RIGA TECHNICAL UNIVERSITY

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Building Ceramics in Latvia: Demand and Supply Problems

Doctoral Dissertation Compendium

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GENERAL REVIEW

General Essence and Topicality

The economy transformation processes that took place in Latvia on the restoration of its national independency urge re-assessment of the place and role of each branch of economy in the context of new structural policy and European integration developments. The positive result would be expressed in a substantiated branch development strategy. This appears to be necessary both for entrepreneurs on the microeconomics level and for the government on the macroeconomics level to create beneficial environment and conditions for the development of business activities.

The subject of the research completed in the Dissertation is the manufacturing of building ceramics products. This choice has been defined by the importance of building ceramics manufacturing for the development of construction industry and national economy on the whole. The subject of the research is the problems in demand and supply of building ceramics.

The main task of manufacturing is to provide the construction industry and other consumers with a high-quality products for construction. That is why it should be based on local raw materials and labour resources.

The Latvian entrails resources contain remarkable amounts of high-quality mineral raw materials, including loam that can be successfully utilized for the purposes of manufacturing of building materials. Unfortunately, opportunities of manufacturing building materials out of ceramics are being used very scarcely and sometimes not rationally enough. Many building materials could have been manufactured in Latvia by using power saving and environment friendly technologies, but they are still are imported from Estonia, Lithuania, Finland, Sweden, Spain and other countries. Besides, the quality of many imported materials does not match the climate of Latvia.

Low volume of building and construction works, in-flow of western building materials into the Latvian market, as well as insufficient quality of local building products and high consumption of energy, - all these contribute to cost supplement and a cutback in production of local building products. For example, loam brick production contracted by 12 times during the period of 1990 -1996.

The branch experts both in Latvia and in the neighbouring countries have done a great deal of research on the manufacturing of the building ceramics, while economic problems and problems of management in the field have been reflected hardly enough.

The research was made over the period of 1998 to 2004, while some issues were treated as per shorter periods of time or as taken in comparison. The historical matters in the field were summarized starting from the 13th century.

The goal of the Dissertation is to develop scientifically substantiated main trends of the building ceramics manufacturing development based on the study of demand and supply problems in the field, as well as suggest certain improvements of developing the building ceramics manufacturing in the context of demand and supply problems.

To reach the set goal the following **tasks** should be completed:

- To study and analyse the historical aspects of building ceramics manufacturing in Latvia and brick making traditions;
- To explore possible and desirable place of building ceramics products manufacturing in the national economy, as well as assess the necessity of it for the development of the entire construction industry;
- To explore the building ceramics products market as per its current situation and in the long range and detect the main development trends to make forecasts on the building ceramics market growth;
- To find out building ceramics import and export developments tendencies;
- To analyse free market supply trends;
- To study supply and demand problems in the building ceramics products market;
- To offer a scientifically and economically substantiated model of building ceramics market demand and supply for the nearest future as taken across the macroeconomics trends in the Latvian national economy;
- To develop a system of measures to be taken to enhance the development of local building ceramics manufacturers on the free market background;
- To define major measures to improve the equality of locally manufactured building ceramics to raise its competitiveness;
- To explore the building ceramics products demand and supply across the milieu of building ceramics products consumers, manufacturers, traders and contractors;
- To perform a sociological research across the respondents from different social groups to develop an offer of an efficient family house design.

Choice of the Topic

The complicated period of reorientation of national economy from the socialist model to the free market economy dominated by a private initiative has created new economic problems. These are connected to problems of manufacturing of building ceramics products by small and medium size manufacturing businesses, usage of high capacity productions and specific features of privatization processes, as well as incapability of entrepreneurs to manufacture a competitive product.

These new problems predetermined the choice of a topic and the necessity for social and economic research and solutions and projects based on scientific studies that all are provided in the Dissertation. Today's situation urges specifically for complex researches to embrace the entire whole of building materials production industry.

The Object and Subject of the Research

The Object of the Research is the manufacturing of building ceramics products. The choice is determined by the importance of building ceramics manufacturing for the development of the construction industry and the entire national economy.

The Subject of the Research is the building ceramics products demand and supply problems.

Research Methods

Combined research methods have been chosen for the purposes of the Dissertation to obtain accurate results in reaching the set goal. In course of the research the following methods have been applied, that is, that of economic analysis and forecasting, monographic method, method of non-objective constructing, quantitative, qualitative, model design, system and timeframe analysis methods, etc., as well as basic approaches of applied system analysis and strategic decision making theory.

Limitations

The building ceramics manufacturing and demand problems embrace an extensive range of issues. It is impossible to render all of them in detail within the limits of this Dissertation. This is, why a comparative analysis of construction materials industry development trends in other countries has not been reflected in this work.

Theoretical Basis of the Research:

- The effective legislations and normative acts of the Republic of Latvia;
- The European Community documentation;
- Directive on building materials 89/106/EEK;
- Published scientific works;
- Statistical data published by the Central Statistical Office and other organizations;
- Original polling data collected by students of the Faculty of Construction and Architecture of the Latvian University of Agriculture under the governance of the Author and regarding the following:
    - building ceramics products manufacturing and demand problems;
    - proposals regarding the development of an efficient family house design;
- polling results as collected by the Author.

A range of foreign researcher has addressed the problems of building ceramics products manufacturing and its demand and supply related issues in their published works. The Author used several of them in her Dissertation. Many scientists, doctoral students and experts in this country have approached the study of demand and supply problems. Also their works had an influence on the Author's Dissertation. The following are mentioned in the alphabetic order: I.Arhipova, S.Bāliņa, P.Barauskas, O.Baumanis, Dž.Blaits, B.Brežgo, U.Cielens, A.Cimmers, Dž.Dadlijs, F.Deglavs, H.Diderihs, E.Dunsdorfs, J.Eiduks, L.Frolova, N.A.Gerlivanovs, U.Gods, H.Jekabsons, J.Jenšs, J.Juškēvičs, V.Kampars, R.Karnīte, J.Kļaviņš, H.Knape, O.Krastiņš, A.Krūmiņš, V.Kuršs, V.Kvainauskaite, S.Lagzdiņa, A.Leitass, B.Lessers, I.Liepa, J.Liepiņš, R.Liepiņš, V.Nešpors, I.Ose, R.Počs, L.Popovs, N.A.Popovs, H.Riekstiņš, J.Saulītis, U.Sedmalis, S.Segliņa, B.GSkamtajevs, A.Stinkule, M..Šenfelde, R.Škapars, D.Šķiltere, A.Šteinerts, R.Švinka, V.Švinka, U.Upenieks, R.Vaivods, J.Vasiļjevs, J.Vilnītis, A.Zeida, J.Zutis, A.Zvejnieks and others.

Scientific Novelty

Scientific Novelty of the Dissertation:

1. For the first time during the political independence of the Latvian State a complex research of building ceramics manufacturing issues on the whole has been performed, entangling raw materials extraction, preproduction processing and manufacturing and consumption of building materials in one logical integrated system;
2. Technical and economical features of building ceramics products manufacturing as business activities and a branch of national economy have been developed, as well as the analysis of the Latvian building ceramics manufacturing economical status has been made, observing the correlation of such factors as resources, manufacturers, consumers, the state and external trade;
3. The necessity of building ceramics manufacturing and its place in the national economy of Latvia has been clearly demonstrated;
4. A complex of measures to extend and improve the manufacturing of building ceramics products in this country has been developed with the purpose to essentially improve the competitiveness of the entire branch;
5. The problems of the building ceramics domestic market have been identified;
6. The building ceramics products export development proposals have been worked out;
7. Proposals for a Draft Normative Act have been supplied (Amendments to Regulations #181 dated April 30, 2001 "Procedure For The Assessment of the Compliance of Building Materials In The Regulated Domain" by the Cabinet of Ministers);
8. The necessity for state investments has been substantiated;

9. The scientifically and economically substantiated econometric model of supply and demand for the building ceramics market in the upcoming future has been developed as based on the macroeconomical trends in Latvia and other Baltic countries;
10. A catalogue of mathematical models for demand and supply of building ceramics products has been developed.

Approbation of the Research Results and Practical Application

The results of the Dissertation are practically applied as follows:

1. Results of the research are included in a course of lectures held by the Author in the Riga Technical University (Basics and Norms of Construction) and in a course of lectures held by the author in the Latvian University for Agriculture for Professional Training Program Students (Practical aspects of Construction, Contractor's Activities In Free Market Environment);
2. For guidance of students of the Latvian University for Agriculture and the Riga Technical University in their work over their theses, term and research papers.
3. Results of the research have been made known to scientists and entrepreneurs in Latvia and Estonia, an evidence of which is given by the list of academic and practical publications hereof;
4. Results of the research have been approbated:

    - While taking part in a Work Group of the Latvian University for Agriculture LLC "Inženiereksperтīžu centrs" by preparing proposals for amendments to Regulations #181 dated April 30, 2001 "Procedure For The Assessment of the Compliance of Building Materials In The Regulated Domain" by the Cabinet of Ministers;
    - While participating in the research „What is an efficient one-family house and how to reduce its construction costs?" by the Joint Stock Company "Latvijas Hipotēku un zemes banka". Acknowledged research data has been used for the development of the Housing Loan Scheme by the *Hipotēku banka* and its further improvements assisting in realizing one of the bank's basic tasks, that is, crediting of housing to families with average level income;

5. Results of the research have been reported at international conferences in Latvia and Estonia;
6. Results of the research contained in the Dissertation and published can be used in practice by the Latvian Ministry of Economics and other public institutions in making industry development policy, concepts, plans and forecasts, as well as practically applied in production businesses and lecturers of Latvian High Schools and Colleges in construction and other related courses for students.

Scientific Publications

The results of this work have been released in 17 scientific publications, including internationally acknowledged editions under review with the total volume of 89 pages:

1. Gusta S. Būvmateriālu sertifikācijas ekonomiskās problēmas// Uzņēmējdarbības vide: Tiesiskā bāze un kvalitāte. Starptautiskās zinātniskās konferences rakstu krājums. 71.-75.lpp., Rīga, Biznesa augstskola Turība, 1999.
2. Gusta S., Šteinerts A. Latvijas būvnormatīvu pilnveidošanas sistēma kā būvmateriālu rūpniecības attīstības priekšnosacījums// Baltijas reģiona valstu integrācijas problēmas ceļā uz Eiropas Savienību. Starptautiskās zinātniskās konferences materiāli. 30.-36.lpp., Rēzekne, Rēzeknes Augstskola, 2000.
3. Gusta S., Zvejnieks A. Būvniecības un būvizstrādājumu ražošanas attīstības problēmas Latvijā// Rūpniecības attīstība pārejas periodā: Starptautiskās zinātniski praktiskās konferences zinātniskie raksti. 96.-103.lpp., Rīga: RTU, 2000.
4. Gusta S. The Problems of a Supply and Demand of Ceramic Building Materials in Latvia// The 6th Nordic-Baltic Conference in Regional Science: Nordic-Baltic Sea Region on the Eve of 21st Century. Reports, p.159-162, Riga, University of Latvia, 2000
5. Gusta S., Poriņa V., Šteinerts A. Ārējās tirdzniecības ietekme uz uzņēmējdarbības attīstību Latvijā// Ekonomisko un sociālo attiecību transformācija: procesi, tendences, rezultāti. Starptautiskās konferences rakstu krājums. 322.-326.lpp., Rīga, Biznesa augstskola Turība, 2001.
6. Gusta S. Nozīmīgāko būvmateriālu importa un eksporta analīze (1995.-1999.gadā)// Zinātne lauku attīstībai. Starptautiskās zinātniskās konferences referāti. 196.-200.lpp., Jelgava, Jelgava, LLU, 2001.
7. Gusta S. Keramikas izstrādājumu importa un eksporta attīstības tendences 1995.-1999.gadā// II Pasaules latviešu zinātnieku kongress. Rīga, LZA, 2001. - referātu tēzes 548.lpp
8. Gusta S. Production and Perspectives of Ceramic Plates in Latvia// Agricultural Mashinery, Building and Energy Engineering: Estonian Agricultural University Transactions, 214. p.58-63, Estonia, Estonian Agricultural University, 2001.
9. Gusta S., Steinerts A. Latvijas būvizstrādājumu atbilstības novērtēšanas sistēmas attīstības problēmas// Rīgas Tehniskās universitātes Zinātniskie raksti, 3.sērija, Ekonomika un uzņēmējdarbība, Tautsaimniecība: teorija un prakse. 4.sējums. 36.-42.lpp,, Rīga, RTU, 2001.
10. Gusta S., Zvejnieks A. Keramikas izstrādājumu ražošanas un pieprasījuma izpēte// Inženierekonomikas nozīme uzņēmējdarbības attīstībā. Starptautiskās zinātniski praktiskās konferences zinātniskie raksti. 30.-36.lpp., Rīga, RTU, 2000.
11. Gusta S., Šteinerts A. Latvijas būvnormatīvu sistēmas pilnveidošana kā viens no būvmateriālu rūpniecības attīstības priekšnosacījumiem//Starptautisks augstskolu zinātnisko rakstu krājums. 15.-20.1pp., Rīga, RTU, 2001.
12. Gusta S., Šteinerts A., Leitass A. Standartizācija kā būvizstrādājumu tirgus regulēšanas instruments// Tautsaimniecības un izglītības attīstības problēmas mūsdienu periodā. Starptautiskā zinātniskā konference. Rīga, RTU, 2002.-referātu tēzes 48.1pp.

13. Gusta S., Šteinerts A., Leitass A. Standartizācija kā būvizstrādājumu tirgus regulēšanas instruments// Rīgas Tehniskās universitātes Zinātniskie raksti, 3.sērija, Ekonomika un uzņēmējdarbība, Tautsaimniecība: teorija un prakse. 3.sējums. 111l.-118.lpp., Rīga, RTU, 2002.
14. Gusta S., Stokmane I. Ekonomisku ģimenes māju kā valsts atbalstītās mājokļu jomas pieprasījuma izpēte// Būvniecība'03. Starptautiskās konferences zinātniskie raksti. 5.-10.1pp., Jelgava, LLU, 2003.
15. Gusta S., Zvejnieks A., Šteinerts A., Leitass A. Būvizstrādājumu atbilstības novērtēšanas sistēmas tālāka pilnveidošana Latvijā// RTU 44.Starptautiskā zinātniskā konference. Rīga, RTU, 2003. - referātu tēzes 33.1pp.
16. Gusta S., Zvejnieks A., Šteinerts A. Būvizstrādājumu atbilstības novērtēšanas sistēmas pilnveidošana// Rīgas Tehniskās universitātes Zinātniskie raksti, 3.sērija, Ekonomika un uzņēmējdarbība, Tautsaimniecība: teorija un prakse. 7.sējums. 56.-63.lpp., Rīga, RTU, 2003.
17. Gusta S., Šteinerts A. Būvizstrādājumu atbilstības novērtēšana Latvijā kā Eiropas Savienības dalībvalstī// Būvniecība'05. Starptautiskās konferences zinātniskie raksti. 2.-11. lpp., Jelgava, LLU, 2005.

Reports at International Scientific Conferences

Major results of the Dissertation as reported at international scientific conferences:

1. International Scientific Conference "Business Environment: Legal Framework and Quality" Business High School "Turība", Riga, March 24, 1999;
2. International Scientific Practical Conference "Development of Industry in the Transition Period", Riga Technical University, Riga, October 10, 1999;
3. International Scientific Conference "Integration Problems of Baltics Region Countries On Their Way to European Union. Ecodynamics of the Baltic Sea Region. New Information Technologies and Their Role in the Processes of Integration." The Rēzekne High School, March 2-3, 2000;
4. 6th Nordic - Baltic Conference in Regional Science "Nordic - Baltic Sea Region on the Eve of 21st Century". Riga: Latvia University, October 4-7, 2000;
5. International Scientific Practical Conference "Engineering Economics Share in Business Development" dedicated to the 40th Anniversary of the Department of Industrial Economics and Management, Riga Technical University, November 24, 2000;
6. International Scientific Conference "Transformation OF Economic and Social Development: Processes, Trends, Results", High School of Business "Turība" , March 30-31, 2001;

7. International Scientific Conference "Science for the Progress of Countryside", The Latvian University of Agriculture, Jelgava, May 23-25,2001;
8. II World Congress of Latvian Scientists, organized by the Latvian academy of Sciences , Riga, August 14-15, 2001;
9. 39th International Scientific Conference devoted to the 50th Anniversary of the Estonian University of Agriculture and 55th Anniversary of the Department of Building and Construction, organized by the Estonian University of Agriculture, Tartu, November 23,2001;
10. International Scientific Conference "Nowadays Problems In Development Of National Economy And Education" dedicated to the 35 th Anniversary of the Faculty of Engineering Economics, Riga Technical University, May 17, 2002;
11. International Conference "Building And Construction'03", organized by the Faculty of Engineers in Agriculture of the Latvian University of Agriculture , Jelgava, March 21-22, 2003;
12. 44th International Scientific Conference of the Riga Technical University "Business and National Economy Development Problems", Riga Technical University October 9-11, 2003;
13. International Conference "Building And Construction'05", organized the Faculty of Engineers in Agriculture of the Latvian University of Agriculture, Jelgava, May 26-27, 2005.

Results of the Dissertation

The following important **results** have been obtained in the course of the Dissertation:

- A research on the manufacturing and demand of the building ceramics products;
- A research to develop proposals for an efficient family house design has been performed;
- The status of the building ceramics market has been analysed; major development trends defined and possible market growth forecasted;
- Mathematical models for the feature definition and forecasting in the loam construction bricks and ceramic tiles market have been worked out;
- Mathematical models for the feature definition and forecasting of external trade of building ceramics have been worked out;

- Mathematical models for the feature definition and forecasting of changes in volume of the domestic gross product and building and construction works have been developed;
- By calculating the correlation dependence, it has been demonstrated that the realization of the construction bricks is influenced by construction bricks export, investments in construction industry and manufacturing of building ceramics, as well as the number of employed citizens and the amount of average salaries;
- As an additional research method for assessing the manufacturing of building ceramics, an experts method has been employed, the results of which reveal the ranking of strong and weak points of the building ceramics manufacturing.

Volume and Structure

The Dissertation consists of Introduction, three Parts of the main text, Conclusion and Proposals, as well as attached List of Bibliography and Appendices. The total volume of the work is 212 computer-aided pages, excluding Appendices. The Dissertation contains 30 Tables, 35 Pictures and 5 Appendices to illustrate the content of the provided research. More than 182 sources of information have been used for the development of the Dissertation, all which are represented in the List of Bibliography. The Dissertation is of the following structure.

The **Introduction** suggests the formulation of the topicality of the given research, defines the Object and the Subject of the research, sets the Goal and Tasks of the research, reflects the structure of the work, provides the theoretical and methodological basis, defines the limitation, the research period and scientific novelties, formulates theses supported by the Dissertation and reflects approbations of the research results.
The content of the Dissertation is presented in Three Parts of its body text.

Part One provides the features and the definition of the building ceramics products manufacturing industry and depicts its current status. The theoretical, historical and legal bases are treated. The production and market tendencies of the 20th century are considered.

Part Two deals with the analysis of the national economy developments in this country over the latest five years; it defines and structures economical problems and assesses possible solutions, as well as renders on valuable mineral resources to be utilized in manufacturing of building ceramics products and their available reserves.

The Constructive Part embraces the study of manufacturing and demand of building ceramics products, the analysis of supply and demand trends in Latvia and export/import development problems, as well as defines influencing factors and makes models of and forecasts on the building ceramics supply and demand.

It also deals with impact the compliance assessment system leaves on production and demand of building ceramics in Latvia.
The Conclusion provides statements and proposals obtained as a result of the completed research.

The major suggestion of the Dissertation is that there are objective possibilities to manufacture building ceramics in Latvia and this can turn into a remarkable branch of the Latvian national economy and influence the development of the entire construction industry in this country, if realized on the basis of a scientifically substantiated strategy. Prerequisites of such development are the modern technology, implemented innovations and, thus, a remarkable rise of the quality of products.
The Dissertation is completed in the Professor's Group, Economics and Management in Entrepreneurship in Construction, Faculty of Engineering Economics, The Riga Technical University in compliance to the requirements of the Law "On Scientific Activities", observing Regulations #134 dated April 6, 1999 by the Cabinet of Ministers and Amendments hereto dated August 31, 2004, as well as taking into account Resolutions by the Latvian Board For Science and the Senate of the Riga Technical University.

Dissertation Defence Theses:

- Urge for building ceramics products in Latvia;
- Extension of the building ceramics production and increase if its competitiveness;
- Building ceramics products export perspectives and prerequisites;
- Place and role of investments in ordering of building ceramics manufacturing processes;
- Urge for state investments and investment administration mechanisms.

MAJOR SCIENTIFIC DEVELOPMENTS

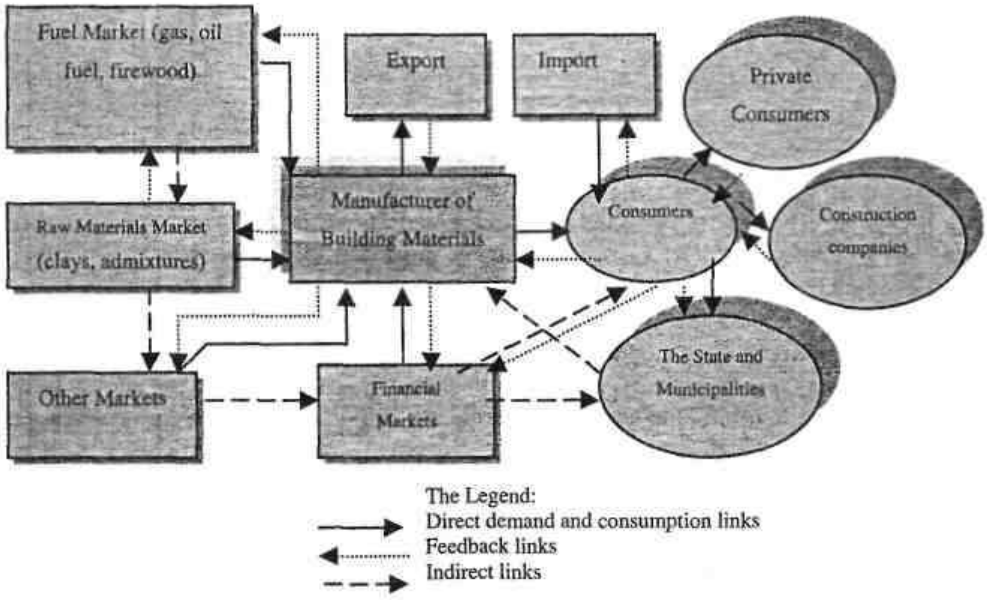
1. Manufacturing of building materials and closely related to it construction industry are one of the sectors of the national economy, a business trend connected to: utilization and processing of natural resources; purchase, storage, transportation of raw materials and construction process itself; and the main task here is to ensure that customers receive quality building materials that are further integrated into buildings and structures.
Construction and manufacturing of building materials together constitute one of the strategic business trends as the status of a state depends on their development. This is a mirror that reflects welfare of the population. Building materials, being a product of construction materials industry, have a specific feature of being an integral part of buildings and structures that represent the final product of the construction. This means, that a building material is an intermediate commodity that forms basis for erection of buildings and structures. Business solutions influence the status and advancement of a national economy,

as no branch of economy can be run without the utilization of construction products, that is, buildings and structures.

Enterprises that manufacture building materials maintain complex links to the outside environment, that can be defined as direct, indirect and feedback links. The author thinks that the manufacturing of building materials could be depicted by using a retrospective analysis based on publicly accessible statistical data or by employing a progress analysis based on qualitative assumptions by researchers and quantitative forecast scenarios. To develop a substantiation method for business solutions adjusted to the current situation in Latvia, it is necessary to start with a reflection of the current developments in this branch of economy.

The Author believes that the manufacturing of building materials can be depicted as per the following objects of analysis (elements of analysis): a branch of economy, its place in the entire national economy, available resources and their quality and quantity, consumers and their status, the state and its influence on the foreign trade.

The analysis has been performed by using the above mentioned pattern to obtain the idea of what the current condition of the Latvian building ceramics production is, giving a special emphasis on manufacturing of loam bricks, roofing and decoration tiles. Picture 1 shows relations of building materials producers with outside environment.



Source: A scheme created by the Author

Picture 1 Building materials manufacturers' links to the outside environment

A broader idea of how the building ceramics manufacturing advanced through time can be obtained from the historic material summarized by the Author, starting from the dawn of the building ceramics industry and on through its history, having taken in account all peculiarities of the technology.

2. Having generalized and analysed the available historical data, the author has come to a conclusion that the offset of brick manufacturing in Latvia dates back to the 13th century, when bricks were used as a finishing material in construction of churches and used together with building stones. In the 14th century they started building masonry houses. Many palaces were built in the territory of Latvia in the 13-14th centuries as well. Entire brickwork construction appeared in Latvia only in the 15th century and the first of them was the Peter's Church in Riga. Still, further on in time bricks were used together with other building materials, that is, - stones. The earliest references to estate brickfields can be found already in the first half of the 15th century in estate house documents. Starting from the 19th century the reference materials are more copious and often systematized: statistical reviews, Manufactory's Board accounting documents. Brick manufacturing in Latvia developed on the outskirts of bigger cities.

The scientific literature and different historical sources point out that in 18th and 19th centuries brick manufacturing was one of the basic production types. The Latvian Encyclopaedia *Latviešu konversācijas vārdnīca* reads: "Brick manufacturing is a branch of manufacture that produces bricks and is developed where there are a plenty of raw clays. Valuable shales should not contain admixtures of chalk-stone, gyprock, pyrite grains and soluble salts". The first half of the 19th century is marked by the first attempts of organizing the manufacturing of bricks on industrial level. Up to 70s of the 19th century bricks in Latvia were kilned in a, so-called, peasant's oven, although starting already from the middle of this century an improved options of special brick kilns can be met: those were supplied with chimneys and allowed more efficient usage of fuel (firewood or peat).

The manufacturing of building ceramics is one of the oldest and richest in tradition branch of industry in our country. In 1991 the brickwork manufacturing was the largest branch of industry in Latvia.

The first brickyard round kilns were launched in operation in 1922. In 20s-30s the major branches of building materials industry were brick manufacturing and cement and lime production.

During the World War II (1941.-1944.) the national economy in this country, brick manufacturing including, suffered great losses. The majority of building materials producing enterprises were devastated. After the war, a desolated industry of building materials has been partially renewed. To bring mechanization in production processes, they were introducing new equipment and technologies in the plants. A vast overview of the industry of the Socialist Republic of Latvia of that time is given in works by Latvian scientists (Vaivods 1962, Zvejnieks 1990, etc.).

In 1960 the total volume of walling material produced in the SSR of Latvia reached the output level of 455 millions of rated brick-units. The Republic was producing nine different types of walling materials, 89.5% of which were kilned loam and limestone bricks. The Author thinks that the main criteria for the development of the production and consumption of different types of walling materials in the local economy frameworks were the raw materials reserves, amount of capital investments and costs per lm^2 of wall square. Taking into account high product costs of bricks and high labour consumption in brick laying operations, it was decided not to build any new brick manufactory of national importance. The increase in brick output over the seven-year economic plan had to be accomplished on the basis of already existing enterprises by improved utilization of their internal capacities, as a secondary output, bricks were produced only at the Drainpipe Factory "Lode" (1963), as there was no now-how of producing ceramic drains without producing a by-product of bricks was not available in the Republic at that time.

As long as construction to a great extent depends on the production of building materials, its task is to ensure the outstripping growth rates in volume of the produced building materials as compared to the growth rates of construction work volume. As per data by the former Institute of Scientific Research in Construction, the annual growth rates of the building materials production should outstrip the building and construction works volume rates by 1.3 to 1.4 to ensure the construction is provided with building materials (Zvejnieks 1990). On new production capacities having been commissioned and the existing extended, the best years of manufacturing of building bricks have been 1966 through 1970 with their annual output of 106 millions of bricks and 1971 through 1975 with annual 86 millions of bricks. For most successful years in production of ceramic drainpipes were 1971 through 1975, when they were producing 70 millions items of ceramic drainpipes annually. In 1980 43% of all employed were employed in industrial production and construction, including 34% of those were working in production. The manufacturing of building materials in 1980 kept busy 4.6% of all the employed. The development of the sphere of production was aimed at construction using local building materials, industrial structures, broader range of building materials and improvement of the product quality.

The construction rates continued to fall by approximately 0.2% per year in 1981 - 1985. During this period the volume of produced building materials increased by average 0.6%. The increment of the production of walling materials was 1.9%, while that of non-metallic building materials was 0.6%. The average annual building materials production growth rates in comparison to the building and construction works volume rates were sufficient to satisfy the demand of the construction industry (Zvejnieks 1990). The internal structure of the industrial construction experienced essential changes. Those were defined by the explosion of prefabricated structures and elements of reinforced concrete. In 1980 the volume of production of reinforced concrete and concrete structures and elements reached 1.5 $mln.m^3$ and since 1970 it increased by 1.3 times. The

volume of wall panels production constituted 20.7% of all reinforced concrete structures.
During the post-war period they built a range of plants for producing completely new types of building materials. Among those were Jēkabpils and Kuprava Expanded Clay Plants and a workshop in Jelgava for the production of stone mass jugs for Riga Black Balsam that was a part of the industrial enterprise "Latvijas keramika". In the course of the eighth five-year economic plans they built 6 plants for producing of building materials and a Lode Drainpipe Factory is one of them.

3. The Construction is a branch of economy that is closely related to the production of building ceramics, that is why, when studying the problems of development of manufacturing of building ceramics, one has to take into account also construction industry development trends and forecasts. The volume of the construction product and the market structure depend on the development of the entire national economy. Provided the economic situation in the country worsens, the decrease in number of commercial, production and infrastructural site follows inevitably and opposite, as soon as the overall situation in the country goes up, first of all, these are commercial, production and infrastructure sites financed by the state or municipalities that primarily attract construction forces; whereas, the construction of housing is activated as long as incomes increase. This model of development operates in the countries of the European Union and elsewhere in the world (Report On the Development of the Latvian National Economy 1998).
The European Committee, in their turn, in their Report on "Competitiveness of the Construction Industry" defined the construction industry in general as the major element of the economy of the European Union that generates 11% of the European Union Gross Product and determines the deposit of investments, attracting 58% of the total fixed investment and provides employment to 8% of the total working population as busy directly in construction and to 16% of them busy in construction related industries (The Strategy And Policy Of Construction 1998).
The most sensitive the construction industry is for economical changes in a country. As per the data provided by the Central Statistical Office of the Republic of Latvia, the volume of construction works decreased by 5 times over the period of 1990 through 1993, when Latvia was undergoing the economic crisis, while the Gross Domestic Product grew less only twice. In 1994 the volume of the construction product began to grow. From 1999 through 2003 the total growth of the volume of building and construction works continued at an annual pace of 9.4%, which by 3 percent points exceeds the average rate of the national economy growth on the whole, but in 2004 of 13.1 % or 635.8 mln lats. It is interesting to learn, whether the volume of building and construction is influenced by one of indexes of national economy development, specifically -by the domestic gross product as it is expressed in market values of all products and services produced in a country during one year. In order to determine,

whether such correlation exists, the following regression model has been analysed:

$$Y_t = \beta_0 + \beta_1 \cdot IKP_t + \varepsilon_t \qquad (1)$$

Where, Y_t - volume of building and construction works over the time period t;
β_i - arguments of the regression model;
IKP_t - the domestic gross product in comparative prices as per 2000 over the time period of 1995 through 2003;
ε_t - a stochastic error.

The valuation of the regression model has been obtained, where Y, represents the abstract volume of construction work over the period of time t.

$$Y_t = 0{,}136 \cdot IKP_t - 245{,}04 + \varepsilon_t \qquad (2)$$

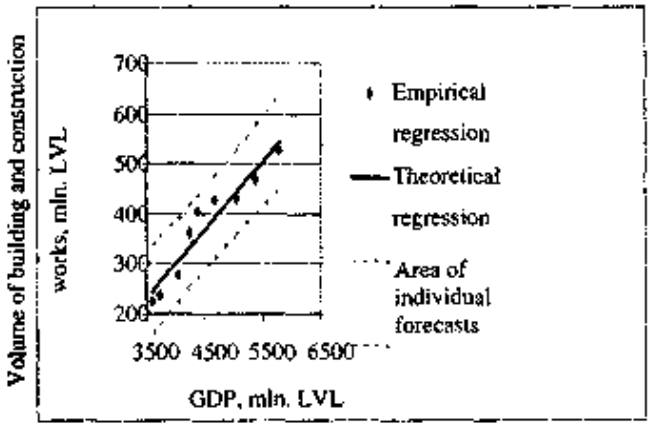
With determination index $R^2 = 0.9147$. The standard error, p-values and 95% integrity interval of the model are provided in Table 1.

Table 1

The Regression Model Arguments Valuations

	Indexes	**Standard error**	**p-value**	**95% integrity intervals**	
β_0	-245,044	72,22908	0,011558	-415,839	-74,2497
β_1	0,136005	0,015695	0,000055	0,098893	0,173117

As the obtained valuation of the suggested regression model reveals, we can conclude that the influence of the domestic gross product on the volume of construction works is essential with a probability of 95% (p-value = 0.000055) (see Table 1). The obtained integrity of the model is high enough to allow substantiation of 91% of the building and construction works growth. Thus, by increasing the domestic gross product by 1 mln lats, the volume of building and construction works will, on the average, grow by 0.13 mln lats. Based on the Gross Domestic Product forecasts, we can also envisage the upcoming volume of building and construction works. Picture 2 reveals the correlation between the building and construction works and the GDP (empirical regression, theoretical regression and the range of values).



Source: Author's Calculations based on the LR CSB

Picture 2 Building and Construction Works and GDP: Empirical Regression, Theoretical Regression, Range of Values in mln LVL

The envisaged volume of building and construction works an vary within the range of values (see Picture 2). In this range of values the forecast is correct and trustful with the probability ratio of 0.95.

Table 2

Forecasts on the Volume of Building and Construction Works: ranges of valuation in mm lats

Year	Initial Data		Assessment Values			
	Volume of Building and Construction y	GDP in factual prices (mln lats) x	$\tilde{y}$	$(y_i - \tilde{y}_i)$	Area of Individual Forecasts	
					$\tilde{y}_i - \Delta \tilde{y}_i$	$\tilde{y}_i + \Delta \tilde{y}_i$
1995	245,3869	3605,978	245,3869	-19,2869	156,2248	334,549
1996	263,978	3742,672	263,978	-25,878	176,6819	351,2741
1997	306,1376	4052,658	306,1376	-28,0376	222,0862	390,1891
1998	332,1778	4244,123	332,1778	28,02216	249,3921	414,9636
1999	351,1522	4383,635	351,1522	53,84782	268,9134	433,3909
2000	392,2354	4685,706	392,2354	36,76465	310,068	474,4028
2001	443,2749	5060,983	443,2749	-11,2749	359,0905	527,4593
2002	487,6498	5387,257	487,6498	-18,3498	399,9344	575,3652
2003	540,5074	5775,901	540,5074	-15,8074	446,7008	634,3139

As die volume of building and construction works continued to increase, the building and construction has taken a remarkable place in the Latvian economy. The number of persons employed in building and construction in 2004 constitutes 8.5% of all working population in this country. The share of construction industry on the GDP in 2003 is 5.6%, in 2004 - 5.8%. Still, when compared to EU Member States, where die building and construction comprises to 10-11% of the GDP, in mis country me industry needs further development. As the economy shows the general rise, the construction industry expands as well, revealing even more vigorous growth than the entire national economy on the average. The author thinks that the current situation in building and construction can be defined as follows:

- The process of privatisation has been completed;
- The total volume of works in the industry increased to a great extent due to the increment of die specific weight of reconstruction and renewal/repairer activities;
- Quickly increases the specific weight of housing construction;
- The specific weight of conventional high-rise apartment houses and new private houses has increased;
- The construction of public and production buildings has decreased;

- The volume of building up of engineering services/utilities and other engineering communications is increasing.

The Author think that the vigorous growth of the building and construction industry is encouraged by the hasty growth of investments, increased domestic demand, as well as better export opportunities for the Latvian building companies.

4. Direct foreign investments are essential for the Latvian national economy, as these promote the implementation of modern technologies and ways of management, production of competitive products and facilitate squeezing into markets of developed countries. By attracting the capital and ensuring the access to modern technologies and management, foreign investments not only encourage the formation of the local market of investments, but also the development of other services markets and product fields, as well as they encourage the remedying of social woes.
Over the latest 10 years one can witness not only the growth of the volume of investments, but also remarkable changes in the allocation patterns of direct foreign investments. More and more direct foreign investments are allocated in the services. Experts suggest that the specific weight of investments in the field already exceeds two thirds of the total volume of direct investments. That is why it is important to emphasize the following:

- Foreign investments are one of the most optimal ways of providing finances for the current account deficit;
- By making direct investment, the relationship between the given investor and the invested enterprise is formed on the long-term basis and a hasty efflux of capital is relatively unlikely;
- Direct deposits by foreign investors in the form of charter capital of companies create no debt bonds to the state, thus, not increasing the external debt of Latvia;
- In Latvia foreign investors reinvest the larger share of their profits, thus, accumulating their deposits in the Latvian enterprises.

The most objective criterion to define the investment environment is the statistical data that reflects the amount of direct foreign investments as per resident of this country. If we view the situation from this point, there is a relatively favourable investment climate in Latvia and the Latvian investment environment is to be rendered as positive. In 2000 the amount of direct foreign investments as per resident exceeded that of 1992 by 4.3 times. It has to be pointed out that these figures have been influenced to a great extent by the number of residents in Latvia, which decreased by 250 thousands since 1992. Up to the end of 2003 foreign investors have deposited in Latvia 775 lats per resident. This figure places Latvia to the sixth position among the EU Candidate countries immediately after Slovakia, Check Republic, Estonia, Hungary and Poland. The total sum of the accrued direct foreign investments at the end of 2004 constituted 2360.8 mln lats or 31.8% of the GDP. The volume of incoming flow of direct foreign investments in Latvia in 2004 was 377.6 mln lats or 5.1% of the GDP.

Hopefully, the future will bring larger amounts of foreign capital investments in sectors that are comparatively advantageous in Latvia, specifically:

- Advantageous geographical disposition, which means transportation;
- Industries related to available natural resources (timber processing, manufacturing of building materials, food production);
- Industries employing an inexpensive, but comparatively qualified labour force (textile industry, metalworking, electric engineering industry and also manufacturing of building materials).

5. The development of building materials production is highly influenced by the market behaviour. In the beginning of nineties, when the level of production has generally fallen down to a remarkable extent, this particular branch has retained the volume of production to meet the domestic demand. Its future advancement could be encouraged mostly by a greater demand, provided, of course, there is an opportunity of extending production at the account of better export of products.
The year of 1992 has reflected the settled rates of building materials production as compared to building and construction activities of a comparatively vast scale. The period of 1999 - 2003, in its turn, features the situation that has developed in the sphere of building materials production over the recent years. Since Latvia has regained its national independence, the range and the quality of building materials have changed. The amount of locally produced building materials reduced immensely and some species have ousted completely, in spite of the fact that there is still a demand for them - the fact is witnessed by the import of such species. The building and construction industry uses building materials produced mostly in the Western Europe, which the locally manufactured product cannot compete with due to its lower quality and higher costs.
The author considers that the following factors suppress the increase of the volume of production:

- Insufficient demand for building and construction works due to low paying capacity of customers related to the current borrowing policy and poor development of mortgage loans system,
- Increased competition in construction industry,
- Increased volume of building and construction services provided by foreign companies in Latvia.

The increment of the domestic demand is essential, including the demand for building materials, which is mostly connected to the increase in volume of construction and, to a lesser extent, also to bigger private consumption amounts. The building materials production development trends are fully supported by the data published by the Latvian Institute for Statistics and the Central Statistical Bureau of Latvia in 2001 Annual Edition "Business and Consumer survey Results".

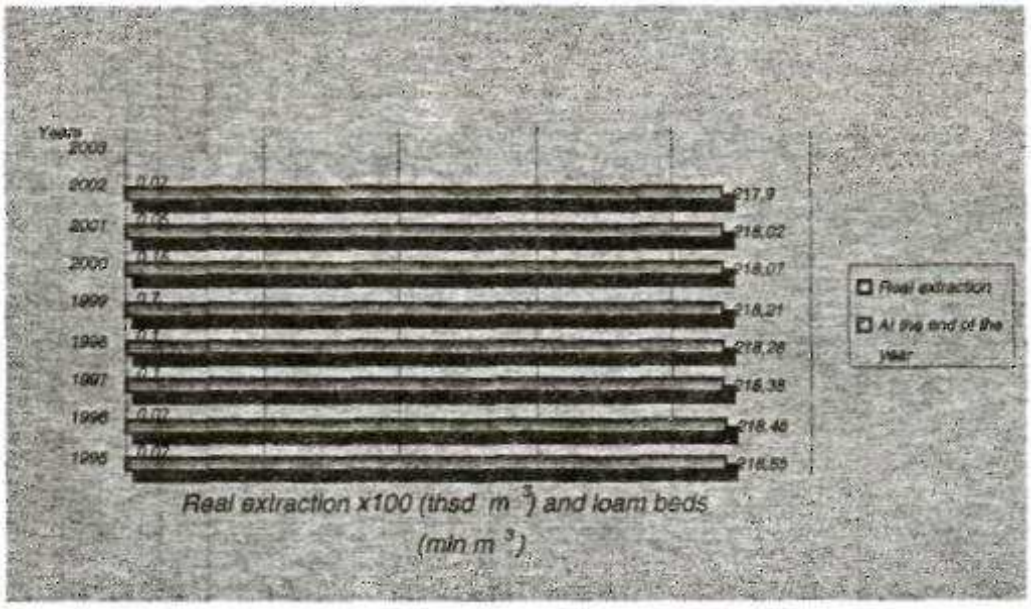
6. The Latvian land is rich in easily accessible and extractable *rocks of various deposits,* embedded close to the surface. These deposits can be found nearly in

all regions of Latvia and include such valuable resources as shale's, limestone, freshwater limestone, stone, various sands, including white sand, dolomite, gyprock, colouring earth, peat, sapropels, healing mud and other more rare resources, which the Author has mentioned in 2.4.

These valuable recourses are the source of different materials and products that would be able to compete on the foreign markets. The Author thinks that possibilities of manufacturing are used insufficiently and sometimes even irrationally. A great deal of products and materials are imported from Estonia, Lithuania, Finland, Germany, Italy, Spain, Sweden and other countries, whereas these could have been manufactured in Latvia by using energy saving and environment friendly technologies.

Only nine beds are currently in use out of the vast range of those explored: many beds have lost their practical importance due to different reasons. The explored deposits of shales constitute only 19% of the total found, while those assessed -81%, respectively. 52.6 mln m^3 or 45% of the total explored deposits of shales are in operating enterprises, while 40.9 mln m^3 or 36% of extractions are frozen as the processing enterprises have ceased their operations. The promising occurrences, in their turn, comprise 21.7 mln m^3 or 19% of the total explored resources of shales. In the manufacturing of building materials and for mineral admixtures they use mostly Devonian and Quaternary shales that are similar in mineralogical content, but differ in their chemical composition and texture. This is what determines the quality of shale and its aptness to the manufacturing of building materials, building ceramics and others.

Picture 3 reveals the dynamics of real extraction process and loam bed resources.



Source: Author's calculations based on the LR CSB

Picture 3 Loam beds resources and real extraction dynamics

The explored Quaternary shales deposits total amount to 93.47 mln m^3, 48.4 mln m^3 or 52% of this type of deposits are being utilized by operating enterprises. The most valuable are low carbon-bearing loams that are used as a raw material for manufacturing of expanded clay. Currently, the explored loam beds that can be used for the production of expanded clay amount to 16.9 mln.m^3. The largest loam deposits are found in Apriķu bed in South-West of Latvia.

Total Quaternary Shale resources are assessed as 488.54 mln m^3, 14.6 mln m^3 or 3% of which are in operation and 18.24 mln m^3 or 3.7% frozen. The largest portion of these highly valuable shales resources, that is 455.7 mln m^3 are located in the following promising deposits: Usmas, Brocēni II and Ventas - all in Kurzeme and their specific weight is 93.3% of the total assessed shale volumes. Table 3 provides the analysis data on loam beds resources and real extraction of clays over the time.

Table 3

Analysis of Shale Resources and Real Extraction of Clays Over the Set Period of Time

	Years of Survey								
	1995 *	1996	1997	1998	1999	2000	2001	2002	2003
Base Growth Rate, %									
Real extraction of clays	100	100.0	142.9	142.9	1000.0	200.0	71.4	100.0	85.7
Shale Resources at the End of the Year	100	100.0	99.9	99.9	99.8	99.8	99.8	99.7	99.7
Base Increment Rate, %									
Real extraction of clays	x	0.00	42.86	42.86	900.0	100.0	-28.57	0.00	-14.29
Shale Resources at the End of the Year	x	-0.03	-0.08	-0.12	-0.16	-0.22	-0.24	-0.30	-0.3
Chain Growth Rate, %									
Real extraction of clays	100	100.0	142.9	100.0	700.0	20.0	35.7	140.0	85.7
Shale Resources at the End of the Year	100	100.0	99.95	100.0	100.0	99.9	100.0	99.9	100.0
Chain Increment Rate, %									
Real extraction of clays	x	0.00	42.86	0.00	600.0	-80.0	-64.29	40.00	-14.3
Shale Resources at the End of the Year	x	-0.03	-0.05	-0.05	-0.03	-0.06	-0.02	-0.06	0.00

** Base Year*

Source: Author's calculations as based on the data by the CSB

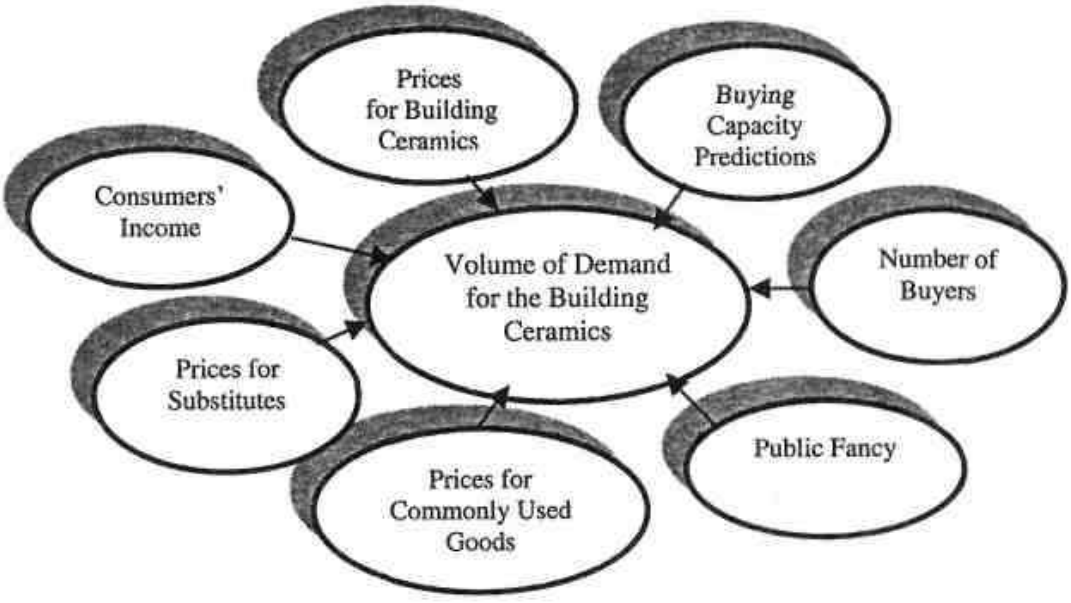
The Chain Increment of the Shale Resources over the entire period is negative and the negative Chain Increment Rate is equable that indicates the level utilization and sufficiency of existing resources for the uniform development of the industry. In 1999 a Chain Increment Rate of the real extraction gave a rise and levelled off in 2000 and 2001.
Observing the calculations as classified in Table 3, we can clearly see that the real extraction of clays reveals hardly an increment over the surveyed period of time.

7. By studying *the correlation of supply and demand*, one can learn about the mechanism of how a market operates: in which way does this mechanism regulates production volumes and prices. The analysis of supply and demand is an important tool that enables you to understand many economic processes, specifically: how do the social, political and economical factors influence prices and in what impact do the state provided decisions, taxes and subsidies, customs tariffs and quotas leave on production and consumption, etc. The role played by consumers of building materials in market economy can hardly be overestimated, as these are exactly the consumers, who determine the volume of production. The Consumers' behaviour is defined by their need in building ceramics products and paying capability.
The notions of "demand" and "volume of demand" should be clearly distinguished. Demand for building ceramics products is a price function, while the amount of sold building ceramics, that is, the volume of demand *d*, as the Author suggests here, depends on the entire range of factors that can be expressed by the following formula:

$$Q^{d}_{\text{ker}} = f(P_{\text{ker}}, P_s, I, P_k, T, N, E, CF) \qquad (3)$$

where
- Q^{d}_{ker} - the volume of demand for building ceramics products;
- P_{ker} - price of building ceramics products;
- P_s - price of substitutes;
- I - consumers' income;
- P_k - price of commonly used goods;
- T - public fancy;
- N - market volume (number of buyers);
- E - buyers' prediction;
- CF - other factors.

Picture 4 shows the Chart for the volume of demand for building ceramics products as designed by the Author.



Picture 4 Building Ceramics Volume of Demand Chart

The Author finds that the major values that influence the demand for building ceramics products is price for building ceramics, commonly used goods and substitutes, as well as consumers' income.
The author suggests that the dependence of flexibility of demand for building ceramics products on price fluctuations can be expressed as follows:

$$E = \Delta Q/AP, \qquad (4)$$

where E - Building ceramics demand flexibility dependent on price fluctuations;
ΔQ - Realised changes in the volume of demand for building ceramics products (%);
ΔP - Price fluctuations (%). The flexibility of demand for building ceramics products is influenced by the following factors:

1)Availability of substitutes of a building ceramics product: the more substitutes of a product are available on the market, the more elastic is the demand for a particular product;

2)Whether a building ceramics product belongs to a primary commodities category or to luxury goods: demand for primary commodities is rigid, but demand for luxury goods is flexible;

3)A specific weight of a building ceramics product in the consumer budget: the bigger is a product' share in the consumer budget, the more elastic is the demand for it;

4)Price fluctuations for other commodities;

5)Price for a building ceramics product;

6)The time element: the bigger is the time span for making a decision, the more flexible is the demand for a particular building ceramics product. This happens due to different reasons.

The first reason is that the majority of consumers have developed already a structure of their consumption habits and, if the price for a building ceramics product rises, they need a certain time to get accustomed to other building ceramics products that are on supply.
The second reason is related to the survival time of a product. For example, flexibility of demand for certain building ceramics products taken over a shorter periods of time will be more inflexible than that over a longer time spans, as they are substituted with other more efficient products as time passes.

8. The manufacturing of building ceramics products is an integral part of the entire complex of building materials industry and that is why its problems are common to the industry on the whole. One of these problems that leave their impact on the entire industry is *the formation of the supply of building ceramics products.* The supply of building ceramics products is an essential issue, when speaking about the trends of development of their manufacturing, as long as it is very important that there is a substantiated supply, because the formation of it is the engine that drives the motivation for production. A well substantiated supply allows not only to meet the existing demand for a particular building ceramics product type, volume and quality, but also enables to enlarge the capacity of a market niche or a part of it, thus, provided opportunities for gaining larger profits. This is extremely essential, especially, if we are speaking of such market conditions, when there is a necessity to concentrate the production of building ceramics products, achieve higher level of specialisation and increase the competitiveness of products (loam bricks, roofing tiles, decoration tiles, etc). This all means that it is necessary to study the problem solution options and related conditions that could promote the formation of well substantiated supply and optimal range of building ceramics products.
For this particular reason the Author has employed: the monographic method that allowed her to study methods of operations of those most successful enterprises in the field of manufacturing of building ceramics; constructive method of calculations (method of options) to develop several options of solving managerial and economic tasks by having generalized the most successful of them in the Conclusion. The studies have been completed on the basis of tangible evidence provided by the LR CSO data. Having summarized the statistical information and analysed the operation methods of enterprises, acting in the industry, the following research tasks have been suggested:

- Find possibly the optimum organizational and economic options of building ceramics products supply types in the existing structure of enterprises in the industry;
- Define those peculiarities that form the supply of building ceramics products on both the foreign and domestic markets;
- Find out factors that are capable of changing the character of supply expressed in quantity fluctuations of building ceramics products on supply;
- Define the economic mechanism to increase the volume of production of such building ceramics products that would allow increase also the market

niche capacities, simultaneously not diminishing the volumes of production of other building ceramics products.

Solutions of the issues suggested in the Research Tasks are presented in the account on the completed research and the detailed analysis of the proposed issues.

The supply of building ceramics products is one of the structural elements of the supply of building materials as a whole. Building materials have always been and always will be in demand, although the demand for certain kinds of building materials is erratic. This means that the erratic market demand can affect building ceramics products as well and this, consequently, means, that, although, there will be a need for building ceramics supply, the volume of such supply can change time from time; this should be taken into account, when building up a supply strategy of building ceramics manufacturing enterprises.

The supply is a certain quantity of specific type of a product that producers or sellers are willing and capable of producing or supplying for a market at a certain price and in a certain period of time. The supply of building ceramics products is a price function.

The author suggests that the volume of demand for building ceramics products, that is influenced by a range of other factors, can be expressed by a following formula:

$$Q^{s}_{\text{ker}} = f(P_k, P_{res}, T_{teh}, T_{nod}, I\%, N, E, CF) \quad (5)$$

where Q^{s}_{ker} - volume of demand of building ceramics products;

P_k - real cost of building ceramics products;

P_{res} - cost of building ceramics products production resources;

T_{teh} - technology and effectiveness of building ceramics producers;

T_{nod} - tax system impact;

$I\%$ - credit interest;

N - number of building ceramics producers (sellers);

E - producers' (sellers') prediction;

CF - other factors.

The Supply Curve provides graphical presentation of correlation between the price of a commodity - building ceramics products, - and the quantity of a commodity, which the Seller can and is willing to offer for a specific market. The current supply of building ceramics products in Latvia is formed by the two major domestic factors, not taking into account external factors, such as, say, imports of building ceramics products, and these are, specifically:

1. Workload capacities of enterprises producing building ceramics products;
2. Market value of building ceramics products.

The term of Workload Capacity should be translated in a sense that enterprises do not utilize their production capacity to the utmost. Several reasons for that can be mentioned here: a lack of investments, insufficient demand, shortage of valuable raw materials. The Market Value of building ceramics products , in its turn, should be interpreted as domestic market values, as well as external market values that influence the export volumes of ceramics product manufactured in Latvia and the imported amount of ceramics products.

The supply of building ceramics products can be manifested on different levels, depending on the continuous demand growth increment. This allows to offer he same volume of a product, but at higher prices. Although, there are situations, when a product is offered at higher prices and relatively smaller quantities: this refers to situation, when a specific building ceramics product is manufactured at a high-tech level and, thus, at high, newly created, value. This demanded to offer building ceramics products at higher market sales prices. The formation of the building ceramics products supply - just the same as any other product supply, -depends on the level of prices in a specific market situation. The situation, as it has developed in the production of building ceramics products in Latvia, bears no positive witness in favour of the producers involved. The volume of imported products has increased remarkably, especially this refers to decoration tiles, and hampers the development of local production enterprises. The volume of import leaves its impact on building ceramics products types manufactured on a large-scale, which means that these are produced in relatively larger quantities and at less expensive prices. But the increase in production volumes exactly of this type of products would be so much expected due to low paying capacities of the population. Alas, it is substituted by the product imported, mainly, from Lithuania, that is offered at a less expensive price and, thus, is more affordable for Latvian consumers. The best analysis of the situation can be given with the help of the demand flexibility.

The flexibility reflects the way how the demands responds to price fluctuations, assuming that all other values remain without change. The flexibility of the demand can be applied also in an opposite direction: to calculate how will the price change, if changes the demand. The demand flexibility can be defined as changes in volume of the relative offered product responding to volume fluctuations, or:

$$E_s = \frac{Q_s}{\Delta Q_s} / \frac{\Delta P}{P} \qquad (6)$$

where E_s - flexibility of demand for building ceramics products;

Q_s - volume of demand for building ceramics products;

ΔQ_s - building ceramics products demand volume fluctuations;

ΔP -building ceramics products price fluctuations;

P - price for building ceramics products.

Thus, the increment of a specific building ceramics product supply on the domestic Latvian market causes the decrease in price without any changes to its flexibility. Still, this should be avoided not to excessively inflate the market situation by producing as diverse range of ceramics products as possible. This allows for the versatility of ceramics products supply in the Latvian market. Different options of the product - ceramics products - supply feature different degrees of flexibility that allows to maintain comparatively high prices and gain bigger profits.

The bulk of building materials, building ceramics products including, are manufactured by a large scale production enterprises; this could refer also to the manufacturing of building ceramics products in Latvia - except certain cases, - especially in conditions of already concentrated production. Still, it is sometimes rather difficult for a large - scale production to arrange for a diversity of the building ceramics products range.

It' another thing is with small-scale enterprises that are more flexible in their operations. They are capable of producing a broader range of products limited only by their own production capacities and market niche permissions. Besides, it should be taken into account that there should one basic type of product, while other types of products that constitute the range are its differentiated derivatives that do not complicate the process of production. This leaves room for quick switching to another type of the range by radically decreasing or entirely cutting off the production of a previous one, still not excluding a possibility to resume it. The volumes of type of building ceramics products range can vary a lot and not always these are optimal. The volume of each building ceramics products type depends on supply of other types of building ceramics products, because many of them can be used as substitutes of others and, moreover, many of Latvian enterprises producing building ceramics are manufacturing one and the same type of product. This has lead to a situation, when we have to do only with one conditioned market niche in Latvia with hidden and still unused possibilities of expanding this market niche.

The production volume of building ceramics products and, thus, also that of their market supply, is defined by the availability of valuable and quality raw materials that forms a limitation of building ceramics products manufacturing at the very start of it. Besides, the seasonal aspect of the building ceramics products manufacturing should be taken into account as it creates natural fluctuations in the production. And these seasonal fluctuations are unlikely to be levelled off.

The seasonal nature of production influences the exponents of the dynamic line, that is, the development ratios of building ceramics products supply fluctuations. In theory they can vary from the minimum to the maximum level for all types of the building ceramics products range. The increase or decrease of seasonal factor, while not disclosing changes in other features, can be diagnosed by calculating the fluctuation ratio of each separate annual index of seasonality, say, standard deviation. If the standard deviation of indexes shows an increment over years, the phenomenon of seasonality increases. Thus, if a new type of building ceramics

products is being manufactured over a short period of time only, it can increase seasonal stock reserves, aggravating the situation in the formation of supply. Really, a classic seasonal levelling off method can be used for flattening of seasonal fluctuations in building ceramics products supply, that is, to manufacture goods with long shelf life. But, still, the levelling of the building ceramics products supply should be completed then at all enterprises in the industry. Provided only few enterprises become busy with the levelling, a factor of risk arises in the industry that will result in impressive price fluctuations and pronounce differentiation.
Besides, allowances should be made for a relatively low capacity of the Latvian market, which means that even comparatively modest changes in the existing supply of building ceramics products can lead to excessive price fluctuations that is directly connected to the risk of losses.
This is to be taken into account, when creating new types of building ceramics products and developing the supply of the product range having in mind mathematical calculations based on objective function of profit maximisation (7). Besides, the major limiting factors are the available amounts of raw materials, production capacity limitations and the production cycle involved.

$$F(x) = \sum_{j=1}^{n} p_j x_j \rightarrow \max \qquad (7)$$

where p_j - profit or income from one sold product unit;

x_j - possible product volume.

The maximum amount of profit not always is ensured by a bigger production volume of building ceramics products. It is essential to form an effective supply. Thus, it is not necessary to have many large-scale enterprises that would offer to the market big quantities of the same products. Along with large-scale production effective and flexible small-scale productions of building ceramics products could take their part on the market offering a comparatively broader range of products; and more than that, a small-scale enterprise is capable of offering exclusive and expensive types of ceramic products. The supply of exclusive and highly valuable building ceramics products can be equivalent to the large-scale supply, giving an equivalent amount of income: an equal worth share of profit as compared to the invested capital means. This is manifested in creation of specific conditions for production of exclusive ceramics. Thus, both large-scale and small-scale productions of building ceramics have their share in the optimisation of the industry.

9. *The sociological study of* building ceramics products *manufacturing and demand.*
In the recent years the sociological study results gain in importance in looking for different issues and problems solutions. In order to define the current situation in Latvia and learn the public opinion on building ceramics products condition, the author has headed the polling as based on her created questionnaire among the following groups of respondents: traders of building ceramics products and building materials; contractors, producers and consumers. As the result of the polling the filled in questionnaires have been received and

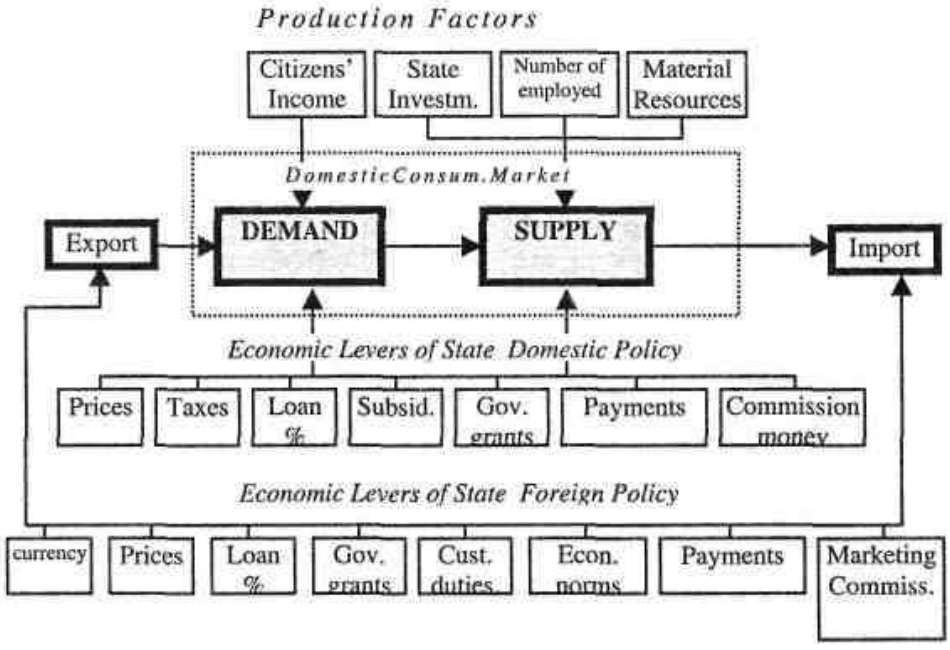
accepted as usable for data processing and analysis. The data has been analysed by using the MS Excel application.
The goal of the sociological study is to find out the current situation in Latvia, identify standing problems, as well as assess future perspectives in the field of manufacturing of building ceramics products by interviewing traders, contractors, producers and consumers of building ceramics products and building materials. Having in mind the supply and demand analysis data, we will find out how to more successfully satisfy the needs of the mentioned groups of respondents and harmonize their interests within the frames of building ceramics products and building materials industry. This is the first such kind of polling is carried on in Latvia.
Having compared and analysed the results of the sociological polling, the Author has concluded that in order the locally produced products become competitive on the domestic and external, especially that of European Union, markets, qualitative changes are requisite in the building ceramics products industry in this country.
The major factors influencing the consumers' choice of building ceramics products are 20% go for outer appearance and 18% for refractory properties.
The Author considers that the following is requisite to improve the situation:

- Improve the quality of labour force by attracting new qualified professionals;
- Continue the exploration of shale deposits to ensure the procurement of mineral resources for perspective manufacturing of a wide profile of products;
- Improve building ceramics products design, assortment and quality by employing innovative technologies and laying a special emphasis on promotion of locally produced quality products;
- Give a higher priority to the marketing of products;
- Establish a state supported centre for design that would manage and patronize the image making of local products and companies and their promotion on the markets worldwide;
- Develop mechanisms to sponsor the production, support and defend the local market;
- It is necessary to continually perform polling to follow the changes in demand and supply of building ceramics products and building materials on the regular basis.

The main proviso of increasing the production of building materials and building ceramics products has always been and still remains the higher competitiveness of products that depends on their quality and price. The issue of competitiveness of the product should receive special attention both on the part of building materials producers and state policy makers.
The second sociological study among various groups of respondents revealed the majority of them as the most acceptable option of a family house would choose a masonry house (49%), a wood carcass house (33%), and only 18%, which is less than a half of all the respondents, would choose some other structural options. The majority of those in favour of masonry would like to have it done out of

building ceramics products - loam bricks or KERATERM blocks,- a fact that proves of the existing demand for building ceramics products.

10. The econometric model of the developments of building ceramics production.
The informative correlation between the development parameters of building ceramics production within the econometric model is presented in Picture 6. This particular model has been adopted by the Author on the basis of the econometric model of development of agriculture and can be used as a permanent econometric model.
Picture 5 makes one conclude that the building ceramics products self-sufficiency principle is realised in the econometric model within the concern of building materials production policy. As per principle mentioned above, the volume of import is mainly defined by the difference between the building ceramics products total demand and total supply. The same as the volume of export is defined by the difference between the building ceramics products total demand and total supply.
Besides, both import and export volumes are influenced by economic levers accepted by the state in the realm of its foreign policy, such as: currency rates, export and import prices, loan interests, governmental grants, customs duties, etc. The total demand for building ceramics products depends also on the state accepted economic levers of domestic affairs: prices, taxes, loan interests, subsidies, governmental grants, etc. The economic levers reflected in the Picture below have been employed in the econometric model not only as influencing factors, but also as parameters for model simulation.



Picture 5 Informative correlation between the development parameters of the building ceramics production within the econometric model

11. The analysis of import and export of major ceramics products is performed in compliance to the relative product classification defined by the LR Committee on Statistics as based on the unified method.

The import/export balance of the Latvian ceramics products still remains negative with a tendency of a steady annual increment of specific weight of import. Thus, for example, over the recent 8 years the specific weight of export in the total balance of building ceramics and refractory products (Class 69) progressed as follows: 30.9% in 1995, 24.5% in 1996, 19.3% in 1997, 20.1% in 1998, 18.2% in 1999, 18.5% in 2000, 17.2% in 2001, and 16.2% in 2002. The volume of exported product has increased by 0.31 mln. Latvian Lats or 13%, while that of imported product - by 10.63 mln lats or three times as much. The increment of building ceramics and refractory products is influenced mostly by the following factors:

- Insufficient local market supply of traditional locally manufactured product procured on the basis of local raw materials;
- Comparatively low competitiveness of products due to high prices that are not supported by the quality and durability of products;
- An outstripping growth of building and repair, as well renewal as compared to the production increment of the above mentioned products;
- Structural changes in building and construction industry that resulted in growing demand for building ceramics products of high quality and durability that required further furnishing as applied;
- The closing down of refractory products productions;
- Mistrust in quality of locally manufactured products and materials;
- Lack of raw materials necessary for manufacturing of refractory products.

The flow trend of loam bricks, roofing tiles, glazed and unglazed ceramic slabs import dynamics over the surveyed period can be defined by the following trend functions:

In reference to building loam bricks:

$y_{MCĶ} = -0{,}041\ x + 0{,}4737;$ $R^2 = 0{,}8966$ (8)

In reference to roofing tiles:

$y_{JK} = 0{,}0096x;$ $R^2 = 0{,}6575$ (9)

In reference to glazed/unglazed ceramic slabs:

$y_{KP} = 0{,}7743x + 1{,}28;$ $R^2 = 0{,}9495$ (10)

The dynamics of import development featured high growth rates. This has been proved by the analysis of import volumes of building ceramics products over the selected period of time (see Table 4).

Having evaluated the calculations summarized in Table 4, we can see that the biggest increment of import volume in the class of building ceramics products is revealed in regard to glazed and unglazed tiles, which has raised by 301.2% over the period as compared to the Base Year. A Chain Increment Rate is constant, excluding 1999 (-2.1%), showing a slight tendency to decrease. The smallest increment, though, is revealed in regard to the import of building bricks.

Table 4

Analysis of Import Volumes 1995-2003

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Building ceramics and refractory products, altogether	***4.61***	***6.27***	***9.52***	***11.76***	***11.71***	***11.86***	***14.77***	***15.24***	***18.24***
Chain Increment Rale, %		36.0	51.8	23.5	-0.4	-1.3	24.5	3.2	21.8
Base Increment Rate, %		36.0	106.5	155.1	154.0	157.3	220.4	230.4	302.6
Refractory hard finishes	***1.2***	***1.59***	***3.19***	***3.08***	***3.18***	***2.20***	***3.64***	***2.54***	***3.34***
Chain Increment Rate, %		32.5	100.6	-3.4	3.2	-30.8	65.5	-30.2	31.5
Base Increment Rate, %		32.5	165.8	156.7	165.0	83.3	203.3	111.7	178.3
Construction Bricks	***0.44***	***0.36***	***0.38***	***0.32***	***0.32***	*0.16*	***0.15***	***0.15***	***0.14***
Chain Increment Rate, %		-18.2	5.6	-15.8	0.0	-50.0	-6.3	0.0	-6.7
Base Increment Rate, %		-18.2	-13.6	-27.3	-27.3	-63.6	-65.9	-65.9	-68.2
Glazed/Unglazed Slates and tiles	***1.66***	***2.76***	***3.82***	***5.2***	***5.09***	***5.74***	***6.62***	***6.66***	***8.81***
Chain Increment Rate, %		66.3	38.4	36.1	-2.1	12.8	15.3	0.6	32.3
Base Increment Rate, %		66.3	130.1	213.3	206.6	245.8	298.8	301.2	430.7
Roofing Tiles	***0.003***	***0.003***	***0.04***	***0.04***	***0.004***	***0.03***	***0.06***	***0.11***	***0.11***
Chain Increment Rate, %		0.0	1233.3	0.0	-90.0	650.0	100.0	83.3	0.0
Base Increment Rate, %		0.0	1233.3	1233.3	33.3	900.0	1900	3567.7	3566.7

Source: The Author's calculations as based on the LR CSB data

A Base Increment Rate is negative that proves of the fact that local producers are capable of satisfying consumers' demand for building bricks and ceramic slabs. As a positive factor here, an annual increment of loam bricks export, excluding the year of 2001. The prove of it is revealed in the building ceramics products export volumes analysis as it is presented in Table 5.

Table 5

Analysis of Export Volume 1995-2003

	1995	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Building ceramics and refractory products, altogether	***2.07***	***2.03***	***2.28***	***2.96***	***2.61***	***2.7***	***2.26***	***2.38***	***2.64***
Chain Increment Rate, %		*-1.9*	*12.3*	*29.8*	*-11.8*	*3.4*	*-16.3*	*5.3*	*10.9*
Base Increment Rate, %		*-1.9*	*10.1*	*43.0*	*26.1*	*30.4*	*9.2*	*15.0*	*27.5*
Refractory hard finishes	***0.4***	***0.4***	***0.06***	***0.06***	***0.03***	***0.03***	***0.02***	***0.02***	***0,02***
Chain Increment Rate, %		*0.0*	*50.0*	*0.0*	*-50.0*	*0.0*	*-33.3*	*0..0*	*0.0*
Base Increment Rate, %		*0.0*	*50.0*	*50.0*	*-25.0*	*-25.0*	*-50.0*	*-50.0*	*-50.0*
Construction Bricks	***0.84***	***1.05***	***1.52***	***1.91***	***1.98***	***1.98***	***1.58***	***1.73***	***1.79***
Chain Increment Rate, %		*25.0*	*44.8*	*25.7*	*3.7*	*0.0*	*-20.2*	*9.5*	*3.5*
Base Increment Rate, %		*25.0*	*81.0*	*127.4*	*135.7*	*135.7*	*88.1*	*106.0*	*113.1*
Glazed/Unglazed Slates and tiles	***0.05***	***0.18***	***0.18***	***0.58***	***0.29***	***0.27***	***0.27***	***0.21***	***0.32***
Chain Increment Rate, %		*260.0*	*0.0*	*222.2*	*-50.0*	*-6.9*	*0.0*	*-22.2*	*52.4*
Base Increment Rate, %		*260,0*	*260,0*	*1060*	*480.0*	*440.0*	*440.0*	*320.0*	*540.0*
Roofing Tiles	***0.05***	***0.04***	***0.05***	***0.06***	***0.04***	***0.02***	***0.01***	***0.003***	***0.006***
Chain Increment Rate, %		*-20.0*	*25.0*	*20.0*	*-33.3*	*-50.0*	*-50.0*	*-70.0*	*100.0*
Base Increment Rate, %		*-20.0*	*0.0*	*20.0*	*-20.0*	*-60.0*	*-80.0*	*-94.0*	*88.0*

Source: The Author's calculations as based on the LR CSO data

Say, for example, in 1996, as compared to 1995, the export of building bricks, as expressed in values, increased by 0.21 mln lats or 25.0%, in 1997 it increased by 0.47 mln lats or 44.8%, in 1998 - by 0.39 mln lats or 25.7%, in 1999 - by 0.07 mln lats or 3.7%, in 2000 it showed no increment and in 2001 it decreased by 0.40 mln lats or 20.2%, but in 2002 it gave a rise by 0.15 mln lats or 9.5% and 2003 it gave a rise by 0.06 mln lats or 3.47%.

12. As Latvia becomes a Member State of the European Union, entrepreneurs of this country should be able to make use of scientifically substantiated forecasts as decision making becomes more and more complex and the amount of

information to be estimated grows. As market economy and competition develops, the *modelling and forecasting of demand* is becoming more and more topical. The modelling and forecasting of demand is aimed to diminish the uncertainty about future developments in manufacturing of building ceramics products, which is reachable by preparing a substantiated data to facilitate decision making and provide the analysis of possible certain decision's consequences. Making forecasts contributes to the competitiveness of an enterprise, enhances its production programmes, including the bringing of product/service structure in compliance to demand to the best possible satisfaction of it; it upgrades the quality of products un improves their structure; it encourages investments and gives the consistency of money circulation; it also allows fro improving the client care processes.

The understanding of demand for a particular company's product, as well as for products of the entire industry and ability to predict future developments is essential for the successful operation of any enterprise. Forecast models exampled in literature on economic issues define mostly technical aspects of forecasts, but those numerous factors connected to the demand are not taken into account.

The author suggests that these specific factors that form the demand for building ceramics products are analysed and the process of making forecasts on the building ceramics production is defined.

Main goals here are to: identify the process of making forecasts about the building ceramics production; analyse specific factors that influence the building ceramics production; create a combined model for making forecasts on the demand.

The Authors thinks that making forecasts on the demand for the building ceramics production on the level of the entire industry is connected to fluctuations of economic parameters (GDP, individual income, deposits) over the period of approximately 5-15years. These are the values that are directly applied in planning of market capacities, accumulation of capital, as well as in defining financial needs in the long-range, development of new products and new markets. This makes the author conclude that the specific factors influencing the building ceramics production and cause changes in demand across the entire industry have to be analysed.

To facilitate the identification of factors that influence the forecasts making in regard to demand for building ceramics products, the author suggests to:

1. Select specific values for the purposes of analysis, as long as different factors influence different types of demand;
2. Select an array of economic activities that are closely related to changes in the demand for building ceramics products;
3. Study tendencies in building ceramics products sales over the recent 5-10 years and compare them to the GDP trends, industrial production and personal income at disposal;
4. Develop the created model;

5. Analyse the quality factors of the past, present and future to define what factors active in the past would continue influence the situation (political changes in this country, technology innovations);
6. Realize mistakes allowed in previous forecasts.

The list of the above mentioned activities could be expanded or contracted depending on the existing needs of the building ceramics industry. The Author recommends to start by grouping building ceramics products as per type of utilization and complete a separate study in regard to building bricks, decoration tiles, etc. One should also take into account several important aspects of making forecasts in regard to the life cycle of a product, as the demand for products of short-run consumption can be predicted more easily than that of durability products; that is why the demand cannot be predicted for a longer period. The Author thinks that the most important factor regarding the durability products, - which building ceramics products certainly are, - is a personal income at disposal. The paying capacity of durability products consumers includes larger expenses, when compared to that of the short-run products; this makes the income development trend over the recent years of a great importance. The tendency of paying capacity shows increase, when the level of income rises as compared to the previous years or the situation, when it has fallen. The optimistic forecast is related to the increase of income and the pessimistic - to its decrease and the existing stagnancy, when income is erratically.

In order to define, how closely the indications of building ceramics demand and supply are related within the frameworks of the analysis, the author employs the correlative method of interrelation by comparing the building ceramics production and realization to the national economy defining values that influence the former. The calculated correlation ratios of pairs are summarized in Table 6.

As per data obtained in the result of the correlative analysis, the author comes to a conclusion that the *realization of building bricks* is strongly influenced by the building bricks production, which is proved by a close positive correlation ($r = 0.92$), and also by investments in construction ($r = 0.81$), while the influence of average salaries of those employed ($r = 0.73$), investment absorption in the industry ($r = 0.73$), export ($r = 0.63$) and GDP ($r = 0.68$) is secondary. The new apartments construction hardly leaves any impact on the building bricks realization volumes. New materials have been used throughout also in construction of residential buildings over the recent years and the obtained data reveals that this factor's influence is not essential.

The production of building bricks is strongly influenced by the realization of building bricks, the evidence of which is given by a close positive correlation ratio ($r = 0.92$), while the influence of export ($r = 0.74$), investments in construction ($r = 0.73$), investment absorption in the industry ($r = 0.69$), average salaries of those employed ($r = 0.66$) and GDP ($r = 0.60$) is secondary.

Table 6

Loam Bricks and Decoration Tiles: The Correlation of Production, Realization and National Economy Defining Parameters

Parameters	Production	Realization	Export	Import	Average Salaries	Non-financial Investments in Construction	Non-financial Investments in Industry	GDP	Residential Buildings Constructed	Apartments Constructed
The Correlation of Loam Brick Production, Realization And National Economy Defining Parameters										
Production	XXX	0.92	0.74	-0.46	0.66	0.72	0.69	0.60	-0.29	-0.53
Realization	0.92	XXX	0.63	-0.48	0.73	0.81	0.73	0.68	-0.3	-0.52
Export	0.74	0.63	XXX	-0.58	0.69	0.79	0.68	0.60	-0.43	-0.71
Import	-0.46	-0.48	-0.58	XXX	-0.92	-0.82	-0.91	-0.94	0.89	0.96
The Correlation of Decoration Tiles Production. Realization And National Economy Defining Parameters										
Production	XXX	0.71	0.41	0.43	0.56	0.68	0.63	0.51	-0.09	-0.50
Realization	0.71	XXX	0.63	0.53	0.60	0.83	0.73	0.59	0.2	-0.43
Export	0.41	-0.22	XXX	0.91	0.90	0.89	0.85	0.87	-0.68	-0.77
Import	0.43	0.53	0.91	XXX	0.99	0.94	0.97	0.99	-0.80	-0.92

Source: The Author's calculations as based on the LR CSB data

As the above mentioned factors increase, increases also the production and realization of building bricks. The results of the study prove that *the income from realization of decoration* tiles depends on the decoration tiles production volume (r = 0.71). The realization of decoration tiles is strongly influenced by non-financial investments in construction (comparative prices of 2001 in mln of lats) (r = 0.83), commissioning of family houses (total area in m^2) (r = 0.86); private investments in construction of family houses (comparative price of 2002 in thousands of LVL) (r = 0.85), while the influence of non-financial investments in processing industry (comparative price of 2001 in mln lats) (r = 0.73), average salaries of those employed (average monthly net in lats) (r = 0.60), GDP (thsd lats, 2000 average prices) (r = 0.59), import of decoration tiles (comparative prices of 2001 in mln lats) (r = 0.57), GDP per resident (in lats, 2000 average prices) (r = 0.55), number of employed persons (r = 0.54) and number of economically active persons (r = 0.51) is secondary. As the mentioned factors increase, increases also the production and realization of decoration tiles. The obtained data reveal low influence of the amount of constructed residential buildings (r = 0.23) and low negative influence of the number of constructed apartments (r = -0.40) on the realization of decoration tiles.

The decoration tiles production, in its turn, depends on their realization (m^2) (r = 0.70), GDP (thsd lats, 2000 average prices) (r = 0.69), non-financial investments in construction (comparative prices of 2001 in mln lats) (r = 0.64), number of commissioned family houses (total area in m^2) (r = 0.62), private investments in construction of family houses (comparative prices of 2002 in thsd lats) (r = 0.62), non-financial investments in processing industry (comparative prices of 2001 in mln lats) (r = 0.59), average salaries of employed persons

(average monthly net in lats (r = 0.51) and amount of import of decoration tiles in mln lats (r = 0.51).

It should be pointed out here that the influence of these factors on the production of decoration tiles is secondary. The two strongly influencing factors, - the same as in production of building bricks and other branches of the industry, - are investments in construction and processing industry. The fact that the average salaries influence the amount of produced tiles has been reconfirmed and, similarly to the previous study, the data, proving that the number of constructed apartments has low influence on the amount of tiles production, has been obtained. The data revealing the influence of the average salaries on the import has been gained as well.

The diversity of methods of forecasts and the complexity of forecast making techniques restrains them from being applied in real practice of building ceramics producers and traders in Latvia. The choice of an appropriate forecast making method is a real issue amo.ng the Latvian entrepreneurs. Further in the text we will consider methods that can be applied in studying the demand for such building ceramics products as building bricks, ceramic slabs, and roofing tiles. The author recommends to employ such statistical methods as correlative analysis, single-factor and multi-factor linear regression, as well as linear and non-linear forecasting for studying of the demand for building ceramics products, using Microsoft Excel 2000 and SPSS 10.0 data processing applications. She also suggests that the models of statistical importance that have been obtained in the result of multi-factor linear regression analysis should be used. The statistical data is summarized across the period of 9 years and various parameters have been used. The goal was to define the factors of the most essential influence on the production, realization and import of building bricks and decoration tiles. All the models gained in the result of the performed studies are summarized by the Author in the Catalogue of Models (see Picture 6), that present a graphical illustration of factors that influence the production, realization and import of building bricks and decoration tiles. Further, we shall take a look on several of the models developed by the Author. As a regulative element of the model *a volume of produced building loam bricks* in thousands m^3 and a factorial element - *realization of building loam bricks* been taken, the following model is established:

$$Y_t = \beta_0 + \beta_1 \cdot MBReal_t + \varepsilon_t \qquad (11)$$

Where:

Y_t- volume of produced building loam bricks over the time period r;

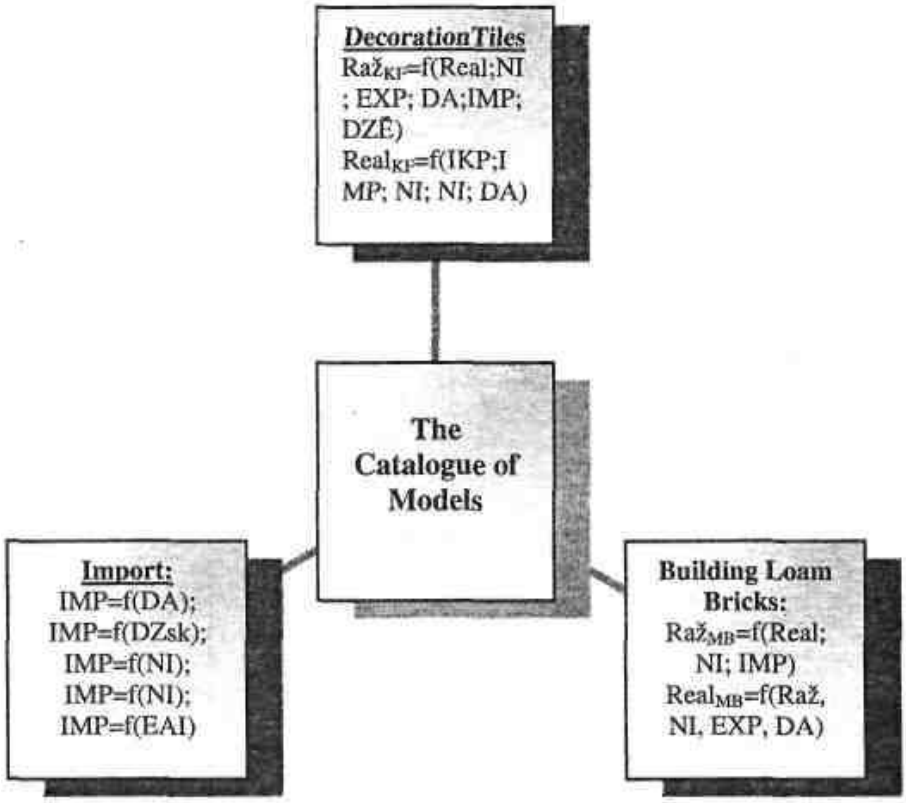
β_i - regression model parameters;

$MBReal_t$ - realization of building loam bricks over the period of 1995 through 2003;

ε_t - a stochastic error.

The following valuation of the regression model has been obtained, where *y* represents the theoretical volume of produced building loam bricks over the time period *t*

$$Y_t = 0{,}289 \cdot MBReal_t + 8{,}187 + \varepsilon_t \qquad (12)$$



Source: A scheme developed by the Author

Picture 6 The Catalogue of Building Ceramics Products Demand/Supply Models

With determination ratio of $R^2 = 0.848$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 8.

Table 8

Valuations of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	8.186726	3.205003	0.037862	0.608103	15.76535
β_1	0.288802	0.046264	0.000427	0.179405	0.398198

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the given regression model, one can conclude that the influence of building loam bricks realization on the volume of building loam bricks production is essential with 95% probability (p-value = 0.000472) (see Table 8). The credibility of the obtained model is high enough and it can be applied to detect 85% of the increment in the volume of building loam bricks production. Thus, by increasing the realization of building loam bricks by 1 thousand m^3, the realization of building loam bricks should then be increased by 0.29 thsd m^3, on the average.

Provided *the volume of produced building loam bricks* in thousands m^3 is taken as a resultative element of the model and *non-financial investments in construction* - as factorial element, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot INV.B\bar{U}VN_t + \varepsilon_t \quad (13)$$

Where Y_t- volume of produced building loam bricks over the time period *t;*

β_i - regression model parameters;

$INV.B\bar{U}VN_t$ - non-financial investments in construction (comparative prices of 2001 in mln lats) across 1995- 2003;

ε_t - a stochastic error.

The valuation of the regression model has been done, where *y* represents the theoretical volume of building loam bricks production over the time period *t*

$$Y_t = 0{,}187 \cdot INV.B\bar{U}VN_t + 16{,}24 + \varepsilon_t \quad (14)$$

With determination ratio of $R^2 = 0.53$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 9.

Table 9

Valuations of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	16.2394	4.264302	0.006643	6.155935	26.32286
β_1	0.186728	0.066561	0.026321	0.029336	0.34412

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the gained regression model, one can conclude that the influence of non-financial investments in construction on the volume of building loam bricks production is essential with 53% probability (p-value = 0.026321) (see Table 9). The model can be applied to detect 53% of the increment in volume of building loam bricks production. Thus, increasing the amount of non-financial investments in construction by 1 mln lats, the production of building loam bricks should be increased by 0.187 thsd m^3, on average.

Provided the *volume of produced building loam bricks* in thousand m^3 as a resultative element of the model and *export of building loam bricks* - as a factorial element of the model are taken, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot EKSP_t + \varepsilon_t \quad (15)$$

Where Y_t- volume of produced building loam bricks over the time period *t*;

β_i - regression model parameters;

$EKSP_t$ - export of building loam bricks in mln lats across 1995-2003;

ε_t - a stochastic error.

The valuation of the regression model has been done, where *y,* represents a theoretical volume of building loam bricks production over the time period *t.*

$$Y_t = 0{,}006 \cdot EKSP_t + 19{,}143 + \varepsilon_t \quad (16)$$

With determination ratio of $R^2 = 0.55$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 10.

Table 10

Valuations of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	19.14303	3.129571	0.000483	11.74278	26.54328
β_1	0.005556	0.001905	0.022456	0.001051	0.010062

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the regression model, one can conclude that the influence of building loam bricks export on the volume of building loam bricks production is essential with 55% probability (p-value = 0,022456) (see Table 10). The obtained model is of high credibility and it can be applied to detect 55% of the increment in the volume of building loam bricks production. Thus, increasing the volume of building loam bricks export by 1 mln lats, the building loam bricks production is increased by 0,006 thsd m^3.

Provided the *volume of building loam bricks realization* in thsd m^3 as a resultative element of the model and *non-financial investments in construction* - as factorial element of the model are taken, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot INV.B\bar{U}VN_t + \varepsilon_t \qquad (17)$$

Where Y_t- volume of realized building loam bricks over the time period *t;*
β_i - regression model parameters;
$INV.BUVN_t$ - non-financial investment in construction (comparative prices of 2001 in mln lats) across 1995-2003;
ε_t - a stochastic error.

The valuation of the regression model has been done, where y represents a theoretical volume of building loam bricks realization over the period of time *t*

$$Y_t = 0{,}663 \cdot INV.B\bar{U}VN_t + 26{,}85 + \varepsilon_t \qquad (18)$$

With determination ratio of $R^2 = 0.66$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 11.

Table 11

Valuation of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	26.84652	11.61364	0.054056	-0.61534	54.30839
β_1	0.662993	0.181276	0.008099	0.234343	1.091643

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the regression model, one can conclude that the influence of non-financial investments in construction on the volume of building loam bricks realization is essential with 66% probability (p-value = 0.008099) (see Table 11). The model can be applied to determine 66% of the increment in the volume of building loam bricks realization. Thus, increasing the amount of non-financial investment in construction by 1 mln lats, the realization of building loam bricks is increased by 0.663 thsd m^3, on average.

Provided the *volume of building loam bricks realization* in thsd m^3 as a resultative element of the model and *non-financial investments in processing industry* - as factorial element of the model are taken, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot INV.NOZ_t + \varepsilon_t \quad (19)$$

Where Y_t - volume of realized building loam bricks over the time period *t*;
β_i- regression model parameters
$INV.NOZ_t$ - non-financial investment in processing industry (comparative prices of 2001 in mln lats) across 1995-2003
ε_t - a stochastic error.

The valuation of the regression model has been done, where *y* represents a theoretical volume of building loam bricks realization over the period of time *t*

$$Y_t = 0{,}127 \cdot INV.NOZ_t + 49{,}98 + \varepsilon_t \quad (20)$$

With determination ratio of $R^2 = 0.53$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 12.

Table 12

Valuation of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	49.9811	7.069769	0.000199	33.26376	66.69843
β_1	0.126529	0.045084	0.026276	0.019924	0.233135

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the regression model, one can conclude that the influence of non-financial investments in processing industry on the volume of building loam bricks realization is essential with 53% probability (p-value = 0.041713) (see Table 12). The model can be applied to determine 53% of the increment in the volume of building loam bricks realization. Thus, increasing the amount of non-financial investment in construction by 1 mln lats, the realization of building loam bricks is increased by 0.127 thsd m^3, on average. The decoration tiles import study results have been obtained in a similar manner. Provided the *volume of decoration tiles import* in thsd m^3 as a resultative element of the model and *non-financial investments in processing industry* - as factorial element of the model are taken, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot INV.NOZ_t + \varepsilon_t \quad (21)$$

Where Y_t - the volume of import of decoration tiles over the time period *t;*
β_i - regression model parameters;
$INV.NOZ_t$ - non-financial investment in processing industry (comparative prices of 2001 in mln lats) across 1995-2003;
ε_t - a stochastic error.

The valuation of the regression model has been done, where y represents a theoretical volume of decoration tile import over the period of time *t.*

$$Y_t = 10{,}11 \cdot INV.\ NOZ_t - 302{,}6 + \varepsilon_t \quad (22)$$

With determination ratio of $R^2 = 0.79$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 13.

Table 13

Valuations of Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	-302.601	390.2355	0.494599	-1544.51	939.3031
β_1	10.1116	3.007413	0.043661	0.540659	19.68254

Source: The Author's calculations as based on the LR CSB data

Observing the valuation of the regression model, one can conclude that the influence of non-financial investments in processing industry on the volume of decoration tiles import is essential with 79% probability (p-value = 0.043661) (see Table 13). The credibility of the obtained model is high and it can be applied to determine 79% of the increment in the volume of import of decoration tiles.
Provided the *volume of decoration tiles import* in thsd m^3 as a resultative element of the model and the *average salaries of those employed in the national economy* - as factorial element of the model are taken, the following model is obtained:

$$Y_t = \beta_0 + \beta_1 \cdot VDA_t + \varepsilon_t \quad (23)$$

Where Y_t - the volume of import of decoration tiles over the time period *t;*
β_i - regression model parameters;
VDA_t - average salaries of those employed in the national economy sector (average monthly net in lats);
ε_t - a stochastic error.

The valuation of the regression model has been done, where y_t represents a theoretical volume of import of decoration tiles over the period of time *t*

$$Y_t = 26{,}17 \cdot VDA_t - 1508{,}19 + \varepsilon_t \quad (24)$$

With determination ratio of $R^2 = 0.91$. Standard errors, p-values and a 95% integrity interval of the model ratios are presented in Table 14.

Table 14

Valuations OF Regression Model Parameters

	Ratios	Standard Error	p-value	95% integrity interval	
β_0	-1508.19	436.9069	0.040878	-2898.62	-117.753
β_1	26.17417	4.560823	0.010506	11.65958	40.68875

Source: The Author's calculations as based on the LR CSO data

Observing the valuation of the regression model, one can conclude that the influence of the average salaries of those employed in the national economy sector on the volume of decoration tiles import is essential with 91% probability (p-value = 0.010506) (see Table 14). The credibility of the obtained model is high and it can be applied to determine 91% of the increment in the volume of decoration tiles import.
All of obtained models can be applied for the purpose of making forecasts, defining the forecast results influencing factors for future predictions. Making out a forecast, it is important to show the full range of errors and intervals, within which the forecast results can vary.
The models obtained by the Author by mathematically statistical calculation prove the economic inferences that:

1. When volumes of building loam bricks production, amount of non-financial investments in construction and volume of building loam bricks export increase, the volume of realized building loam bricks is increased as well, but it is negatively influenced by insufficient investments in construction and low average salaries of those employed in the national economy sector;

2. When volume of building loam bricks production increases, the volume of building loam bricks realization increases as well, while it is negatively influenced by insufficient investment in processing industry;
3. The volume of building loam bricks production is positively influenced by realization of building loam bricks and non-financial investments in processing industry, while it is negatively influenced by the import of building loam bricks and insufficient investments in processing industry;
4. The volume of building loam bricks production is positively influenced by the volume of building loam bricks realization and non-financial investments in processing industry;
5. When non-financial investments in construction and import of decoration tiles increase, the realization of decoration tiles increases as well, which is negatively influenced by low average salaries of those employed in the national economy sector;
6. When non-financial investments in construction and processing industry increase, the realization of decoration tiles increases as well, which is negatively influenced by low average salaries of those employed in the national economy sector;
7. The volume of imported decoration tiles is influenced by such factors as: average salaries of those employed in the national economy sector (in lats), non-financial investments in processing industry (comparative prices of the year 2000 in mln lats), non-financial investments in construction (comparative prices of the year 2000 in mln lats), number of constructed apartments, as well as economically active residents.

13. The Author has produce a matrix for defining the current condition of building ceramics production as based on the results of the accomplished studies. The Definition Matrix is presented in Table 15:

Table 15

The Definition Matrix: Building Ceramics Production

Strong Aspects Of the Building Ceramics Production	**Weak Aspects Of the Building Ceramics Production**
▪ Rich traditions in production of building ceramics and building and construction; ▪ Rich tradition in training specialists in the field since the end of 19th century; ▪ Sufficient resource potential, a prove of which is the production volume reached in 80s; ▪ Developed infrastructure that encourages the further development; ▪ Still less expensive labour as	▪ Insufficient financing and high loan interests; ▪ Low paying capacities of the majority of population that hamper the development of the dwelling sector and, consequent-ly, that of building materials, building ceramics including, production; ▪ High energy costs as compared to other Baltic countries; ▪ Poor professional and educational

compared to Western Europe countries; ▪ The privatisation of enterprises of the industry; ▪ A National system of norms and standards has been established, developed and harmonized with EU Directives. The production of building materials in Latvia has been harmonized with the EU requirements. A remarkable share of locally manufactured building ceramics products complies to the requirements of EU Directives and become more competitive on the EU market; ▪ The demand for construction and building materials production still increases, including the demand for building ceramics products; ▪ There the highest development rates of building and construction in Latvia as compared to other Baltic countries and EU Member States on the whole; ▪ This country has natural resources of quality minerals (limestone, dolomite, gyprock, as well as various clays) that are usable in manufacturing of valuable building materials; ▪ As the volume of building and construction increases, development tendencies in operation of enterprises, producing building materials, building ceramics including, are observed.	basis and unasserted range of programmes due to insufficient financing of the educational sphere; insufficient qualifications of newly graduated professionals; ▪ Low salaries in education that results in the deficit of professionals; ▪ Many frozen building and construction projects, as well as lack of levelling and layout planning of land plots that hampers the implementation of many projects; ▪ Insufficient legal provisions in support of the industry and shortage of the uniform information system in the building materials industry; ▪ Outdated equipment that consumes too much energy; ▪ Insufficient cooperation between the educational institutions and employers, as well as poor cooperation with foreign professional organizations; ▪ Insufficient unified national policy, shadow economy and corruption; ▪ Insufficient capacities of the State Inspection in Building and Construction in supervising the market.
Potentials	**Risks**
▪ On joining the EU, business activities and labour markets have expanded; ▪ New perspectives in establishing joint ventures to enter Western markets; ▪ Increase in production of building materials as the volume of building and construction works increases; ▪ Larger investments as less ministerial barriers arise; ▪ Better mortgage loan development perspectives as the paying capacity of the population increases; ▪ Involvement of State and municipal authorities in development of the dwelling stock; ▪ Possibilities to improve institutional structures;	Internal risks: ▪ Unaccomplished territory planning and shortage of regulations on construction in localities that can lead to the degradation of the balanced urban environment, loss of the historical and cultural heritage and defective developments in building and construction; External risks: ▪ A flow of illegal labour force from Eastern-European countries and its employment in building ceramics production; ▪ Western companies and entrepreneurs manipulating large

▪ Tendencies of small businesses development; ▪ Better accessibility of information; ▪ Development of professional organizations.	financial resources; ▪ Different tax policy of the neighbouring states that influence business activities in Latvia; ▪ Outflow of young and promising employees to the open EU market; ▪ Shadow economy and unfair competition supported by corrupted officers.

CONCLUSION: STATEMENTS AND PROPOSALS

1. The following important *conclusions* have been drawn in the course of development of the Dissertation by competing studies and summarizing the historical data in regard to the *development of the building ceramics production over various periods of time:*

1.1. Bricks are the most ancient building materials created by men. The beginnings of manufacturing of bricks can be found already in the 13th century, when these have been used for construction of churches as a finishing material, while the brick masonry buildings appeared only in the 15th century: the prove of the fact is found in the form of data on estate brickyards. In the 18th century they were using bricks vastly for construction of estate houses and palaces, while the manufacturing of bricks is defined as one of the basic industries. The preconditions for the manufacturing of bricks at that time were: the geography of shale beds, sufficient resources of fuel in the closest neighbourhood, available water routes, as well as the increased demand for building bricks, which to a great extent determined the location of brickyards in Zemgale un Vidzeme;

1.2. The manufacturing of bricks and roofing tiles was the main branch of building materials production in Latvia in 1913, when the annual volume of bricks production was 230 mln items. Also in the 20s-30s of the 20th century the manufacturing of bricks retained its leading positions together with the production of cement and lime. 274 brickyards were operating in Latvia in 1935;

1.3. In the times of Soviet Latvia, the silicate industry, manufacturing of building ceramics products including, has been developed and improved remarkably; it has been supplied with modern equipment - in 1980s there were 40 enterprises manufacturing ceramics and refractory products that produced 28 mln items annually over the period of 1976-1980. The largest amounts of bricks were produced in the end of 1960s, 1970s and in 1990;

1.4. During 1990 - 1995 a quick reduction of building materials, building ceramics including, production has started. In 1996, for example, only 25-30 mln bricks have been produced. Many enterprises have been shut down, ransacked and demolished, while those still operating has gone bankrupt and restructured. There was no demand for locally produced building materials neither on the Latvian market, nor on the market of the

neighbouring countries, what has lead to a situation, when only a few enterprises survived and JSC "Lode" was among those, having developed now into the leading building ceramics enterprise in the Baltic.

2. Having analysed the results of the study on *availability and utilization of operating supplies* in regard to Latvian enterprises, the Author has come to the following conclusions:

2.1. The operating supplies for the manufacturing of building ceramics, clays including, are well ensured by local natural resources for a long period of time;

2.2. The total volume of shale deposits in Latvia has been slashed as compared to the 80s of the 20th century. Currently Latvia is utilizing only a small share of its subsoil assets (25.2% of shales, 11.4% of sands, 26.6% of limestone etc.);

2.3. The amount of raw materials available for the utilization in building materials industry exceeds the current demand for, which means that vast business possibilities are not used, including those of export;

2.4. There is no developed national strategy of perspective utilization of subsoil resources that would envisage long-range investments for the future to develop the production of building ceramics and the regions of Latvia related to the utilization of shale deposits (for example, Apriki of Liepaja and Kuprava of Balvi); this would create new workplaces and improve the social and economic situation in those regions.

3. Having analysed the results obtained during the research on the *building ceramics market demand and its growth perspectives,* the Author has concluded that:

3.1. As long as the building and construction is the industry closely connected to the manufacturing of building ceramics and the one that determines the demand for it in Latvia greatly, it is essential to analyse the development trends of the building and construction industry to be able to predict tendencies in building ceramics demand in future. Due to the economic crisis the specific weight of building and construction works in the 1995 GDP was only 12.8% as compared to the level of 1990. No other branch of the Latvian economy experienced such remarkable reduction in volumes of production. In 2005 the development of building and construction industry in Latvia is forecasted as 2-4 times bigger that the total GDP increment;

3.2. Over the recent years the development of building and construction in Latvian is the most dynamic amongst the other branches of the national economy. Starting with 1995, the building and construction industry commenced a new stage in its development, which features growth of building and construction works, restructuring of the industry, usage of new materials and technologies, as well as expanded geography of operation and entering hew markets. The increment in the volume of building and construction in Latvia is the most vigorous among other European countries and has reached annual 13-14%, approximately;

3.3. The highest volume growth in building and construction is revealed in construction of residential buildings. In the end of 2003 the dwelling stock total area in Latvia reached only a few per cents increment as compared to dwelling stock total area in 1990, while in 2005 5785 new apartments, private and semi-detached houses have been commissioned that by 4,2% exceeds the amount of new dwelling projects over the last five years;

3.4. Up to 2003, the production volumes in all building materials production branches and in all operating enterprises decreased by 5-10 times as compared to 1990 due to the reduction in volume of building and construction and export of building ceramics products;

3.5. The results of the study prove that there is still an unpleasant balance in export/import of building and other types of ceramics products. A larger quantities are still to be imported to the country, that those that are exported. Thus, say, in 1995 the amount of the imported product exceeded the exported product by 2.54 mln. LVL or by 2.2 times. In 2003, respectively, the excess was 13.62 mln lats or 7.4 times, while in 2004 it was already 24.77 mln lats or 10.7 times. An exception here is the JSC "Lode" that export about 50% of its building ceramics product;

3.6. There is still the invasion of foreign building ceramics products, - and in many times their quality is low - to the local market that is hardly controlled;

3.7. Since Latvia has regained its independence, the Eastern markets have reduced immensely. But the entering external market is a long time process connected to a whole range of economic and political problems waiting for their solutions. Entering Western markets is burdened by high competition and quality requirements, while entering Russian markets is hampered by Russian customs policy and problems in the system of payments;

3.8. The situation developed, as to Author's opinion, due to low competitiveness of products, insufficient involvement of the state in promoting production and export of building and other types of ceramics, shortage in all-around data about export opportunities, as well as the situation, when foreign trading organizations are hardly informed on building and other types of ceramics produced by Latvian enterprises;

3.9. Main factors that hamper the increase in volume of production are: insufficient demand for building and construction works as compared to the nineties of the previous century, which roots in a low consumer paying capacity that, in its turn, is related to the existing crediting policy and high mortgage rates; growing amount of building and construction works performed by foreign companies in Latvia and outflow of labour;

3.10. When considering how the state trading policy influences the building materials market in Latvia, I come to a conclusion that there is no legislation on market protection in Latvia to defend local producers of building materials from the import of analogous products. This is defined by the fact that Latvia has joined the WTO. The only regulation that currently protects the interests of Latvian producers is the Law "On Valuation Of Compliance":

- A system of evaluation of building materials compliance that has been harmonized with that of European Union has been successfully implemented in Latvia;
- The System of Valuation of Compliance of building materials is an instrument that encourages production of quality, user friendly materials and regulates the market and competition;
- The harmonization of requirements by Latvian National Standards and Latvian Building Code is of utmost importance for the development of building materials industry and successful operation of Compliance Valuation System, which means that the European harmonized standards should be adopted and Latvian National Standards developed in spheres, where there are no CEN standards worked out;
- A Certificate of Compliance is not the only document that proves the compliance of a product. If a building material is not of a high risk category or is used in structures with no special challenges, its compliance can be confirmed by a Producer's Declaration, in some cases, even not applying to a declared Institution of Certification.

4. Having analysed the *quality, assortment and costs of the building ceramics products manufactured by Latvian producers,* the author comes to the following conclusions:

4.1. The Product Quality Management in Latvia is a relatively new development and is accepted mostly by big and successful enterprises;

4.2. The international Quality Certificate, proving the compliance to the ISO 9001 Standards requirements is held only be quite a few enterprises busy in manufacturing of building materials;

4.3. Market outlets for the majority of enterprises busy with manufacturing of building materials are limited, as long as their product does not comply to the international standards;

4.4. The range of products is insufficient due to the shortage in modern industrial technologies and extra financing to improve the existing facilities;

4.5. The Latvian enterprises of building ceramics should enrich the range of their offered products both on the local and external markets;

4.6. The expansion of building ceramics products range along with the enlargement of its market offer suits the most small businesses that are more flexible in their operations;

4.7. Large-scale enterprises of building ceramics products drat tend to less expensive and larger volume concept, should be able to produce smaller quantities of side products similar to their basic type;

4.8. The production of building ceramics is seasonal that is related to the formation of deposits, thus, the real offer of the building ceramics products range will be determined by available stocks of operational supplies;

4.9. In creating types of building ceramics products range, a mechanism of their integration in the common structure of building ceramics offer should be envisaged to allow the most possible income and avoid losses.

The results obtained in the course of preparation of present Dissertation and conclusion drawn by the Author enabled her to develop the following important *proposals* fur further enhancement of the building ceramics industry:

1. Making use of accomplished scientific studies on the building ceramics product demand and market trends in Latvia and having in mind the current demand, technologies available in the industry and possibilities of extra financing, it should be arranged for a more extensive utilization of natural resources, thus, promoting businesses and giving better possibilities of export of products. For this particular purpose it is necessary to establish a concept and a scientifically and economically substantiated well-balanced programme of utilization of Latvian mineral resources for the period of 2015-2025; and I further suggest that investments should be attracted for advancing awareness, exploration and utilization of mineral raw materials;
2. Tax allowances should be granted to newly established, middle and small businesses in building materials industry, building ceramics including, involved in processing of valuable deposits;
3. Extra investments are to be envisaged as a share of the budget to encourage further exploration of Latvia subsoil assets and technologies for the needs of production;
4. I suggest that producers of building ceramics plan possible demand on the market and search for new possibilities within the common European market and outside it by using the results of the study on building and construction and building ceramics industries development trends, as well as product import/export tendencies;
5. Trade Representative Offices in the neighbouring countries could serve as a source of necessary information on demand for various goods, local trade persons' preferences and assist in establishing good contacts with local businessmen, thus, providing essential support of medium and small businesses.
6. Producers of building ceramics should be given an opportunity to use EU Structural Funds and options provided by other funds for development and expansion of their enterprises and let them be more actively involved in working out of projects regarding the attraction of EU Structural Funds;
7. International cooperation in the fields of building ceramics production, processing and trade should be encouraged;
8. I suggest that public authorities should undertake larger responsibility for the realization of various development programmes;
9. In order to ensure an increment in the demand for building ceramics products, it should be arranged for their broader use in renewing, restructuring and refurbishing of buildings and structures, belonging to the cultural and historical heritage. For this purpose, the following requirement should be included in regulations related to building and construction

activities in historical and cultural centres of Latvia, - such as, Sabile, Kandava, Kuldīga, Cēsis, - specifically: project of buildings and structures to be erected within the historical landscape of these towns should be executed, using respective building ceramics products manufactured in Latvia (bricks, roofing tiles, clinker paving-stones, etc);

10. Using the results obtained by the scientific study, the Latvian producers of building ceramics should gradually change their trading policy and market strategy, which will result in acquisition of such benefits as increased production volumes, larger market shares, decrease in import of similar products, higher quality and competitive abilities of their products, lesser product costs. Lower financial risks, better opportunities of attracting extra financing, more rational utilization of labour - this all contributing to the improvement of the entire production cycle;
11. I suggest that the production of expanded clay should be resumed in Latvia on the basis of existing mineral resources of shales, as well as the production of technological plants for the building materials industry;
12. The Author suggests that the following should be taken into account to diminish the real costs of products:
    - Attraction of extra financing is possible on the basis of improved quality of work in the production and an implemented new trading policy;
    - Real product costs are high due to irrational utilization of existing resources by operating businesses;
    - Real product costs can be diminished by restructuring of production related services, namely: departments of realization and production.