means that they don't find R&D activities worthy enough. However, the enterprises can be the leaders of markets by improving their existing products, giving importance to investigation activities and producing new products and strategies. It can be said that the results about the contributions of R&D units to the business enterprises are consistent. R&D provides the increase of rivalry power and quality for the enterprises as stated by many theorists (Porter, 2008; Gules and Bulbul, 2004; Tekin and Zerenler, 2009; Tekin et al., 2007; Akgemci, 2008). It is a positive situation that the enterprises in the region have this conscious.

4.1 Suggestions

After general evaluations and interpretations, it is possible to make *suggestions* about the determined situations and problems of the enterprises.

- The needed studies of law to support such as tax discounts and new credit opportunities should be renewed in order to encourage the business enterprises.
- The local managements should constitute their innovation strategies. The subjects such as R&D standards, estimating, evaluation and sharing the best applications and making them widespread should be established horizontal relationships with other operation plans. Informing and being aware studies should be done in order to be close to society (Arsan, 2007).
- Innovation culture and innovation approaches should be accepted as a lifestyle by society through spreading them to all over the country in order to improve innovation and reach it to the needed degree. The important factors in spreading the innovation culture are increase of the data flow, the experts in universities taking place in industry institutions.
- The State can overcome with the problems by providing people who favors change financial helps, establishing R&D institutions, providing the coordination's among institutions, supporting the collaboration of university-industry, encouraging the innovations' spreading, reorganizing the education system according to today's circumstances and making legal arrangements.
- In order to increase the R&D expenditures, firstly, the enterprises or industry regions should establish shared R&D units, and secondly, professional associations should encourage and support them.
- The units can be formed which work together with R&D unit in our universities, work by following our enterprises continuously, make statistical studies and follow and solve the problems of our enterprises. People can consult our universities about this subject.
- It is required to decrease bureaucracy in the support of national R&D and innovation provided for firms and to be objective and transparent in evaluations. Many small firms which can sign important project lose their trusts and courage because of bureaucracy and they can't benefit from these supports. So, bureaucracy should be decreased and evaluations should be made objectively (Vardar, 2007).

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Table 1. The last 5 years, rates of innovation of enterprises

Question	Options	F	%
1. Type of technology used in the enterprise	Very old	01	02.0
	Old	06	12.2
	Moderate	19	38.8
	New	21	42.9
	Very new	02	04.1
2. New product development (product innovation)	Never	06	12.2
	Rarely	07	14.3
	Moderate	23	46.9
	Very	08	16.3
	More	05	10.2
3. New production techniques (process innovation)	Never	01	02.0
	Rarely	05	10.2
	Moderate	23	46.9
	Very	19	38.8
	More	01	02.0
4. Technological innovation activities have been unsuccessful	Never	38	77.6
	Rarely	08	16.3
	Moderate	01	02.0
	Very	02	04.1
	More	00	00.0
5. Technological innovation activities in progress	Never	02	04.1
	Rarely	06	12.2
	Moderate	15	30.6
	Very	17	34.7
	More	09	18.4
6. Make organizational innovation	Never	00	00.0
	Rarely	13	26.5
	Moderate	18	36.7
	Very	12	24.5
	More	06	12.2
7. To innovation in marketing	Never	00	00.0
	Rarely	06	12.2
	Moderate	14	28.6
	Very	16	32.7
	More	13	26.5
8. Input supply and distribution channels, innovation	Never	00	00.0
	Rarely	10	20.4
	Moderate	19	38.8
	Very	16	32.7
	More	04	08.2
	Total	49	100.0

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Table 2. Types of innovation in their businesses

Question	Options	F	%
1. Goods (product) innovation	Never	04	08,2
	Rarely	14	28,6
	Moderate	14	28,6
	Very	12	24,5
	More	5	10,2
2. Services innovation was done	Never	01	02,0
	Rarely	08	16,3
	Moderate	21	42,9
	Very	16	32,7
	More	03	06,1
3. Innovation in production processes were performed	Never	00	00,0
	Rarely	09	18,4
	Moderate	11	22,4
	Very	19	38,8
	More	10	20,4
4. Innovation was made in logistics, delivery and distribution processes	Never	01	02,0
	Rarely	10	20,4
	Moderate	20	40,8
	Very	13	26,5
	More	05	10,2
5. Innovation was made in support activities related to the processes	Never	00	00,0
	Rarely	05	10,2
	Moderate	24	49,0
	Very	14	28,6
	More	06	12,2
	Total	49	100.0

Table 3. Reasons for making innovation enterprises

Question	Options	F	%
1. Because of competitors, we need to innovate	Not important	00	00,0
	Less important	04	08,2
	Important	13	26,5
	Very important	15	30,6
	Too much important	17	34,7
2. Due to changing demands and needs of consumer	Not important	00	00,0
	Less important	02	04,1
	Important	13	26,5
	Very important	17	34,7
	Too much important	17	34,7
3. Due to change of the current technology	Not important	00	00,0
	Less important	03	06,1
	Important	17	34,7
	Very important	13	26,5
	Too much important	16	32,7
4. Due to changes of prices or input structure	Not important	00	00,0
	Less important	05	10,2
	Important	20	40,8
	Very important	09	18,4
	Too much important	15	30,6
5. Decrease in market demand for old products	Not important	03	06,1
	Less important	06	12,2
	Important	18	36,7
	Very important	12	24,5
	Too much important	10	20,4
6. To enter new markets	Not important	00	00,0
	Less important	02	04,1
	Important	12	24,5
	Very important	15	30,6
	Too much important	20	40,8
7. For efficient use of resources owned	Not important	00	00,0
	Less important	02	04,1
	Important	08	16,3
	Very important	23	46,9
	Too much important	16	32,7
	Total	49	100.0

Table 4. Technological innovation in enterprises by whom it was done

Question	Options	F	%
1. Innovation was largely in-house.	Today	31	63,3
	The last years	09	09,0
	No answer	09	18,4
2. Innovation was held together with other organizations	Today	14	28,6
	The last years	18	36,7
	No answer	17	34,7
3. Innovation works largely with other organization (external) was built	Today	08	16,3
	The last years	04	08,2
	No answer	37	75,5
	Total	49	100.0

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Table 5. Severity levels of the factors promoting innovation of enterprises

Question	Options	F	%
1. Meet customers' demands and expectations	Not important	00	00,0
	Less important	00	00,0
	Important	14	28,6
	Very important	19	38,8
	Too much important	16	32,7
2. Respond to competitors' attacks	Not important	00	00,0
	Less important	01	02,0
	Important	09	18,4
	Very important	19	38,8
	Too much important	20	40,8
3. Image and prestige to win	Not important	01	02,0
	Less important	09	18,4
	Important	09	18,4
	Very important	16	32,7
	Too much important	14	28,6
4. Reduce demand for existing products	Not important	01	02,0
	Less important	05	10,2
	Important	12	24,5
	Very important	22	44,9
	Too much important	09	18,4
5. Improve production capabilities	Not important	01	02,0
	Less important	02	04,1
	Important	14	28,6
	Very important	16	32,7
	Too much important	16	32,7
	Total	49	100.0

Table 6. Success of new product development and commercialization of businesses

Question	Options	F	%
1. Compare with your competitors, do you think the success of your business in new product development	Very unsuccessful	00	00,0
	Unsuccessful	12	24,5
	Partially successful	14	28,6
	Successful	14	28,6
	Very successful	09	18,4
2. Compare with your competitors, do you find your business successful commercialization of new products?	Very unsuccessful	01	02,0
	Unsuccessful	13	26,5
	Partially successful	14	28,6
	Successful	15	30,6
	Very successful	06	12,2
	Total	49	100.0

Table 7. Reasons for businesses to create R & D unit

Question	Options	F	%
1. Attitudes and behavior of competitors	Not important	00	00,0
	Less important	00	00,0
	Important	03	30,0
	Very important	05	50,0
	Too much important	02	20,0
2. Meet customer demands and expectations	Not important	00	00,0
	Less important	00	00,0
	Important	00	00,0
	Very important	02	20,0
	Too much important	08	80,0
3. The company's overall strategy	Not important	00	00,0
	Less important	00	00,0
	Important	03	30,0
	Very important	03	30,0
	Too much important	04	40,0
4. Other reasons	Not important	00	00,0
	Less important	05	50,0
	Important	02	20,0
	Very important	03	30,0
	Too much important	00	00,0
	Total	10	100.0

Table 8. The R&D activities in enterprises

Question	Options	F	%
1. Basic research	None	00	00,0
	A little	03	30,0
	Moderate	02	20,0
	A lot	04	40,0
	Much more	01	10,0
2. Applied research	None	00	00,0
	A little	00	00,0
	Moderate	03	30,0
	A lot	05	50,0
	Much more	02	20,0
3. Development research	None	00	00,0
	A little	00	00,0
	Moderate	01	10,0
	A lot	03	30,0
	Much more	06	60,0
4. Preliminary design research	None	00	00,0
	A little	00	00,0
	Moderate	06	60,0
	A lot	03	30,0
	Much more	01	10,0
	Total	10	100.0

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Table 9. The evaluation of innovation activities of enterprises in R & D units

Question	Options	F	%
1. Current product development and improvement	Not important	01	10,0
	Less important	01	10,0
	Important	00	00,0
	Very important	03	30,0
	Too much important	05	50,0
2. To the imitation of product innovations	Not important	02	20,0
	Less important	01	10,0
	Important	02	20,0
	Very important	02	20,0
	Too much important	03	30,0
3. Differentiate the product	Not important	00	00,0
	Less important	00	00,0
	Important	01	10,0
	Very important	05	50,0
	Too much important	04	40,0
4. The harmonization of market conditions of the products	Not important	01	10,0
	Less important	01	10,0
	Important	02	20,0
	Very important	00	00,0
	Too much important	06	60,0
5. Develop new products	Not important	00	00,0
	Less important	00	00,0
	Important	01	10,0
	Very important	02	20,0
	Too much important	07	70,0
6. Develop new processes	Not important	00	00,0
	Less important	00	00,0
	Important	04	40,0
	Very important	03	30,0
	Too much important	03	30,0
7. Improve the existing production technology	Not important	00	00,0
	Less important	01	10,0
	Important	00	00,0
	Very important	03	30,0
	Too much important	06	60,0
8. Develop new production technology	Not important	00	00,0
	Less important	01	10,0
	Important	02	20,0
	Very important	03	30,0
	Much more important	04	40,0
	Total	10	100.0

Table 10. Benefits of business R&D unit within the last 5 years

Question	Options	F	%
1. Reduce costs	No	00	00,0
	Less	00	00,0
	Moderate	00	00,0
	Very	07	70,0
	Much more	03	30,0
2. Increases in quality	No	00	00,0
	Less	00	00,0
	Moderate	00	00,0
	Very	01	10,0
	Much more	09	90,0
3. Increases in speed	No	00	00,0
	Less	00	00,0
	Moderate	02	20,0
	Very	03	30,0
	Much more	05	50,0
4. Increases in flexibility	No	00	00,0
	Less	00	00,0
	Moderate	00	00,0
	Very	06	60,0
	Much more	04	40,0
5. Enter new markets	No	00	00,0
	Less	00	00,0
	Moderate	02	20,0
	Very	03	30,0
	Much more	05	50,0
6. Increased competitiveness of the business	No	01	10,0
	Less	00	00,0
	Moderate	00	00,0
	Very	03	30,0
	Much more	06	60,0
7. Increased product variety	No	00	00,0
	Less	01	10,0
	Moderate	01	10,0
	Very	04	40,0
	Much more	04	40,0
8. Prevented wastes	No	00	00,0
	Less	00	00,0
	Moderate	01	10,0
	Very	05	50,0
	Much more	04	40,0
9. Business has won a more dynamic structure	No	00	00,0
	Less	00	00,0
	Moderate	04	40,0
	Very	04	40,0
	Much more	02	20,0
10. Business has won a vertical growth	No	01	10,0
	Less	00	00,0
	Moderate	02	20,0
	Very	05	50,0
	Much more	02	20,0
	Total	10	100.0

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