4. Networked Economy

8 major Internet Providers (IPs) have filled in the questionnaires, developed according to the approved methodology [1], in order to gain information, related to **Information Infrastructure index** variables (sub-indices). The aforesaid IPs - IP TelCom (www.iptel.by), Atlant Telecom (telecom.by), Basnet (inform.bas-net.by), Global-OneBel (www.global-one.by), Business Net (www.bn.by), Forenet (BelSoft CJSC, forenet.by), Unibel (www.unibel.by) BSUnet (www.cit.bsu.by) represent different niches of the Internet Provision market in the Republic of Belarus.

The results of questionnaire analysis of 7 micro-indices, aggregated into 4 indices – components of the Networked Economy Component Index, are presented below. The experts assessed the level of Networked Economy Readiness (or advancement) of the country, which can range from the 1st (least-advanced) to the 4th (most-advanced) stage, for each micro-index independently, and average data assessment for each index and generalized data assessment for Networked Economy component index were evaluated on their basis.

4.1. ICT Employment Opportunities

According to our estimations, there are about 600 companies, firms and organizations operating on the ICT market of Belarus (in such fields as PC and telecommunication hardware manufacturing, assembly and sales; software development and delivery, telecommunications and Internet services), and less than 50 of them, whose share equals to 25 - 28 %, have their brand names - their

A Business Directory, posted on Computer News On-line site, which is considered to be one of the oldest and most frequently visited Belarusian Internet sites for ICT experts (http://www.kv.by/sprav/sprav.cgi), included 494 registered firms/corporations as of the end of 2002. Their geographical breakdown is given below**:**

Minsk - 373;
Brest and adjacent areas - 28;
Vitebsk and adjacent areas - 25;
Gomel and adjacent areas - 23;
Grodno and adjacent areas - 24;
Minsk adjacent areas - 8;
Moguilev and adjacent areas - 13.
Functional breakdown:
Internet - providers - 56;
Software developers - 70;
ICT application consulting companies- 60;

PC and telecommunication hardware manufacturing, assembly and delivery, service support and maintenance - 250.

These are, as a rule, private organizations/companies, therefore there must be at least 600 companies operating on the ICT market of the Republic of Belarus, if state institutions and R&D Institutes of the Ministries of Industries, Communications, Education, and others, the National Academy of Sciences *of Belarus are taken into account.*

Software Development. Mr. Dmitry Loshchinin, a managing director of Luxoft company (Moscow) proposed the following description of the Belarusian software market: «The people (programming specialists) in Russia aim to get a job in banks, in other organizations, and in Minsk the programmers have nothing to be occupied with, but off-shore programming» [10].

The Russian software producers work in the Belarusian market, as a rule, through the local companies; the Belarusian corporations mainly aim at the western customers' orders. The local customers are state institutions, which feel no need for software and ICT solutions, and financial institutions, banks and corporate customers. So, Softclub, a Belarusian software producer, specializes in banks, the Center of information technologies (under Belarusian state university of informatics and radioelectronics) deals with government contracts. Most of the software producers are set up on the grounds of R&D or higher educational institutes.

Personnel problem. In Belarus, there are problems both with programmers, and particularly with ICT managers. According to Mr. Alexey Badayev, «The personnel problem in Russia, in Belarus and in Ukraine is quite acute. Taking into account, that Microsoft sets very high standards for those, who challenge to apply to the company, it is not an easy task for Microsoft managers to select an employee, who meets the requirements». Partly, the core of this problem, in Mr. Badayev's opinion, is emigration of the qualified specialists. IT-experts go West (sometimes Russia becomes an intermediate destination point on their way). Since the local market is not very much developed yet, consequently, it can not offer many opportunities for professional self-realization of the experts. «If we to talk about programmers, they are jogged to leave because they can't sell their developments here due to the high level of piracy», — concludes Mr. Badayev [10].

The problem of emigration of programmers to the West (USA, Canada, Germany, etc.) was rather acute some time ago. The situation has changed greatly thanks to the western companies — they do not require human resources so badly at present, as it was earlier, and some major corporations even dismiss software developers. The problem of personnel emigration to Russia is not the issue of the day.

Still, Belarus possesses well-established higher educational institutions and old traditions, which is sufficient to train qualified programmers. In the Soviet times Minsk was the center of developments in the field of microelectronics. According to Mr. Igor Agamirzyan, manager of the East-European department for relations with the research and development organizations "Microsoft Research", « historically USSR main IT centers were Moscow, Leningrad, Kiev, Novosibirsk and Tallinn, i.e. the cities with theoretical schools and traditions in mathematics. Kazan and Minsk come next; due to the PC production facilities and the appropriate design institutes that were concentrated there.

Off-shore software. Many experts have left the country, of course. Despite this, or may be due to this, off-shore programming develops extensively in the republic. Mr. Anatomy Gaverdovsky, the vice-president of Vested Development company, considers Minsk to be the largest center of the off-shore programming in the former USSR: «There are very serious companies in Minsk. Minsk is comparable with Moscow in respect of offshore programming. These companies work to a large extent for Europe».

Mr. Dmitry Loshchinin too has highly evaluated the Belarusian firms involved in off-shore, «There are two major off-shore software companies in Belarus, IPAm and IBA. They have professional staff of programmers and managers. IPAm has an office in Princeton. IBA was created on the basis of the R & D Institute for computer development under the IBM support, and mainly fulfills the orders of the latter. In general, the system of education in Belarus is on the proper level, and the above-stated companies work very professionally, so that Luxoft considers possibilities of cooperating with them. Besides, the staff of each of these companies is up to a thousand employees, they are almost the only employers with decent employment terms for programmers in the republic» [10].

On the whole, there is quite a diverse perception about off-shore software markets of Ukraine and Belarus in Russia. Probably, it is because the leading off-shore software companies of both republics aim only at Western orders and do not contact the Russian software developers. The Russian integrators are not yet impelled to explore this market. According to Dmitry Loshchinin, it

can be explained by the lack of funds in the markets of the republics, though the situation is gradually changing for the better in Ukraine. But this is an exception rather than a rule. Most of all the Russians trade ready-compiled solutions through the dealers. Mr. Alexander Yegorov, the general director of Reksoft company, defined his attitude toward a «fraternal» off-shore business rather roughly: «The «brothers» have a couple of big decent companies like IPAm and IBA, which have regular distribution channels abroad, and there are lots of petty firms, like Miratech, which we collide with at European, first of all at the German market, and which are desperately dumping , messing up and empoisoning our life. No other information is available to us» [10]. But it has become impossible already to disregard the potential of the Ukrainian and Belarusian programmers.

Thus, the main problems in Belarusian labor market and in the ICT sector are interconnected:

1) Low level of salaries in all branches of the country's economy (the average salary in 2002 equaled to 100 US dollars per month, and this was actually considered to be a huge achievement), which is determined by the general economic situation in the republic;

2) Stably high (as compared to the rest of the world) training level of the specialists in the IT field at universities;

3) Drastic growth of the information and telecommunication products world market.

The domestic and foreign experts unanimously consider the software products market to be the most dynamical sector of Belarusian economy, as it almost achieved the world level.

Programming branch of the Belarusian economy, which attracts international attention to our IT industry. The republic is of interest for the foreign corporations - computer and software producers, first of all, segment of a commodity market of the products, and for this reason the world community doesn't mind cooperating with Belarus.

On international arena the Belarusian IT market is known as a market, possessing a cheap skilled workforce in the field of programming. In reward to the achievement of a required skill level, the leading corporations in IT area (for example, Philips, Netherlands) establish direct contacts with Belarusian universities. They render some help to educational institutions and select dozens best senior students, who are then employed by the European companies and supported in the further MS degree studies. Thus, as it is a common practice in North-American National Hockey League (NHL).

According to mass media, the number of programmers vacancies in the USA reaches 800 thousand, beside that, European countries (Germany, Great Britain and others) have proclaimed certain programs, aimed at recruitment of some dozens thousand programmers from CIS countries per year, starting 2000

As a result of economic crisis in the country, an average salary of skilled Belarusian programmers is trifling as compared to an average world one, which has resulted in their obvious reorientation on the foreign markets.

Skilled Belarusian programmers are destined to replenish human capital of foreign corporations. It is usually implemented through the wage jobs in western centers, or through separate contracts for certain tasks. As a rule, these activities are executed outside state systems of the registration, employment and taxation, therefore such phenomenon was titled "off-shore programming". The growth rates for off-shore programming are difficult to calculate, however according to my personal estimations, in Belarus the volume of such programming increases not less than by 50 % annually.

There are some basic ways of migration of the Belarusian programmers in IT-companies of Western-European countries, Israel, Australia, USA and Canada and huge set of various practical implementations. We shall describe some of them, resting upon our substantial experience in scientific and pedagogic activities (since 1980), and fates of colleagues from the National Academy of Sciences of Belarus.

1. University - post graduate education at university (academic institution) - scientific degree (PhD) in the field of computer sciences - scientific activity (training) in a western science center (IT company) – immigration, having a reliable place for living and working – guided by the preceding Belarusian colleagues, employed in this center (company).

2. Activity in a Belarusian software company (university, academic or sectoral institute) - an official contract from a foreign company for design of a software product (fulfillment of the joint international scientific project) - tracking of the designed software product overseas (submission of joint research report abroad) – subsequently, a permanent job in this company (university).

3. Post graduate education during 1-3 years with more detailed training in foreign languages, obtaining an experience in designing particular IT products and advanced programming methods. In most cases post graduate training gets interrupted without reservation of a scientific degree and participation in educational process of a university. The specialist passes to a job either in a Belarusian company on mining of IT products, or in an information department of joint venture on the territory of Belarus. In 1-2 years the invitation for job in other country is originated either by a specialist, or by western company - founder of joint venture.

4. From middle 90 years, in connection with broad internet access in Belarus, the most popular among the programmers way became independent search for vacancies abroad and passing of remote testing of experience, using Internet-technologies, with the subsequent departure abroad through intermediate firms or directly through the companies - IT producers, possibly with preliminary fulfillment assignments in Belarus (off-shore programming).

The described above basic schemes usually attract young people in the age of 22 - 35, which results in an aging of computer staff in Belarusian firms and institutions, in educational sector, and in IT products design. It has a negative effect both on reproduction of the IT specialists, and on the level of Belarusian firms working with localization of IT systems for the Republic of Belarus.

National IT branch suffered considerable loss, resulting from mass emigration of the Jewish population in Israel and USA at the end of ‘80s and ‘90s of past century.

Realizing the danger of a situation, when considerable portion of scanty resources is allocated to training of the IT specialists, who tend to emigrate abroad, an attempt was made to officially support domestic producers of information technologies and software in Belarus. The President of the Republic of Belarus Decree of State Support of Development and Export of Information Technologies (dated May 4 2001, No 234) was adopted in 2001; it served as a basis to set up the Scientific and Technological Association “National InfoPark” (IT Incubator) in December 2001. The members of “National InfoPark”, who are ICT and software product developers, are exempt of taxation, collections and other payments (except for 5% profit tax and compulsory allocations to social insurance funds). This initiative presumes tax exemptions and other financial privileges for a number of state and commercial organizations, which have considerable experience and work in a certain direction - software products design. It is supposed to boost the domestic producers of information technologies and software products with the western corporations’ orders, which will allow not only to execute the control over transfer of know-hows abroad in the most reasonable way, including the control over financial flows, but will also enable, using proper combination of foreign and domestic orders (government contractual work), not only to support programmers with high salaries, through fulfillment of expedient "the currency-bringing orders", but also to execute state orders – from the Government or domestic organizations, for example, from the social sectors (Ministry of Public Health and Education).

The indicated approach on the one hand will allow to lower outflow abroad of highly qualified IT specialists from Belarusian state and commercial firms essentially, and on the other hand - will introduce the country on the IT world market to firms having long-term experience and tradition, fill them up with young talented programmers, who could support their high level training at universities through this.

Nowadays, the local IT-market as ready to solve any problem of local manufacturers, associated with information flows management. And even on the level of international standards, taking sectoral specificities into account.

The main problem, which a manufacturing enterprise – consumer of IT solutions - can face, lies not in the absence of a decent supplier. The problem is the underdevelopment of Belarusian IT-market – it's missing some key items, essential for the elaboration of optimal IT – strategies. Just as it is impossible to consider stock market to be fully developed in the absence of depositary or banking system – in the absence of independent audit.

First of all, the structure of the majority of big domestic enterprises, unfortunately, lacks a figure of IT – manager, which is extremely widespread in foreign business (with the exception of Belarusian companies, operating in ICT market – CEO or one of his/her deputies stand for IT – manager there).

IT – manager's role is to become in a way a filter between CEO and technical services. He/she is never occupied with current business (maintenance or preventive measures etc), but solves principal problems. His/her task is to make the enterprise's information system work most efficiently producing minimum costs.

The real IT – manager is not very interested in technical issues. He/she is responsible for the efficiency of the enterprise's information system, expressed in business terms: increase in labour productivity, reduction of costs, recoupment of investments, realization of certain advantages and so on. In order to fulfil this task, IT – manager should possess a power, equivalent to the power of CFO in the corresponding field of influence.

It is quite possible, IT – sphere of a particular enterprise is not so developed yet in order to employ a separate full – time "manager for informatization purposes". It is equally possible that a qualified candidate can rarely be found. The collaboration scheme of "enterprise – IT-consultant" was elaborated specifically for such cases in the West.

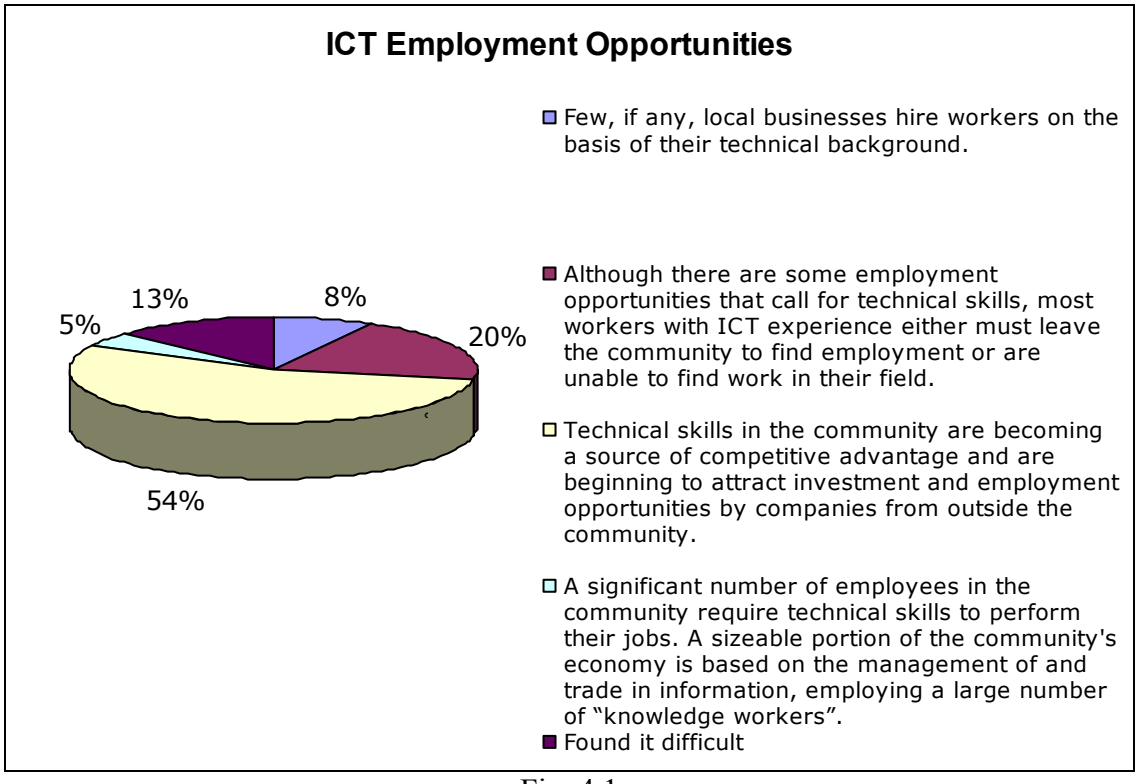

Fig. 4.1

It is noteworthy that a couple of big computer companies act as some sort of "informal"

consultants for large Belarusian enterprises. They start a valuable information system from the very beginning there and then deal with its maintenance and modernization. This is quite an efficient scheme. But the problem is that only one out of two conventional IT – consulting schemes can be practically implemented in Belarus, viz IT – consulting of the first type (the "informal" one), when the consulting company not merely gives advises concerning ITs, but also offers some equipment in order to solve specific problems (such companies are typically called system integrators in Russia and Belarus. As a rule, they stake on definite equipment producers).

Fig. 4.1 shows the assessment results of the 'ICT Employment Opportunities' Index, one of eighteen indices, set in poll at *tut.by* site according to [1].

Readiness (or advancement) estimation breakdown (in percentage) and average estimation of the ICT Employment Opportunities index are shown below in Table 4.1.

Table 4.1

Average Estimation of the ICT Employment Opportunities Index

Stage No	Belarus, %	Minsk, %	Regions, %
1	0	0	0
2	89	22	89
3	0	56	0
4	11	22	11
Index Average Estimation	**2.22**	**3.0**	**2.22**

The total estimation breakdown (given as percentage based on collected data) covering the whole republic, the city of Minsk and administrative regions and assessed by four micro-indices are further shown in Table 4.2.

Table 4.2

4.1.1. ICT Employment Opportunities

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	Few, if any, local businesses hire workers on the basis of their technical background	0	0	0
2	Although there are some employment opportunities that call for technical skills, most workers with ICT experience either must leave the community to find employment or are unable to find work in their field	89	22	89
3	Technical skills in the community are becoming a source of competitive advantage and are beginning to attract investment and employment opportunities by companies from outside the community	0	56	0
4	A significant number of employees in the community require technical skills to perform their jobs. A sizeable portion of the community's economy is based on the management of and trade in information, employing a large number of "knowledge workers." Information and communication technologies are considered central to the strategies of many organizations	11	22	11

4.2. B2C Electronic Commerce

One of the main indices of the net economy is the use of web sites by enterprises for advertisement purposes. According to the poll carried out by the Institute for Privatization and Management (Minsk) within the project "The Promotion of Private Enterprises in Belarus" at the end of 2002 (www.ipm.by), 88% of CEOs of private enterprises use computer in their daily

activities. About 30% of private and 10% of state enterprises have a web page. All in all there are over 2000 web sites (pages) in Belarus (Fig. 4.2).

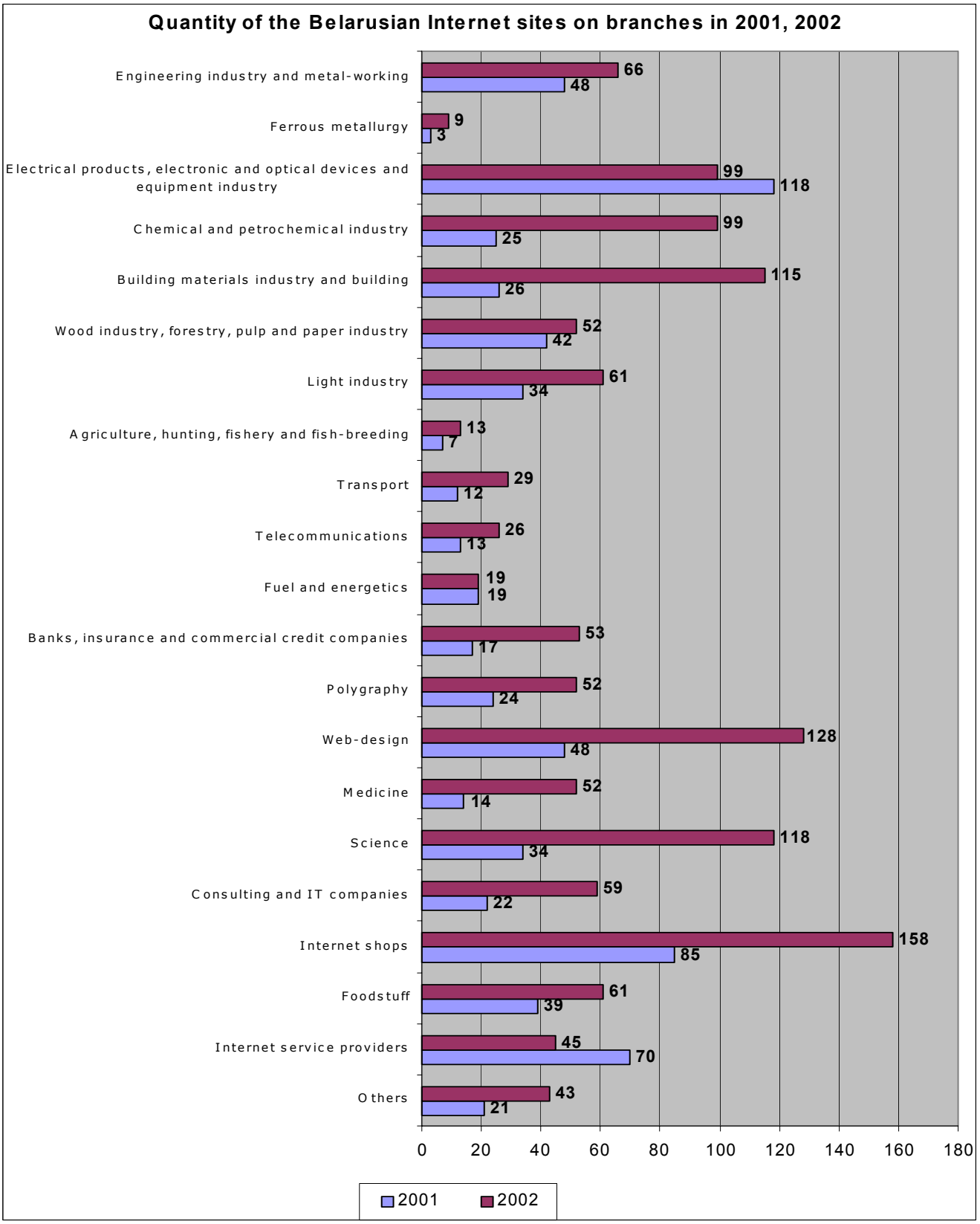

Fig. 4.2

Over 1200 of them inform about goods and services. There is a constant and steady increase in the quantity of the companies' web sites. Only during the period 2001 - 2002 the quantity of site owners among the enterprises more than doubled.

Those enterprises, earlier represented in the Internet by one or two static pages, now have informative and well-designed sites aimed at satisfying the users' information needs. Nevertheless the majority of business sites are only under construction. Moreover, the scale of Internet use differs significantly among enterprises. The greatest success has been achieved by those, whose management o recognizes information as a valuable public resource along with material assets and as a basis for knowledge-oriented economy. In spite of the general positive dynamics of the IT-market, several enterprises specializing in the information support of the small and middle business discontinued their activity in 2002 and are in the process of liquidation.

Internet – shops. Despite the fact that the legal and methodological bases of the Internet-shopring activity are not completely determined yet, trend of their development is outlined by Internet-stores, such as Minsk.shop.by and Real.shop.by, who are some sort of leaders of Internet trade in Belarus. The total quantity of registered electronic-shops in search systems is more than 200 (the research was made within this project):

Minsk region (Minsk) 200;
Vitebsk region (Vitebsk) 5;
Brest region (Brest) 5;
Gomel region (Gomel) 1;
Grodnensk region (Grodno) 4;
Mogilev region (Mogilev) 4.

Belarusian e-shops mainly sell household equipment, computers and their spare-parts, CDS, video- or audio- tapes (Fig. 4.3). Unfortunately, it is impossible to use credit or debit cards for payments and some non-electronic pattern such as pay-sheets and receipts have to be involved.

Besides the specialized electronic shops, trade houses are open; they offer a wide range of goods -CD- ROMS, video cassette, computers and spare-parts, Internet- map, telephones, food products, perfumery [universum.shop.by], automobiles, tire, audio -, video -, domestic electronics, plates dishes, lamps, office equipment, children's goods, office supplies, furniture, personal hygiene, cosmetic, sport goods, flowers, plants, photography supplies, telephones, communication devises, audio and video devises, household equipment, food products, tobacco, telephones, sport goods, trade areas based on the server of the same company, and the logotypes of other electronic shops.

Internet helps obtain different services: medical, the information placing, flower design service, planting of greenery, the connection to Velcom network, the prolongation of pager service, sale and rent of real estate, etc.

Card payments. Plastic bank cards were first introduced in Belarus in 1993. There are two types of bank cards currently in use in the country: the cards issued by the national payment system "BelCard" and those issued by international banking associations VISA and MasterCard/Europay. In addition, banks issue their own cards and acquire private bankcards issued by non-resident banks.

Bankcards in circulation are debit cards with or without an account overdraft option. Use of credit cards is very limited. 12 out of 29 banks, registered in Belarus, issue bankcards.

BelCard, the national payment system for bankcards, was founded in March 1994 on the basis of smartcard (chip card) technology. Its first cards were issued to customers in September 1995. Presently, the use of these cards doesn't go beyond Belarus. 11 banks including the central bank issue BelCard cards in the national currency. As of the end of 2002, there were about 80,000 offline cards in circulation. More than 400 sales outlets (including service facilities) equipped with POS terminals accept the cards. Cash can be withdrawn with BelCard cards in 79 automated teller machines (ATMs) and in more than 260 cash issuing offices. The total volume of BelCard card transactions during the first six months of 2002 was equivalent to around USD 30 million.

In Belarus, VISA and MasterCard/Europay cards have been in use since 1993. Seven Belarusian banks are members of these international banking associations. Transactions using VISA and MasterCard/Europay cards can be executed both in Belarus and abroad, while transactions using Cirrus/Maestro cards are possible in Belarus only. VISA and MasterCard/Europay cards are accepted as payment media by 800 sales outlets (including service facilities). Cash withdrawals using VISA and MasterCard/Europay cards can be made in 35 ATMs and in more than 440 cash issuing offices.

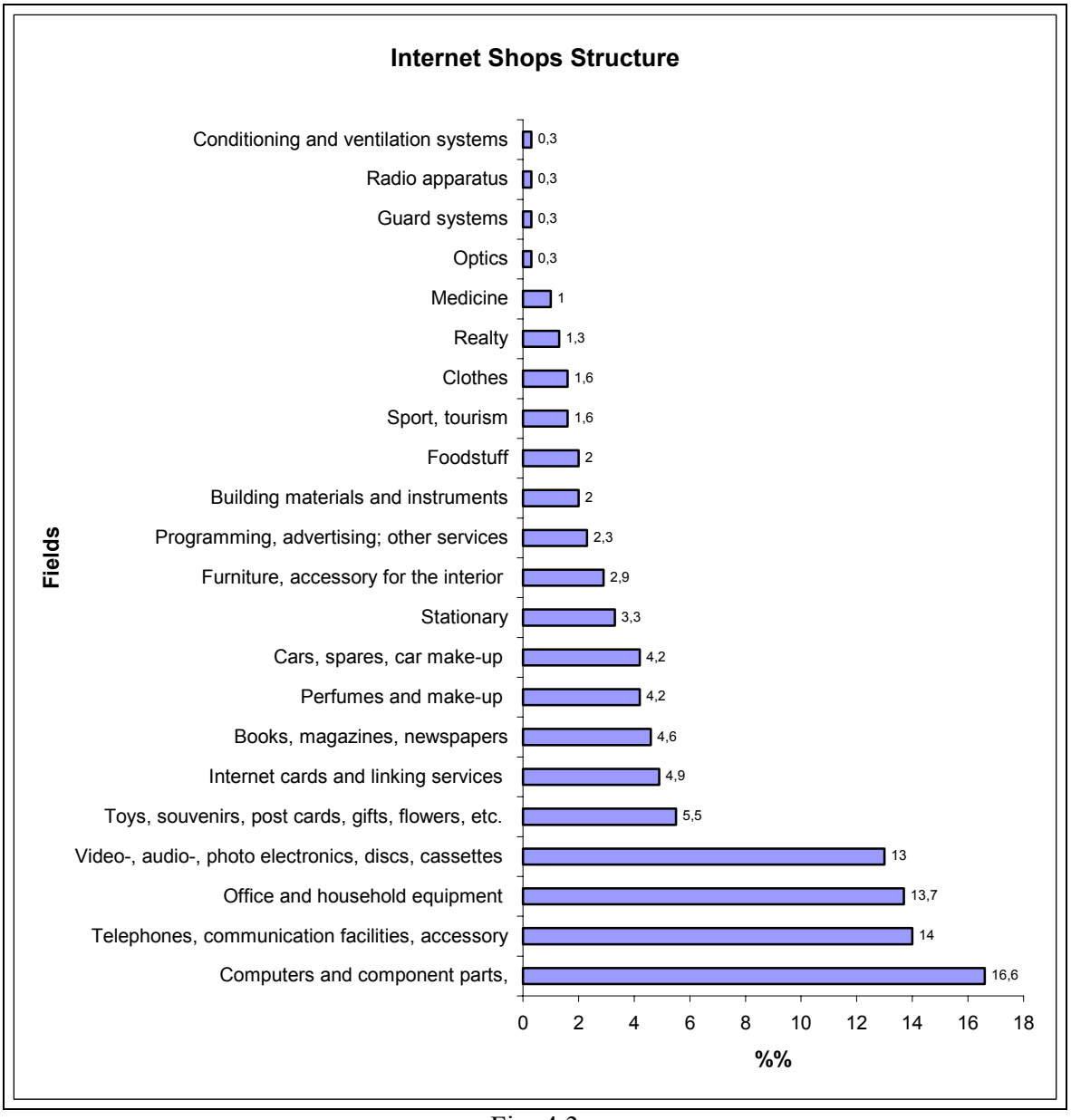

Fig. 4.3

In addition, there is a developing market for payment cards with a number of different applications. State-owned enterprise “Beltelecom” issues some three million disposable and reloadable phone cards a year (with a total equivalent value of about USD 3 million). The Minsk metro authorities issue some one million travel cards annually (with a total equivalent value of about USD 1.3 million). About 250,000 cards are used for obtaining fuel and related goods at filling stations (with annual turnover of about USD 5.0 million).

Fig. 4.4 shows the assessment results of the 'On-line business operation' Index, one of eighteen indices, set in poll at *tut.by* site according to [1].

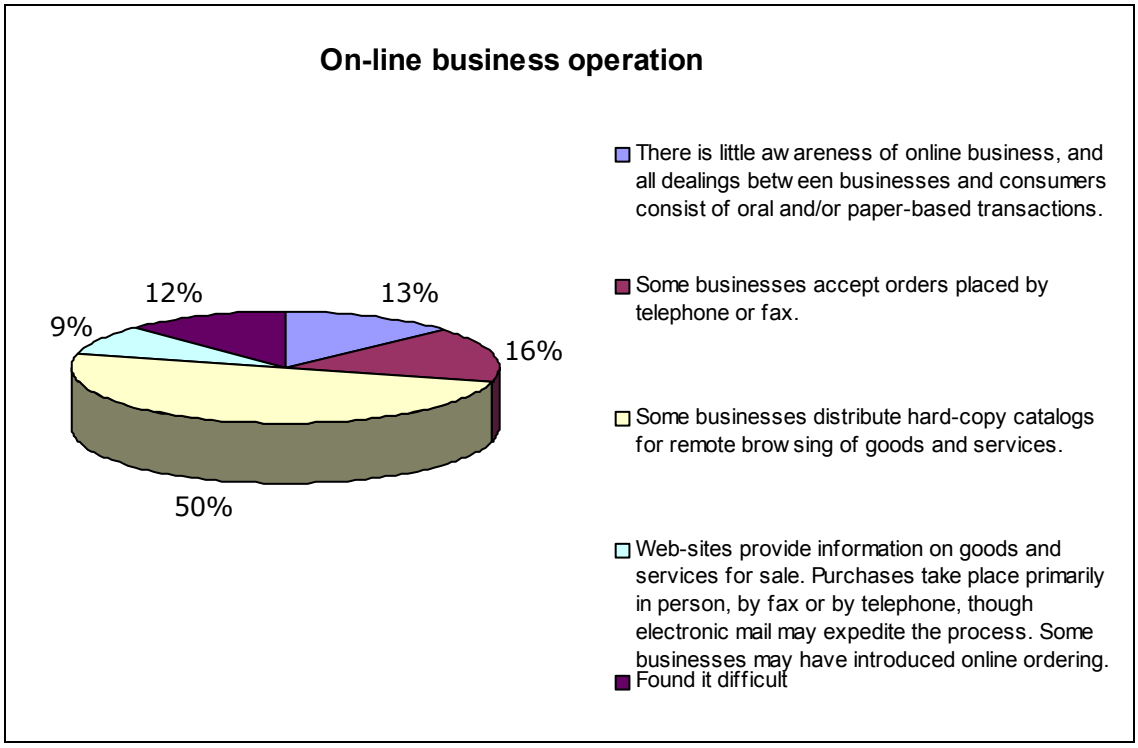

Fig. 4.4

Readiness (or advancement) estimation breakdown (in percentage) and average estimation of the B2C Electronic Commerce index are shown below in Table 4.3.

Table 4.3

Average Estimation of the B2C Electronic Commerce Index

Stage No	Belarus, %	Minsk, %	Regions, %
1	16.5	0	22
2	72.5	22	72.5
3	11	67	5.5
4	0	11	0
Index Average Estimation	**1.95**	**2.89**	**1.84**

The total estimation breakdown (given as percentage based on collected data) covering the whole republic, the city of Minsk and administrative regions and assessed by four micro-indices are further shown in Tables 4.4, 4.5.

Table 4.4

4.2.1. Business operation by using web-sites

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	No businesses in the community operate web-sites	11	0	11
2	Some local businesses operate web-sites. The basic information they provide is static and infrequently updated	78	11	89

3	Many businesses post key information on web-sites. Information is often not kept current and relevant	11	67	0
4	Many businesses in the community have incorporated the World Wide Web into their sales, marketing, and customer service systems	0	22	0

Table 4.5

4.2.2. On-line Business Operation

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	There is little awareness of online business, and all dealings between businesses and consumers consist of oral and/or paper-based transactions	22	0	33
2	Some businesses accept orders placed by telephone or fax. Some businesses distribute hard-copy catalogues for remote browsing of goods and services	67	33	56
3	Websites provide information on goods and services for sale. Purchases take place primarily in person, by fax or by telephone, though electronic mail may expedite the process. Some businesses may have introduced online ordering	11	67	11
4	The total volume of online retail is a noticeable component of the community's commercial activity, as may be evidenced by advertisements for commercial websites in traditional media and other indicators	0	0	0

4.3. B2B Electronic commerce

Automated System of Interbank Settlements. A major constituent part of the Belarusian payment system infrastructure is an Automated System of Interbank Settlements (ASIS), providing for fiscal liability fund transfers of the parties. ASIS, operating nowadays, is meeting requirements of banks and legal entities, on the whole, in effecting payments duly and qualitatively. At present time about 120 thousand interbank transfers of funds totalling the amount of about 378 billion BYR roubles are daily passed via this system. A reliable and stable operation of ASIS in many respects ensures functioning of the economical system of the Republic of Belarus as a whole. Failure to effect payments in the due time and suspense of the fund remittance system for liabilities of both clients and the National bank of the Republic of Belarus would result in huge financial and economical losses. By virtue of the above stated, a great emphasis is put on efforts to ensure that interbank transfer operations are reliably and securely effected within the national payment system.

The participants of the Automated System of Interbank Settlements are the National Bank of the Republic of Belarus (NBRB), other banks and non-bank financial intermediaries.

The main functional components of the Automated System of Interbank Settlements comprise the system of transfers of gross and due amounts in on-line [real-time] mode (BISS system) and clearing payment system effecting petty cash and not urgent remittances.

BISS system enables to render interbank gross remittance services, as well as effect due remittances irrespective of their amount related both to own bank payments or the ones of any non-bank financial intermediary (hereafter referred to as «bank») or at the request of a client, serviced by a respective bank. The said remittances are made on the basis of the electronic payables containing required data, including text, references of the primary payables, and those, which are not followed

by exchange of hard-copy payables. The electronic payables, from the moment being accepted by the BISS system, are considered irrevocable and are handled, depending on their receipt, on the «First came - first served» basis. Banks and their clients may use funds, received at their accounts, as soon as they are available. The BISS system permits also to make interbank payments resulting from other cash clearing remittances conducted within a day on a net basis in the clearing system, from security purchase-sale transactions and from other operations when bank plastic cards are used.

To effect interbank payments of both large (due) remittances and cash ones, the banks of the republic favour the services of a single computing center, namely Belarusian Interbank Settlements Center (BISC), a republican unitary enterprise, which is a BISS and clearing system operator.

The operations on various bank correspondent accounts opened with NBRB are made provided so that the funds are available on the respective corresponding accounts without overdraft being allocated by the National Bank. The banks are obliged to provide for resources/funds being available on the correspondent accounts within operational day in the amounts required to effect payments. If needed, the banks may earmark resources/funds on correspondent accounts to make payments on the clearing basis. If sufficient amount is not available on a correspondent account of the remitter's bank at the moment when the electronic payable is received by BISS system, the said electronic payable is put on a waiting line for funds. As soon as funds become available on the given correspondent account, the electronic payables are automatically executed by BISS system.

The National Bank gives due notice to modernising and upgrading software and hardware to effect clearing settlements permitting to keep in line with the advanced networked technologies in this field. Software and hardware infrastructure is being developed stage by stage according to the schedule worked out and approved by the Board of Directors of the National Bank.

An upgraded ASIS should provide for a high level of operational reliability permitting to complete the final payments for a respective day, ensuring traffic processing even in such critical and emergency situations as contingencies, so-called technogenic emergencies and terrorist' acts, power supply shutdowns, communications breakage.

This requirement has led to the creation of a computing stand-by center of the National Bank, which is to be constructed in the territory of the republic. Such necessity stems from the fact that all functionally essential computing and technical hardware means of ASIS are located in one building and occupy the floor space of the main computing center. In case of any huge failure or natural disaster in the area where the computing center in question is situated the interbank payment operations may be abruptly ceased for sufficiently a long spell of time, which might be fraught with destabilising consequences affecting the economy of the republic. The construction of the computing stand-by center would allow to restore the interbank payments in case of threats of any kind within 4 hours, with 1 hour only being prescribed to tackle the technical matters concerned with measures to switch over to stand-by systems.

The stand-by center project provides for the mostly advanced technologies in the field of optical telecommunications, data storage, transfer/transmission and huge information processing capacities to be applied. The concept envisages construction of a remotely located backup-data base facility duplicating in full scope the main center for security purposes – in case if one of them gets out of order. The range between main and stand-by centres is supposed to be about 15 km, for it is enough for saving service capability of one of them in case of technogenic emergencies or huge accidents in that very area where another centre is deployed. The centers are linked with fiber optic lines using modern technologies of data compression by means of multiplexing.

The stand-by center is to be put into industrial operation in late 2003.

Next stage of establishing a highly reliable and secure payment system involves the reconstruction of the main computing center in order to increase its operational efficiency and facility safety.

The Central archive of electronic documents, first in the republic, was set up in 2000in order to render safety, registration and proficient handling of electronic documents in the National Bank.

The Central electronic document archive (CEDA) is to receive for keeping in safety the electronic documents and information on interbank payments, the electronic documents of structural divisions of the central frame of the National Bank, which have installed the automated systems for processing and filing documents in electronic format.

As for today the interbank payment files which have been processed since 1998 till current day, the electronic documents of the Central Depository of the National Bank of the Republic of Belarus (NBRB) on government/public securities and credit instruments of the NBRB covering the years of 2000 to 2002, electronic documents on primary allocation of the government/public securities and credit instruments of the NBRB for 2001 to 2002 are stored in the Central archive of electronic documents. The total amount of electronic documents and interbank-payment-related information, daily received for keeping in CEDA database, makes up 14 to 17 MB or 130 to 160 thousand documents.

Late in 2002 an automated subsystem for repository documentary synchronization was set up; it is now successfully operating with repositories of the interbank payment participants, providing for interaction between CEDA and bank repositories, the ones which are participants of the interbank payment system, and allowing the daily verification of electronic payment documents to be stored. Apart from insured guarantee of integrity and completeness of electronic document fund kept there, the system makes it possible to keep backed-up information saved for any event of loss or audit of bank repository database files by the National Bank.

CEDA cooperates closely with the state control bodies of the republic. It forwards the information on all interbank payment operations effected during an operational day to competent statutory frames of the State Control Committee in electronic format on certain days set by order and regulations.

The legal framework of electronic document application, the main requirements set for them, as well as rights, duties and responsibilities of the participants of legal relations arising in electronic document circulation and management are enacted by the Law of the Republic of Belarus (An Electronic Document Law).

The said Law defines that software and hardware means applied for production, formatting, processing, transmitting and keeping electronic documents are subject to certification by a certification body under NBRB.

A certification body dealing with software and hardware means in bank services and technologies was established and two test laboratories were accredited for independent and competent certification to act within the framework of the National certification system under the National Bank using facilities of BISC unitary enterprise, and the unitary enterprise Center of Banking Technologies as measures to avail of the provisions of the Law.

Taking into account the level of responsibility arising from electronic document application in the payment system, a priority in introducing obligatory certification by the National Bank was given to software products used to produce and process electronic documents at ASIS.

The software products related to the above-mentioned subclass were enrolled in the list of commodities subject to obligatory certification on territory of the Republic of Belarus by the resolution of the State Standard Committee. The same resolution set also the date for obligatory certification to be introduced, i.e. 30.12.2003.

Software used for production and processing electronic documents in Client-Bank class systems was defined as the next line of products for obligatory certification to be introduced.

According to data collected from recent studies, there are 12 types of Client-Bank class systems that are currently exploited in Belarusian banking sector. The developers of Client-Bank class systems are the banks and organisations of various forms of ownership. The systems are

installed in more than 500 banking institutions and they service more than 6000 clients.

It is advised to introduce obligatory certification in the said sector in two stages in order to insure the guaranteed level of safety and operational reliability of software for production, processing and outward presentation of the payment orders as electronic documents integrated into Client-Bank class systems.

At the first stage, the body responsible for certification of products in conformity with the information security requirements (the State Center of Information Security) carries out certification of software to be used for production of an electronic digital signature applied by a bank to verify integrity and authenticity of the payment orders, produced by the client in electronic document format.

The software used for production, processing and outward presentation of the payment orders as electronic documents are subject to certification at the second stage.

It is advised to introduce obligatory application of license software used for production, processing and outward presentation of the payment orders as electronic documents which are integrated into Client-Bank automated banking systems beginning from 01.04.2005.

A full implementation of Programs aimed at obligatory certification of software products compiled to produce and process electronic documents in banking sector will allow to essentially advance safety of clearing settlement operations in the payment system of the Republic of Belarus.

At present Belarusian banks develop such financial services, which enable a client to handle his/her bank account remotely. The major banks implement in their practice the advantages of the remote banking system while servicing the clients – legal entities (Client - Bank systems). The banks are found to be at the stage of the informational (presentational) Internet - banking, i.e. they install an elementary information retrieval system servicing clients, which is maintained on their own web-servers. The clients-legal entities may gain access to Internet - banking system through the sites administered by the banks. Banks has not yet granted the services of remote access to bank accounts to private (individual) clients - natural persons.

Internet-banking. At present time there are 30 operating banks in the Republic of Belarus, 14 banks out of that number have already arranged their own web-sites in the Internet network. Table 4.6 shows the stage of bank development concerning integration of the Internet - banking technology.

There were a few valiant but plucked attempts made by a number of enthusiasts from the Brest branch of Belagroprombank (http://members.bresttelecom.by / ~ agro), Vitebsk regional division of Belvnesheconombank (www.bveb.vitebsk.by) and Belgasprombank branch No 1 (www.bgpb1.bizland.com and www.bgpb1.i8.com) who independently tried to design and implement Internet web-pages containing the information related to the above-mentioned financial institutions. Similar experiments may be considered, in all cases, to be a failure: the listed sites, due to a low level of their software and design development, occurring misprints, charge-free servers, where the web-sites were put and maintained and missing not-registered own domain names, would it be, at least, second or third level, discounted the image of banks and which are fraught with both institutions as well as the Belarusian financial system as whole running the risk of losing reputation at all.

Table 4.6

Internet - Banking Service Development in the Republic of Belarus

No	Bank Name	Internet Technology Application
1	2	3
1	National Bank of the Republic of Belarus	Internet – banking development stage: informational. There is a representation web-site with a proper information about the bank and Belarusian banking system. High technical/ software and design level, a domain name is a competent preference – www.nbrb.by. the selected name is short, it corresponds to well-known abbreviation used everywhere, its BY

		first level domain reflects the relationship of the bank with the Republic of Belarus and its all-national scope of operation.
2	Priorbank open joint stock company (OJSC)	Internet – banking development stage: informational, occupying leading positions among the Belarusian commercial banks. A remote client system (similar to a widely distributed Client – bank system) is operational not only through telephone lines, but via TCP/IP protocol as well. Priorbank has a corporate site, its address: www.priorbank.by. It is important to note that a former domain name (www.prior.minsk.by) has been changed for www.priorbank.by. Firstly, it is easier to remember it and, secondly, it puts an emphasis on status of the organization as a bank, not just an ordinary company located in Minsk. Distinctive software and design level of site development, high speed of operation should be noted. Priorbank site has all grounds to be considered a specially recommendatory example of posting information about a Belarusian operational enterprise in Internet website and may be advised as one of the model sites for other banks to be followed.
3	Technobank OJSC	Internet – banking development stage: communication Internet – banking, occupying leading positions among Belarusian commercial banks; access to Internet – bank system is available through its site: http://www.tb.by/. The system provides access to information about a client's account current state only in on-line mode. Technobank has registered one more domain name during this year: http://www.tb.by/; http://www.technobank.com.by/ – a former address has a forwarding link to the latter one.
4	Golden Thaler Bank OJSC	Internet – banking development stage: informational Internet – banking. It is one of the most perspective banks in this sector though, by virtue of some features. In particular, there is an affiliated firm providing Internet access services, namely Golden Thaler Provider Ltd. It proves that there are experts at service of the bank managers who are qualified enough in the Internets – technologies and are able to provide further integration and application of appropriate software and hardware. There is a web-site of the bank, its address: http://www.gtbank.gtp.by/. The site is implemented at a high professional level, it contains the information about the bank, the services which it renders, its clients, etc. The bank's domain name is a little bit unusual and it is also too long.
5	Belarusbank OJSC	Internet – banking development stage: informational Internet – banking. There is a web-site, its address: http://www.belarusbank.minsk.by/. The site is implemented at a high professional level, it contains the information about the bank, services it renders, clients and other useful data.
6	Belpromstroyban k OJSC	Internet – banking development stage: informational Internet – banking. There is a web-site, its address: http://www.belpsb.minsk.by/. The site is implemented at a high professional level, it contains the information about the bank, services which it renders, clients and other useful data.
7	Belarusian Bank of Development and Reconstruction "Belinvesrbank" JSC	Internet – banking development stage: informational Internet – banking. There is a web-site, its address: http://www.belinvestbank.by/ *and* http://www.blbb.by/. The site is implemented at a high professional level, it contains information about the bank, services it renders, clients and other useful data.
8	Djem-bank OJSC	Internet - banking development stage: transaction Internet - banking. There is a web-site, its address: http://www.djem.com/. The site was qualitatively modified and there was a number of key changes in its maintenance and operation within the last year: a domain name was changed from www.djem.com.by to www.djem.com, which tells that the bank is international market-oriented to a greater extent; the bank went from an informational level of Internet - banking up to a transaction one, which proves the bank has serious intentions to introduce technological innovations in its activity.
9	Minsk Complexbank, a Joint Stock Commercial Bank	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.minskcomplexbank.com. It was finally modified and is put in the Web 2 years ago. The selected domain name as registered distinguishes ranking of the bank as a financial intermediary operating within the framework of the whole world market (a BY national identifier is missing).

Table 4.6 (cont.)

1	2	3
10	BELAGROPROM-BANK OJSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.belapb.com. It was finally modified and put in the Web in the last year. the selected domain name as registered distinguishes ranking of the bank as a financial intermediary operating within the framework of the whole world market (a BY national identifier is missing).
11	BELORUSSKIY NARODNY BANK OJSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.bnb.by.
12	BELORUSSKIY INDUSTRIALNY BANK OJSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.bib.by.
13	BELGAZPROM-BANK OJSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.belgazprombank.by.
14	SLAVNEFTEBANK OJSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.snbank.by
15	ATOM-BANK Closed JSC	Internet - banking development stage: informational Internet - banking. There is a web-site, its address: www.atombank.by.

The remaining Belarusian banks did not have their own corporate sites at the time when the poll (December 2002) was conducted and the information was collected via Internet.

A great majority of the Belarusian banks employ e-mail in their daily operation. Some of them even have registered domain names for this purpose, in particular Absolutbank Closed JSC (absolutbank.by), Moscow - Minsk Foreign bank, a unitary enterprise (mmbank.minsk.by), Minsk Transit Bank JSCB (mtb.minsk.by). At the same time, many banks have not yet registered their own domains and prefer to use IP addresses granted by Internet providers maintaining their access to Internet, for example, Commercial and Industrial Bank Closed JSC.

The first group of banks has essential advantages for integration into the Internet - banking systems in-house. Their own domain names registered at the second-third levels are the major factor of maintaining a positive image of a bank in cyberspace and attracting on-line clients (the shorter and plainer is an Internet - address, the easier it is to remember, the lower is probability to put a mistake when typing it in a browser line). It is important to apply copyright registration to the domain name, which should be appropriate to the bank name, as far as there is a probability for a domain name to be intercepted by the unauthorized outsiders. A considerable number of such cases took place worldwide, in particular, recently Rosbank, a Russian bank was forced to pay to the racketeers-perpetrators who had registered *rosbank.ru* name a few tens thousand of dollars for the name to be returned to the Russian bank. To avoid similar precedents in our country in the future it would be expedient to prohibit registration of domain names containing such a group of letters as «bank» by a special law, if there are no corresponding letters in the official name of a legal entity.

Thus, it may be stated, that the main problems of Internet - based operations for the majority of banks are design, production and implementation of their own sites in the Internet, setting of the information about bank's activity, and finally a proper domain name. The process may take several years, and only then the banks will seriously consider these issues, when they are able to implement the Internet - banking service projects.

The structure of the bank involvement in the Internet - banking service as for 2002 is shown in Fig. 4.5.

At present time there is a single bank in the country that is at the Internet - banking transactional level, viz Djem-bank. A great scope of works was made in the bank within the passed

year: from initial stage of designing a web-site up to the development of Internet Client - bank system, which is operational only with the foreign currency, for the time being. In a month time it is scheduled to actuate the services for BYR-based operations. As for foreign currency operations via the Internet network, at first stage the clients will have to bring the terms of transaction to the bank, which will check them up and then reply concerning feasibility of effecting similar operations with a particular client in the future. Thus, the companies will have to visit the bank at first and bring the information about a new business partner of the company prior to commencing operations with each new business partner.

The safety of the Internet Client - bank system is obtained by combination of unique solutions and modern technologies. The protection of traffic is built up on SSL technologies. The authorities of users are divided by using non-adjacent access modes.

To be registered in the Internet Client - bank system it is required:

- to make acquainted with agreement on using the Internet Client - bank system;
- to fill in an application form and return it to the bank;
- to sign an agreement and get passwords to access the system.

The Internet Client - bank system, which was implemented in the Djem-bank, permits to:

- access bank information 24 hours a day, 7 days a week;
- gain information about account status in on-line [real-time] mode;
- create and forward payment orders to bank at any convenient time;
- receive confirmations of payment in graphic presentation;
- work under conditions of low-speed data lines.

.

The breakdown of Belarusian banks as they render Internet Banking services

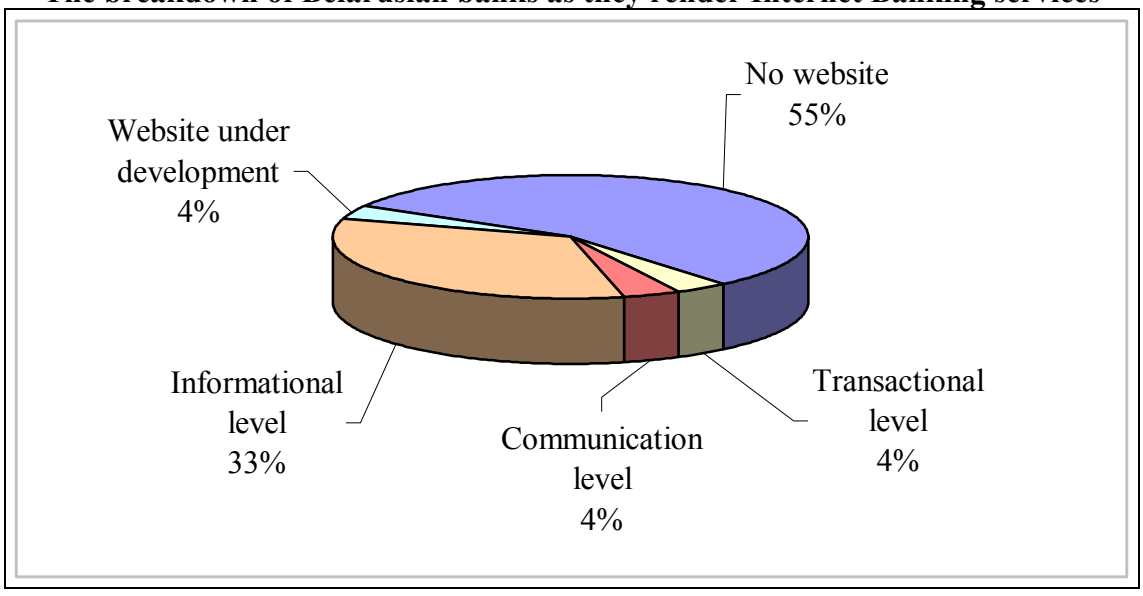

Fig. 4.5

Technobank is at an Internet - banking communication level. Its Internet - bank system permits:

- To form the abstracts of any accounts for optional period of time;
- To form applications for buying (sale) of currency during the tenders at Belarusian Currency Fund Exchange (BCFE);
- To form currency remittances.

Technobank works at the Internet - banking communication level, using the Internet - Bank system. The said system applies the following concepts:

Profile - client, who has accounts (one or several) in Technobank OJSC and who has signed an agreement on using the Internet - bank system;

Profile Administrator- a representative of the client of Technobank OJSC, who has concluded an agreement on using the Internet - bank system and granted login and password to enter the system (logon). Originally he/she enjoys all access rights to accounts;

Profile user - is created by the Administrator of the said profile and enjoys the rights, the Administrator of the profile granted to him/her.

For the sake of security the system will offer to enter the password anew after 60 minutes have expired from the moment of logon or after 20 minutes of idling. Besides the system stores total number of logins, date of the last login, IP-address of the last login for each user.

There is a guest profile function in the «Internet - bank» system permitting to acquaint with its operation. To operate as the guest profile it is required to use 'admin' login (administrator of the profile) or 'mainbuh', 'buh', 'econom', 'engine' logins (profile users). The password for all logins mentioned above is '1'.

At present the Internet - banking services in the Republic of Belarus will be in demand as major corporate clients are interested in improving an internal pattern of business through orientation on Internet - technologies.

Minsk Complexbank, a Joint Stock commercial bank is going to offer its clients the communication Internet - banking services in the near future.

Most of the remaining banks render the services of remote banking etc., which are the varieties of electronic banking and are not related to a shared Internet network.

There is just a single bank to render transaction Internet - banking service to clients in the territory of the Republic of Belarus for the time being. What are the reasons that determine it?

Conventionally, a series of actions in a transacting procedure may be divided into two stages:

1. Proper (direct) execution of a transaction (conclusion of an agreement)

2. Fulfilment of obligations, which arise from the deal (i.e. issue of payment orders to bank, making clearing settlements, delivery of the goods).

If to consider the same stages with reference to the Internet - banking service, it brings about the following.

The clients are guided by the Civil Code of the Republic of Belarus and by other statutory acts and legal instruments adopted in Belarus, which prescribe what kind of relations should exist between the legal entities and liabilities arising from reached agreements while effecting a transaction. However, when obligations, proceeding from the transaction made using Internet, are to be fulfilled, a confirmation problem arises, if the bargain accomplished between clients is legitimate (as the agreement is made in electronic format). As for today the Law of the Republic of Belarus (An Electronic Document Law) is enforced not to the full extent, in respect to certification of software used for electronic digital signature, in particular. As a result, the advantage of Internet - banking and the Internet network itself, as a fast and cheap tool and environment for data transfer, comes to naught. The solution of the problem is beyond the competence of the National Bank, and the problem should be solved and implemented at a top state level, for example by adopting an appropriate law.

As for the second stage of transaction procedure, namely issue of the payment orders to bank and, subsequently, execution of clearing settlements, a normative statutory act regulating a clearing settlement procedure was issued by the National Bank, i.e. the Regulation on bank remittance procedure (Regulation No 66 dated March 29, 2001), which reads that clients are granted an opportunity to transmit their payment orders to bank by using teletransmitting [telecommunication]

devices. Thus, there is a legal ground for direct financial settlements between clients today by using the Internet network.

It is essential to focus attention on the following. One of the relevant problems is ensuring protection of the customers of bank services and products while introduction and employment of Internet -banking. The operation in the Internet network makes it easy to access various products and tools related to any banking, investment, insurance and financial services, to publish or post persuasive, yet sometimes incorrect, advertisements informing about financial services or about protection of assets and funds on the accounts that extends possibilities for fraud. Therefore, it is of primary importance for the state to formulate policy guidelines, which would provide for protection of customers when using Internet -banking products and services, that most of all applies to bank account holders and to users of special financial services in the Internet. Besides, the virtue of the relations in the course of Internet - banking services, while they are rendered and employed, makes some criminal acts more probable to be committed, for example, anonymous (unauthorised) remittance of huge amounts of money for any deceiving or prohibited purposes, etc. Therefore, undiverted attention should be put on such issues as prevention of money laundering and restrains for other illegal activities by using Internet - banking.

The National Bank of the Republic of Belarus gives steadfast notice to the matters of rendering bank-to-client services, pertaining especially to payment settlement and other banking operations by applying telecommunication networks. In addition, it is worth noting, that there is an executive legislation in force, as minimum as required, in the Republic of Belarus permitting the banks to render services at the transactional Internet - banking level by using telecommunications networks.

Information System for Tenders and Competitive Bidding. Electronic commerce in Belarus grows along with the use of international experience in the sphere of trade procedure simplification. It is a component part of the preparation process for Belarus to join WTO.

Most significant projects in e - commerce sphere are represented by the Intergovernmental Center of Electronic Trade (ICET, the pilot site www.etp2000.com) in Minsk, by information - marketing centers of CIS countries, by Belarusian - Russian information – marketing network centers and electronic trade centers.

Among these important role is given to introduction into the practical operation of information system about conducting of tenders (IS "Tenders", www.icetrade.by), developed by the National Center of Marketing and Price Study as the component part of the ICET project.

It is possible to say that IS "Tenders" and ICET projects are the symbols of the state participation in the development of information - communication technology sector.

It is the system of electronic procurement that develops valuable presence of central and regional institutions in the network. Government becomes one of the chief players on the IT market.

Simultaneously with the information about the tenders, "IS - Tenders" resources (www.icetrade.by) are used to present information on enterprises, their production and services. “IS-Tenders” is also used for electronic on-line trade area development, which allows to substantially (in 10 - 20 times) cut down information expenses in terms of enterprise business, goods and services advertisement, and to accomplish effective marketing and price forming policy using the information given by the National Center of Marketing and Price Study.

At present more than 150 enterprises-exporters constantly use Information System "Tenders" (Fig. 4.6). 2 - 3 enterprises are registered every day as the users of the system. 60% of “IS-Tenders” users are private enterprises. Most of registered enterprises (55%) are located in Minsk and Minsk region (Fig. 4.7). The sectoral breakdown of tenders that passed through the system "IS - Tenders" is presented in Fig. 4.8.

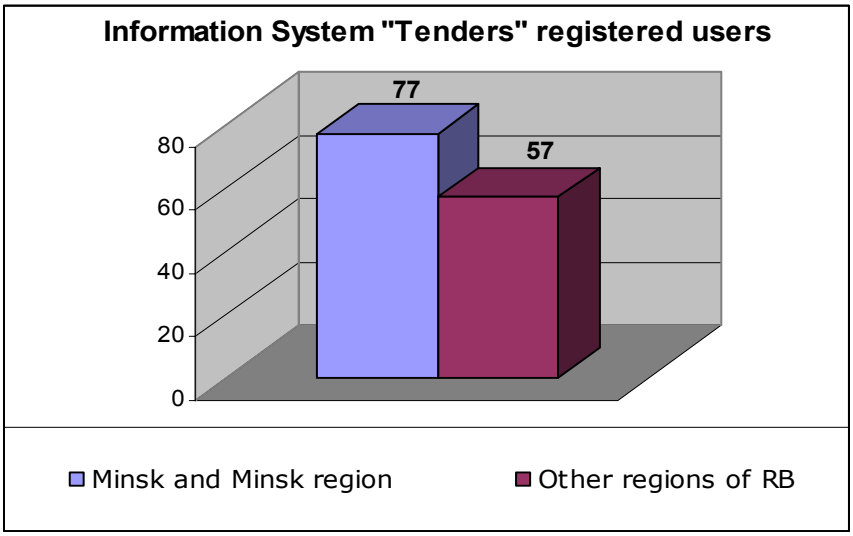

Fig. 4.6

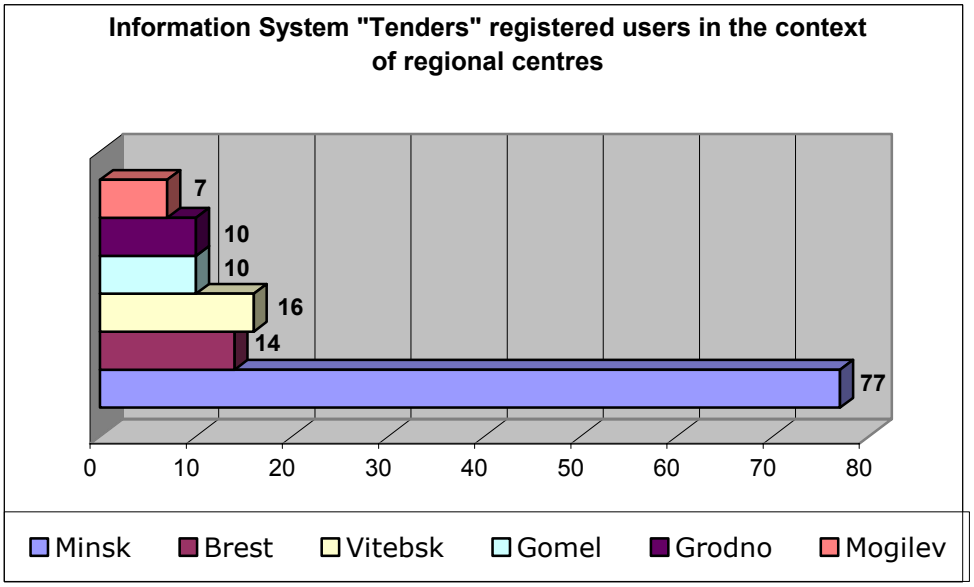

Fig. 4.7

In the current conditions the role and value of foreign-economic activity is growing greatly both for the economy of the country and separate enterprises.

The share of exports in GDP is very significant and in some countries goes up to 30% and more and continues to grow steadily. In Belarus, which is considered to be an open economy, this figure goes up to 50%. Therefore the Republic of Belarus is interested in the integral system of information - support for foreign-economic activity and trade. Our competitors in Europe and America invest in the development of exports up to 10% of the total annual volume of export.

For this purpose, the National Center of Marketing and Price Study, together with other companies, starts an experiment of formation and placement of the national-level information resources on the central portal in order to conduct tenders for public procurement.

National organization of bar coding. In 1998 Belarus joined the EAN International - the European Article Numbering Association, which promotes development and use of standards of the

EAN.UCC system. For the implementation of the decision of the Council of Ministers of April 25, 1998, № 660 "On the organization of works in the field of trade item numbering", the National Association for Article Numbering EAN Belarus was created. In accordance with the regulations of the EAN International, it distributes unique identification numbers of EAN.UCC with the prefix 481 in Belarus. However, there are no sufficient conditions for introduction of bar-coding in logistics and trade inside the republic – there is no equipment to apply and read bar codes. Since trade companies did not have sufficient resources there were no conditions for the creation and steady use of highly automated systems that would enable them to work on the basis of the international commodity identification systems.

Meanwhile the absence of the bar codes on the production of Belarusian manufacturers restrains their penetration to the foreign markets. The decision of the Council of Ministers of May 24, 2000, № 748 " Some measures on improvement of organization and further development of works in the sphere of trade item numbering and bar-coding in the Republic of Belarus'" applied to export production and contributed to a sharp increase in the sales of Belarusian production, marked by bar codes.

In accordance with this Decision of 01.10.2000 , all legal entities and individual entrepreneurs, manufacturing goods in the republic and exporting them, are required to mark these goods with bar codes.

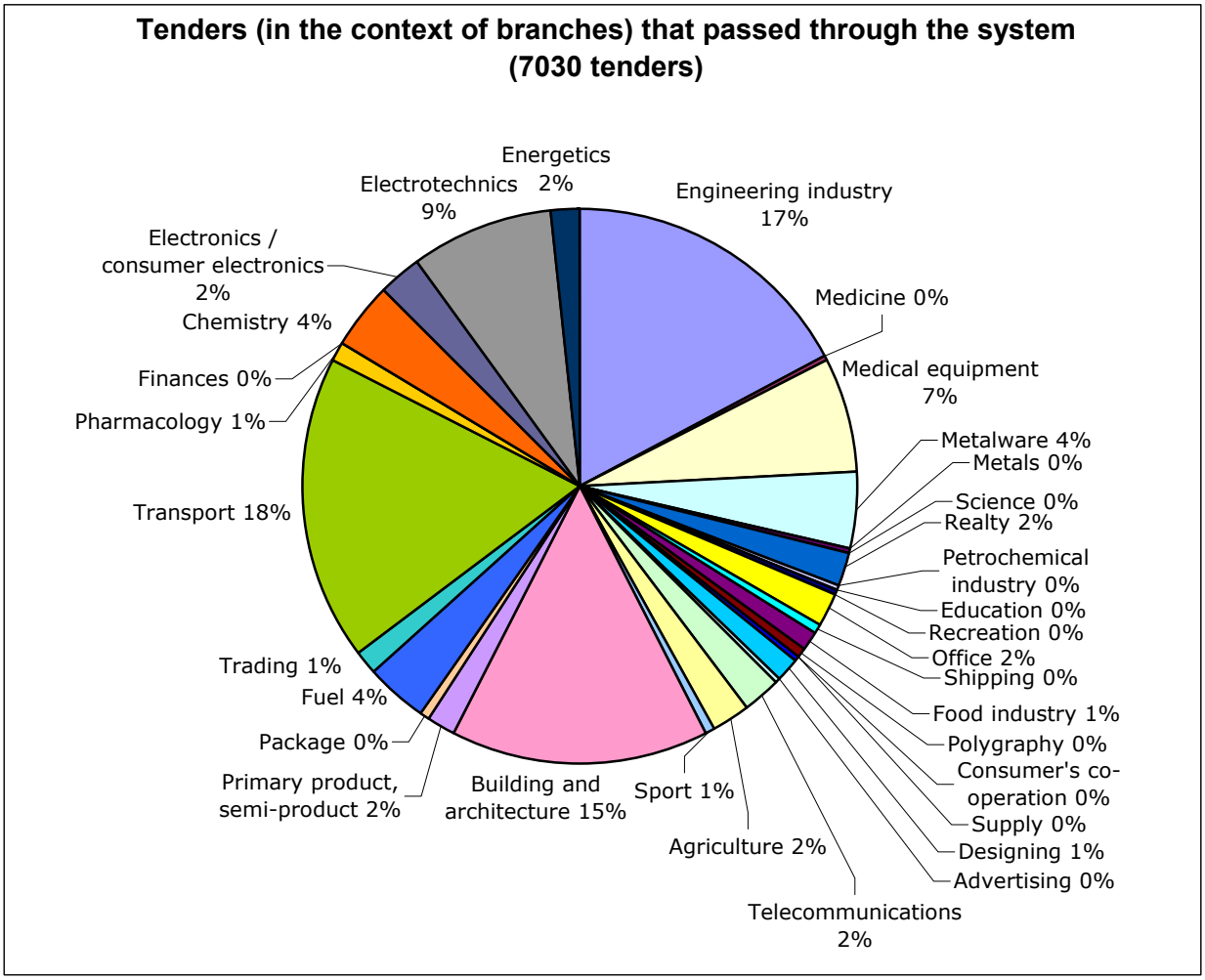

Fig. 4.8.

It is possible to state that fulfillment of the Decision contributed to the expansion of a number of our goods, which finally managed to enter civilized and highly automated market of West Europe, Asia, America. Indeed, the absence of bar codes on them forces consumers (salesmen, suppliers, carriers) to mark the goods with their own identifiers in order to ensure the automated entry and processing of information. As a rule, this implies use of manual labor, that is, waste of time and money. This in practice leads to reduction in the purchasing price of goods, and, therefore, to the loss of producers' prestige.

At present the users of the EAN.UCC system in Belarus are manufacturers, trade companies, packers, distributors, publishing firms, individual entrepreneurs and other enterprises. Over 1000 Belarusian enterprises have been attributed company numbers with prefix 481 since the establishment of EAN Belarus and although for the various reasons about 300 of them have lost the right to use their number and corresponding trade item numbers, as of 01.012003 the right to mark their goods with trade item numbers of EAN.UCC have more than 750 enterprises. There are over 120 thousand trade item numbers registered in the database of the Bar Code Depositor of EAN Belarus. This is mainly export production.

The prospects, associated with the creation of the hypermarket chain in the republic, give confidence in the fact that Belarusian goods, which are currently sold only at the domestic market, will soon be marked by the bar-codes of EAN.UCC as well. This will raise the standards of customer service in the Republic, create conditions for automated trade management and bring many other advantages, which the system of simple and reliable identification offers.

Readiness (or advancement) estimation breakdown (in percentage) and average estimation of the B2B Electronic Commerce index are shown below in Table 4.7.

Table 4.7

Average Estimation by B2B Electronic Commerce Index

Stage No	Belarus, %	Minsk, %	Regions, %
1	22	11	27.5
2	72.5	50.25	67
3	5.5	38.75	5.5
4	0	0	0
Index Average Estimation	**1.835**	**2.28**	**1.78**

The total estimation breakdown (given as percentage based on collected data) covering the whole republic, the city of Minsk and administrative regions and assessed by four micro-indices are further shown in Tables 4.8, 4.9.

Table 4.8

4.3.1. Electronic System Influence on B2B transaction efficiency

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	Businesses have few sources of market information. The efficiency of most B2B interactions is hampered by this lack of transparency, as are prospects for new business opportunities	22	11	22
2	B2B interactions remain inefficient with little transparency	78	44.5	78

3	The deployment of electronic systems has increased efficiency and transparency and lowered transaction costs in B2B interactions. Some B2B transactions are supported by electronic systems (e.g. proprietary systems and databases), but some paper-based transaction (e.g. signature) is usually required at some point	0	44.5	0
4	Many efficiencies in B2B transactions are apparent as a result of the deployment of electronic systems. These efficiencies have changed market structures and redefined industry practices	0	0	0

Table 4.9

4.3.2. Overall Level of B2B Transactions

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	B2B transactions are carried out in person or remotely through paper-based transactions	22	11	33
2	Faxes and telephones are commonly used to facilitate orders or for remote client support, although some paper-based transaction (e.g. signature) is required	67	56	56
3	Electronic B2B transactions are a small percentage of overall B2B commerce	11	33	11
4	Many businesses have incorporated the Web into sales, procurement and inventory management. Some transactions occur online over automated, fully-integrated systems. Order processing and delivery may be executed electronically and monitored through online tracking systems. Overall levels of electronic B2B transactions are a noticeable and growing percentage of total B2B transactions within the community	0	0	0

4.4. E-Government

Strategic goal of development for economically advanced countries is the transition from industrial to information society i.e. to the society, information, innovation and knowledge play a decisive role in all scopes of human activity. It is now universally recognized that competitiveness on global markets, employment level, living standards and possibility for sustainable development, which doesn't harm succeeding generations, depend on the rate of a country's progress towards information society. National programs (concepts) of transition to information society, based on the widest possible application of information resources and information and telecommunication technologies, were adopted in all developed countries, regardless of their size and role on the global political and economic arena. In the end of 2002 the Government of the Republic of Belarus approved a similar program for our country, meaning the Program "Electronic Belarus".

Information infrastructure and information technologies provide for qualitative changes in the functioning of Belarusian state authorities of all levels of power by

- Increasing the quality of administrative decisions through provision with all the information required
- Increasing the efficacy of state machinery (automation of document circulation, introduction of telematic services – electronic mail, facsimile telegraph, video

conferences etc)

- Provision of on-line connection between administrative structures and community (on the one hand, state authorities' activities become more transparent to the community, and on the other, an opportunity for on-line registration of public opinion arises, which would also allow to influence it immediately, targeting definite groups and strata of the population)
- Increasing the efficacy of serviced, which state authorities render to citizens and legal entities.

As of the end of 2002, information systems were missing only in 7 out of 46 ministries, committees and association, subordinate to the government of the Republic of Belarus. Distributive systems, with structures similar to the administrative and territorial division of the Republic, i.e. area – region – Minsk, were created in many branches. State information resources are currently formed in the framework of sectoral information systems; the former are used for the national and sectoral management. A part of these resources is attributed to the population and private business. State information recourses can be subdivided into the following components:

- Resources, referring to population, land and natural resources, immovable property (production and residential constructions, all types of transport communications, motor and railroads, trunk and underground pipelines and power lines), intellectual and technological resources (intellectual and industrial property, patents, inventions, radio-frequency resource);
- Economic sphere, which includes description of economic agents (businesses, financial establishments, NGOs, households);
- Bodies of state power and administration, bodies of local administration, including local sectoral ministries and state committees, National Bank, Ministries of Justice, Finance, Statistics and Analysis, Defense, Economics, Internal Affairs, State concerns, regional, municipal and local executive committees;
- Social and political sphere, including Parliament and subordinate selected bodies, political parties, public and trade-union organizations and associations, mass communication media.

State information recourses form a basis for the interconnect information space of the Republic of Belarus.

1. Land and natural resources. Immovable property. These resources are based on different types of digital maps, which may contain different intensional levels (layers), e.g. natural resources, transport communications, condition of soil, atmospheric air, buildings and constructions etc.

Condition of resources is described using different types of cadastres: land, town-planning, municipal, ecological etc. Creation of cadastres is an affair of bodies of republican administration – Committee for Natural Resources (land cadastre), Ministry of Architecture and Construction (territorial cadastre), Ministry of Natural Resources and Environment Protection (system of environment monitoring), Ministry of Housing And Communal Services (real estate cadastre), as well as of regional and municipal execunive committees.

2. Population. At present, the information regarding private persons and population as a whole is collected and accumulated in a number of departmental information systems: Ministry of Internal Affairs, Ministry of Taxes and Duties, Ministry Of Labor, Ministry of Health Protection, Ministry of Statistics and Analysis, Ministry of Housing And Communal Services and executive committees, which accumulate distinguished patterns for the united population cadastre. There is an urgent necessity in the determination of the complete set of pattern, required to fulfill the above-mentioned tasks, and also in the creation of an appropriate system for the collection, storage and usage of information, while maintaining protection for private life and personal data. The "Electronic Belarus" Program presumes the creation of the state population register.

3. Intellectual resources. Sufficiently high level of scientific and technological potential, education and science in the Republic of Belarus turn intellectual resources to be of the primary national importance. Intellectual resources include patents for inventions, useful models, production pieces, results of research and development engineering, technologies, pre-production and production models. Basic suppliers of intellectual resources are research, planning & design and educational institutions, private persons. Basic holders of intellectual resources are Science and Information Computer Network NIKS of the Republic of Belarus, information network of the Ministry of Education, information resources of the Committee for Science and Technologies.

4. Economic sphere. Sectoral ministries as well as the Ministry of Statistics and Analysis are the main sources and holders for the information on the production activity of state enterprises. Information on the activities of commercial banks and other financial establishments is forthcoming to the National Bank. Local authorities possess information on the registration of enterprises of all forms of ownership. Ministry of Taxes and Duties receives full information regarding financial results of economic activities: total turnover, profit, fixed assets etc.

The State Custom Committee records information on export – import operations and on the cross – border flows of goods.

Integrated information on households' revenues and expenditures, price levels and consumption is accumulated in the Ministry of Statistics and Analysis. Besides, the above ministry possesses macroeconomic information, which is reflected in the national economic accounting of Belarus and serves as a basis macroeconomic analysis and economic development forecasting.

The current system of statistic figures complies with international standards and contains about 500 basic figures, describing economic and social situation in Belarus. The said basic figures include primary information, characterizing activities of economic agents, as well as aggregate macroeconomic variables.

The Ministry of Statistics and Analysis receives aggregate data for a number of statistical indicators from corresponding ministries and departments: from the National Bank, the Ministry of Finance and the Savings Bank – data for monetary system and budget formation and implementation, from the Ministry of Foreign Affairs and Custom Committee – for foreign-economic activity, from Ministry Of Natural Resources and executive committees – for the condition of natural resources, from the Ministries of Labor and Social Security, civilian registry offices and visas and registrations departments – for the condition of human resources and population.

5. Information resources and library network and museums catalogues. Basic sectoral information resources are:

Library stocks,

Museum stocks,

Information stocks on traditional Belarusian culture,

Cine- and video production stocks,

Reflection and description of historical, architectural and cultural values,

Information on well-knows Belarusians etc.

The Informatization Program for The Brunch of Culture, which was elaborated and approved by the Ministry of Culture in 1998, determines creation of information resources in this field. The program presumes:

Elaboration and introduction of computer-aided systems at culture enterprises and establishments,

Creation of integrated databases of different levels,

Introduction of national databases in the Internet.

Nevertheless, the program doesn't receive central financing and several projects are implemented at the expense of internal funds of culture organizations.

The joint library stock makes up 248 million copies.

The National Library (NL) started the process of culture libraries automation in 1990. At present, the National Library, 6 regional libraries and more the 60 are automated.

The National Library has achieved the highest level of automation (more than 90% of its functions), its local network includes 5 servers and more than 130 computer-aided workplaces. In 1993, the library set up electronic catalogue (EC) and analytic databases. At present, the volume of own information resources of the National Library equals to more than 700 000 copies, including:

300 000 items of all types of document, obtained since 1993 in EC. There is an equivalent CD,

200 000 items in bibliographic databases "Chernobyl", "History and related sciences", "Culture and art",

More than 200 000 items in linguistic databases.

Since 1996 the NL has been replenished with electronic resources, which currently total 1000 copies. The most popular databases are:

Bibliographic databases: "Social and humanitarian sciences", Russian national bibliography, US Congress library, etc.;

Full – text databases "Russian Federation Legislation", "Belarusian Legislation"

Supplemental databases "The whole world in palms", "Manufacturing in Russia and in the nearest foreign countries" etc

Information department supplies readers with electronic documents, using 35 - unit CD – ROM tower and networked connection form any operating station, included in the NL local network.

Since 1994 – 1995 all regional libraries, Minsk municipal child (MMCL) have been creating electronic catalogues. The NL, Moguilev regional, and MMCL have Internet access. Head libraries of 6 library systems (Republican National Technical Library, Central National Library, Belarusian State University, agricultural library, medical library, president library) post their electronic catalogues in the Internet. A joint electronic catalogue (JEC) in currently being created.

Joint catalogue of head libraries is a national-level database. UNIMARC is used as an information model. The NL is responsible for the first stage of formation and maintenance of the joint electronic catalogue.

The JEC's structure presumes the following separate databases:

National bibliography,

Joint database of the head libraries' stocks,

Foreign literature,

Rare and old books and manuscripts (from libraries' collections, museums, archives, private collections),

Standard information (OPMM, PMM, all-Union State Standard etc) (OPMM, PMM, ГОСТ и др.),

Patent information,

Thesis abstracts,

Electronic resources.

The joint stock of museum exhibits makes up 3 million items. The process of museums automation was began in 1993. The first stage of museum system automation presumes automation of information, registration and storage functions:

Stock registrations

Museum exhibits description

Formation and maintenance of electronic catalogues

Exposition and exhibition activities

Exhibition and lecturing activities

Editorial and publishing activities

The Institute of Culture Problems of the Ministry of Culture currently forms the "Electronic Encyclopedia Of Belarusian Culture ", which includes CD – ROM based databases of "Belarusian Icons of XV – XIX centuries", collected from 4 museums (National Arts, Ancient Belarusian Culture of the Academy of Sciences of Belarus, Vetka museum and National Museum of Arts History) and others. The said database contains more than 500 icons. The work on the databases "Belarusian National Costume", "Nature and Architecture of Belarus", "Glass. Plastic" and others is currently underway.

6. System of scientific and technical information. The following information centers, which are simultaneously the largest Belarusian information – analytical centers, were formed on the state level:

For nonpublic documents – Belarusian Institute of System Analysis (BelISA),

For reference information – Belarusian State Institute of Standardization and Certification, (BelSISC),

For patent information – the National Center of Intellectual Property,

For legal information – the National Center of Legal Information of President Administration,

For cartographic information – Land Resources, Geodesy and Cartography Committee (Cartfund).

Regional centers of scientific & technical and business information function on the local level.

The system of sectoral information is highly developed, mainly thanks to the Belarusian Center of Scientific Medical Information, Belarusian Construction Information Center, Institute of Economics and Agroindustrial Complex Development and others.

7. Standards and other reference information. National fund supports a number of organization department of BelSISC. According to experts' estimates, national fund of standardization makes up 2 730 000 pages, which equals to 7 gigabyte. The national fund of standards and certificates is another 7 gigabytes.

At present, the fund's library contains 137 000 normative documents, which were forthcoming through official channels. All documents are subject to actualization, i.e. all changes are made immediately. Fund's stocks are official documents hence they are used for elaboration of national and intergovernmental standards, certification of manufacturing and production, and also they are open to private persons and legal entities of all forms of ownership for development and production of goods and rendering of services. For the matters of convenience, there are regularly updated catalogues and computer – aided bibliographic databases:

State standards of the Republic of Belarus,

Intergovernmental standards (all-Union State Standard),

International standards (ISO/IEC, etc),

National standards of European countries (DIN, BS),

Technical specifications of the Republic of Belarus.

8. Patents and other industrial information. There are more than 10 000 CD in the disposal of the National Center of Intellectual Property, including complete sets of disks, containing applications from PCT и ЕПВ, France, Germany, US patents since 1994, incomplete set of Japanese patent documentation, complete set of GLOBALPAT disks. International patent authorities and organizations help form a valuable fund of patent documentation, which might serve as a basis for the fund of state patent examination.

9. Archive information resources. The state part of the National archive fund contains documents referring to state organizations, enterprises and establishments of the Republic of Belarus, functioning on the territory of the Republic since 1917; at present or past situated outside

the Republic, operated or currently operating on the territory of the Republic or passed into state ownership in compliance with legislature of the Republic of Belarus.

The non-state part of the National archive fund contains archive funds and documents in the ownership of:

Public organizations, starting with the moment of their registration in accordance with the established legal procedure,

Religious organizations,

Other non-governmental associations, enterprises, organizations, establishments,

Private persons (documents of different origins, family archives, documents collections, etc).

State administration of the National archive fund and archives in the Republic of Belarus make the Committee of archives and record keeping of the Republic of Belarus responsible for departments of archives and record keeping of executive committees of regional and Minsk municipal chambers of deputies.

State archives, museums and libraries implement permanent storage of the state part of the National archive fund.

Archive branch includes around 40 state archive establishments, which are territorially distributed among the Republic. State archives store more than 55 000 stocks, which contain 11 000 000 items.

State and executive authorities, enterprises, organizations and private persons use information resources of state archives.

10. Funds and data banks on natural resources, cartographical and geodesic information. A couple of national and state programs were introduced in the Republic, in order to maintain rational usage of natural resources and environment protection, viz "National program of rational usage of natural resources and environment protection", state scientific – technical program "Nature management and environment protection for 1996 – 2000 and for the future". For the monitoring purposes, the National program of environment monitoring of the Republic of Belarus is currently being created.

At present, the following cadastres are maintained: climate, land, water, forest, earth's interior, peat funds, atmospheric air, flora & fauna, waist products, at that such cadastres as land, water and forest have been maintained for a long period of time. Regulations on the keeping scheme for the State cadastre of the territories of the Republic of Belarus was approved by the Republic of Belarus Government Regulation of 10 Dec 1996 #790.

Systematic work resulted in the following information databases:

Boring studies of The Republic of Belarus

Boring data was collected, systemized and entered in the database, covering more than 20 000 boreholes, bored on the territory of the Republic by "Belarusian geology" industrial merger, as well as by third-party organizations. The database includes data on the location of boreholes (position data), end use, geological section, implemented development surveys (well-logging records). The information is of doubtless interest for the purposes of water supply, melioration and ecology.

Geophysical studies.

The database contains information regarding all geophysical researches (magnetic exploration and aeromagnetics, geoelectrical prospecting, exploration seismology, gravimetry, geochemical research), implemented on the territory of the Republic by different organizations starting 1946.

Data on the scale of surveying, type of equipment, section or report maps, dates of works and brief summaries significantly lighten information search and extraction.

Building materials

The database contains information on more than 2000 deposits of sand and sandy gravel on

the territory of the Republic. The system if information covers more than 200 parameters, including thickness of stripping, mineral wealth thickness, its deposits under several categories, opportunities for extraction etc.

Bank of hydrogeological information.

Implies estimation of natural resources and exploitation of underground water supply, elaboration of long-term forecasts for the water consumption influence on environment, optimization of water consumption regimes, underground water supply monitoring, creation of regional and local mathematic hydrogeological models.

Potential fields.

The database includes the results of gravity-magnetic survey, scale 1:50 000 and higher, conducted in the southern Belarus. The data can be used for the creation of gravity and magnetic fields maps, not merely for the territory of the Republic, but for merging areas as well, since cognition of general patterns of geological structures requires different-scale maps of different fields and their transformations on large territories.

Geoelectrical and seismological prospecting information archives.

For the purposes of the long – run safety, information was transmitted on magneto-optic disks. The volume of information is 40 – 80 gigabyte. Specially developed information system provides for on-line speedy information search, its grading, selection and classification.

On the whole, creation of information banks and systems of database management is #1 priority for the geological branch, since mathematical tool, used for interpretation of geological & geophysical materials, is constantly improved, which allows to re-interpret previously obtained data on a new higher level without implementing expensive field works.

The issue of the day is creation of local networks in subordinated organizations, with the further integration of the said networks into a joint regional one, creation of a joint bank of geological & geophysical information on the basis of a powerful server and organization of easy access to the bank for all potential users, which would allow to increase significantly the efficacy of exploration works.

11. State information system of social security of the Republic of Belarus. Includes two main sub-systems:

Collection and registration of all insurance payments from both employers and employees, including computer – aided personified records management system, developed by the Fund of population social security

System of settings and payments of pensions and benefits, developed by the Ministry of Social Security of the Republic of Belarus.

Mass communication media. Modern information and communication technologies exert an ever-increasing influence on mass media, at that not merely on the electronic ones, but on printed ones also. One of the determinative trends in the development of information sphere is a convergence of previously independent branches, such as telecommunications, production of audio – visual goods and electronic mass – media. Such convergence is based on the uniform digital submission of different types of information – texts, graphics, audio and video, and also on the use of common standards and protocols for its distribution through different physical channels – on – air, satellite and cable radio and TV broadcasting, data transmission nets and Internet. As a result, internet turns to be the most important mass media, on the one hand, providing for an extra channel for information distribution and on the other hand – receipt of miscellaneous information for other mass media.

Basic global trends concerning use of ICTs for mass media can be observed in Belarus as well: the majority of printed mass media is equipped with editorial – publishing complexes, a part of them has internet access and own web – pages for electronic newspaper versions. But too little attention is paid to the appropriate representation of state authorities and executives in the internet,

there are too little national news, which could serve as a useful information well for mass media. Similarly, Belarusian sector of the Internet lacks national cultural and entertainment information in proper volumes. Production of national content is the main problem for electronic mass media.

The e-government's main purpose is making interaction more efficient, achieving transformation of the very essence of the social system management. There are the following preconditions for the establishment of e-government: economical (reducing of expenditures on public service), technical (essential nascent technologies), social (high standards of social and technical literacy among population and high level of responsibility of the million of the population).

More over, the e-government implements new principles of relations, i.e. transparency of state tenders, wide public involvement in legislation, easy access to information for the citizens.

This concept has been developing for quite a time world-wide. This concept is being realised in the development of the nation-wide system to provide access and distribution of the legal information and is carried out by the National Legal Information Centre and a number of other organisations in Belarus.

It is highly perspective to develop the system which is to provide information on tender bidding and exert all the efforts required to establish the state system of purchases on the grounds of Belresources concern, with the said system being financed from the republican and regional budgets in accordance with the Decree of the President of the Republic of Belarus (Decree No 455 dated August 15, 2002 headed About Revision of the Decree of the President of the Republic of Belarus No 401, dated October 7, 1996). (National Register of the Legal Acts of the Republic of Belarus, 2002, No 94, 1/3973).

Readiness (or advancement) estimation breakdown (in percentage) and average estimation by E-Government index are shown below in Table 4.10.

Table 4.10

Average Estimation by E-Government Index

Stage No	Belarus, %	Minsk, %	Regions, %
1	50	22	50
2	39	44.5	39
3	11	33.5	11
4	0	0	0
Index Average Estimation	**1.61**	**2.115**	**1.61**

The total estimation breakdown (given as percentage based on collected data) covering the whole republic, the city of Minsk and administrative regions and assessed by four micro-indices are further shown in Tables 4.11, 4.12.

Table 4.11

4.4.1.Government On-line Resources

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	No government resources are online	11	11	22

2	A few governmental web-sites exist, providing basic information, often directed at parties outside of the community. This information is static and infrequently updated	67	22	56
3	Some governmental agencies post key information on web-sites, including directories of services, hours of operation, and downloadable forms. Information is often not kept current and relevant. Transactions take place primarily in person, by fax or by telephone, though electronic mail may expedite the process	22	67	22
4	All governmental agencies post key information on web-sites and some have incorporated the Web into their strategy for interaction with the public	0	0	0

Table 4.12

4.4.2. Level of On-line Relationship with the Government

No	Variable (1 determined from 4 for each region)	Belarus, %	Minsk, %	Regions, %
1	There is no awareness of online government, and all dealings between government and citizens or businesses are in person or paper-based. There is limited information available by phone	89	33	78
2	Some limited interaction with the government is possible by telephone or fax. The government distributes some information about services, procedures, rights and responsibilities in hard copy	11	67	22
3	The government manages relationships with some contractors and suppliers online or with other electronic mediation	0	0	0
4	Interactive government websites allow the public to conduct transactions (e.g. apply for permits, pay taxes) online. Much government procurement and many interactions with suppliers take place online or with other electronic mediation	0	0	0

Summary. The estimated average of the Networked Economy Component Index is 1.97 (tab. 4.13). It means actually that the country has not achieved 2nd level of development according to ICT e-readiness indices. The given estimation is low even for Minsk - 2.57, not to mention the regions - 1.86.

Table 4.13

Total Estimation by Networked Economy Component Index

No	**Index**	**Belarus**	**Minsk**	**Regions**
4.1	ICT Employment Opportunities	2.22	3.0	2.22
4.2	B2C Electronic Commerce	1.95	2.89	1.84
4.3	B2B Electronic commerce	1.835	2.28	1.78
4.4	E-Government	1.61	2.115	1.61
Total Estimation by Component Index		**1.9**	**2.57**	**1.86**