

**RIGA TECHNICAL UNIVERSITY**

**Rita GREITĀNE**

**ECONOMICAL ASSESSMENT OF SERVICE QUALITY IN SMALL  
AND MEDIUM-SIZED ENTERPRISES**

**Summary of the Doctoral Dissertation**

**Branch: Management Science**

**Sub-branch: Management of Entrepreneurship**

**Riga 2011**

**RIGA TECHNICAL UNIVERSITY**

Faculty of Engineering Economics and Management

Department of Economics of Productions and Entrepreneurship

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## DOCTORAL DISSERTATION

### PROPOSED TO THE RIGA TECHNICAL UNIVERSITY FOR THE PROMOTION TO THE SCIENTIFIC DEGREE OF DOCTOR OF ECONOMICS (Dr. oec.)

The doctoral dissertation has been developed at the Department of Economics of Production and Entrepreneurship of Faculty of Engineering Economics and Management of Riga Technical University (RTU). The defending of the Doctoral dissertation will take place during an open meeting of the Promotion Council "P-09", Faculty of Engineering Economics and Management of RTU on May 9, 2011, Riga, 1/7 Meza Street at 01 p.m. in the room 209.

#### REVIEWERS

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Kaunas University of Technology (Lithuania)

#### CONFIRMATION

I hereby confirm that I have worked out this Dissertation that has been submitted for review to Riga Technical University for the promotion to the degree of Doctor of Economics (Dr.oec.). This dissertation has not been submitted to any other university in order to receive any scientific degree.

Rita Greitāne.....

April 7, 2011

The Doctoral dissertation is written in Latvian, and consists of introduction, 3 parts, conclusions and proposals, 17 tables, 56 figures, 6 annexes, 18 equations, and total page count is 143. The Bibliography contains 133 sources and references.

The Doctoral dissertation and Summary are available at Scientific Library of Riga Technical University, Kipsalas street 10.

To submit reviews please contact Secretary of the RTU Promotion Council "P-09", professor, Dr.habil.oec. Anatolijs Magidenko; 1/7 Meza Street, Riga, LV-1007, Latvia

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## GENERAL DESCRIPTION OF THE RESEARCH PAPER

### Urgency of the research

Over the last twenty years the Latvian national economy has developed in such a way that it lead to the situation when the biggest share in the overall industry structure belongs to services. At the beginning of the 90s the share of the services sector in Latvian gross domestic product (GDP) was just 10-12% while the size of manufacturing industry sector was considerably larger. In 2009, a diametrically opposite trend could have been observed when the share of the services sector reached 74% while production sector shrunk to a mere 10%. Growth of the production sector is conditioned mainly upon increase in food production and wood processing industries where the added value basis is also relatively small. Changes in the structure of national economy in favour of the services were caused by the fast growth of trade and banking sectors.

After Latvia's becoming member of the European Union (EU) great significance within the context of the overall development of the national economy and increase of the population welfare has been given to the ability of Latvian SME to compete in the common European market; competitive advantage in the home and foreign markets, in its turn, depends on the quality of the goods and services. At the World Economic Forum in 2010 according to the Global Competitiveness Rating Latvia ranked 25<sup>th</sup> among the EU member states, the worst result being demonstrated only by Bulgaria and Greece. At the same time, according to the Global Competitiveness Rating Latvia ranked only the 70<sup>th</sup> most competitive economy in the world, that is, compared to the 2009 data the result was even worse (in 2009 Latvia occupied the 68<sup>th</sup> place). It should be noted that among the Baltic States Latvia also showed the worst results: Lithuania was ranked the 47<sup>th</sup> most competitive economy whereas Estonia took the 33<sup>rd</sup> place. In the research conducted by "The Economist" in 2005 and dedicated to the study of the quality of life the countries of the world offer their citizens, Latvia came 66<sup>th</sup> as to the quality-of-life index out of 111 countries. Taking stock of the positions occupied by Latvia as for the competitiveness and the quality-of-life index, it should be noted that a significant role in the growth of these indicators can also belong to the small and medium-sized service companies.

The ratio between supply and demand has also undergone noticeable changes. Demand for services has increased considerably, which indicates that the role played by SME in the services sector is becoming increasingly more significant on the national macroeconomic level. The majority of the service companies are micro-enterprises – 89 % of the total number of the companies - service suppliers. SME share in the services area is relatively smaller, at the same time, the share of the big companies in the services sector is small too – 0.2% of the total amount. In the years of economic downslide (2008-2009) the size of the services sector continued to grow, for example, in such industries as transport and communications, as well as operations with real estate. Moreover, the services industry drawdown rate was lower compared to the national economy average slowdown rate.

In the conditions of market economy, demand for higher quality services continues to grow. Services perform an important social function: they determine the quality of life and the extent of how much Latvia could be attractive for the development of tourism business. Life

quality is characterised by the level of consumption available for an individual, the spectre and quality of social services, which can be expressed by such indices as life expectancy, GDP per capita, salary levels, etc.

Welfare is the topical issue for Latvian inhabitants, which is connected to the overall development of national economy. Therefore demand for the services is determined by the price and quality ratio, its lower value providing at the same time the required level of quality. Proceeding from theory and practice, price for the services depends on various factors, three of these being the major ones: costs, demand and competition.

Normally demand and competition as factors are not stable being themselves influenced by marketing campaigns, whereas costs is a relatively stable factor and requires management for the purpose of minimisation. Service quality costs management requires a specific approach and methodology. It should be noted that the quality costs theory that was developed in the previous century fails to comply with the modern requirements. Quality as a set of properties capable to satisfy consumer needs is one of the most important factors contributing to the competitive edge of any service. Compared to the goods quality, which became the topic of growing attention and the object for control and monitoring already back in the 1950s, the services quality issues became urgent at a comparatively later time, *circa* 1980s and 90s. Nowadays the service quality issues become increasingly urgent as well. One such indicator is the growing statistics of quality-related complaints received by the Centre for Protection of Consumers' Rights. Thus, for example, in 2008 compared to 2007, the overall number of filed complaints grew by 24%, which is almost 3 times as many compared to the 2005 data. If in previous years complaints about the quality of goods prevailed, in recent years the largest share of complaints referred specifically to the quality of service. EU consumer market monitoring survey (2010 autumn scoreboard results) indicates that the most frequent service types where consumers felt misled were "investments, pensions and securities", "real estate related services" and "Internet service provision". At the same time, EU consumers are especially satisfied with culture products and services. Thus, the amount of loss sustained by European consumers due to the problems, in relation to which they filed complaints, has been estimated at 0.3 % of the EU gross domestic product. At present, consumers pay increasingly higher attention to the relationship between the quality of services and their price. This determines the market demand for the services with the highest quality/price ratio. Provision of the proper quality level is related to specific costs, including quality costs and the relevant service price.

Problems in the development of the services provided by Latvian small and medium-sized enterprises should be assessed within the global and regional contexts. For the range of services to get the competitive edge, it is important to apprehend and overcome the barriers impeding development and implementation of the innovative services with the high added value. Therefore it is important to analyse the quality costs and price of SME-provided services, which has a most direct influence on company competitive abilities as well as on export opportunities.

The urgency of this doctoral research is determined by the role played by the service companies in the process of formation of GDP by creating the product with a high added value thus promoting development of the national economy and raising the competitive

capacity of the companies. Quality assurance is a continuous management of the service process by keeping record of the quality costs, performing their assessment and analysis, by introducing innovative solutions for improvement of the company operations to satisfy the changing consumer demands.

**The goal of the research** is to analyse the quality costs and quality costs theory development in the world as well as define the economic opportunities for assuring increase in quality of services in Latvian small and medium-sized enterprises.

Goal achievement **tasks**:

- Conduct research of theoretic aspects of services, define potential problems and special characteristics of services;
- Analyse theoretic aspects of the quality costs;
- Study the quality costs classification issues by making use of the experience of the most developed countries in the world;
- Organise polling among Latvian enterprises and analyse the poll results to get understanding about quality costs accounting;
- Develop methodology for assessment of the service quality and service quality costs;
- Develop the method for evaluating the innovation quality costs;
- Develop economic assurance of service quality costs in a Latvian enterprise;
- Develop proposals for economic assurance of increase in service quality in small and medium-sized enterprises.

### **The object and subject of research**

The **object** of the research is the services industry, its small and medium enterprises. The **subject** of the research is service quality costs and the factors influencing their economic assurance, problems and models.

### **Limitations of the research**

Issues related to improvement of the quality of services are numerous and the scope of the problems is wide therefore the research is focused on quality increase opportunities mainly from the costs perspective. Greatest attention is paid to quality costs since quality costs to a great extent determine service pricing. The methodology of improving the service quality and costs estimation that has been developed in this research paper was approbated in an information logistics company as well as the innovative service – the electronic signature was reviewed only from the economic perspective. Calculations were not made for the services industry at large since information required for such calculations is confidential.

### **Theoretic and methodological basis of the research**

Theoretic and methodological basis of the research is formed by economic and quality theories, works by foreign and Latvian scientists and researchers addressing quality costs issues, their classification, related problems and the role played in quality assurance. Quality costs, their significance for various service processes in different times have been studied by such American scientists as Armand V. Feigenbaum and Joseph M. Juran in the 1950s, development of quality management was promoted by W. Edwards Deming (1900-1993), who played a revolutionary role in the rise of Japanese economy and increase of the product quality. The principles of quality costs management were defined by the world famous

scientists Philip B. Crosby, Kaoru Ishikawa, G. Taguchi and others. Quality cost issues are being analysed by Jack Campanella, whose book “Principles of Quality Costs: Principles, Implementation and Use” was dedicated exactly to quality costs. Such authors as John S. Oakland and Joel E. Ross also made their contribution in the development of the quality management theory. The scientist Johannes Freisleben also speaks about the quality costs and the large proportion of hidden costs in the total costs of quality. The research paper also drew on the theory of operating costs developed in the writings of the author Ronald H. Coase. A significant role in quality management as well as quality costs research belongs also to the scientists M. Kruglov, G. Shishkov, I. Mazur, V. Shapiro, M. Kane, V. Shvandar, E. Minko, M. Krichevky, V. Okrepilov, E. Gorbashko and others.

Latvian scientists A. Magidenko, D. Solovjovs, I. Forands, as well as other authors made their input in the research of the quality related topics.

For development of the research paper the generally accepted methods of theoretical research were applied, such as analysis and synthesis method as well as expert evaluations, qualimetry method, analysis and summarisation of information, grouping, relative value calculations, reference methods, graphic mapping and other methods.

The **informative basis** of the paper is represented by the scientific literature, international and local publications, methodical literature, information published by Latvian Republic Institute for Standardisation and Certification, Association for Quality and Latvian National Society for Quality, research and reports by other state institutions on the subject of Latvian national economy, dynamics of small and medium-sized service companies, current situation and future development trends, as well as other documents relevant for the subject of the research. The research work also made use of the JSC “Itella Information” statistic data developed for approbation of the presented methodology.

### **Theses put forward for defence**

- Service quality and price are the basis for ensuring development and competitiveness of Latvian national economy in the global market. Service quality costs represent a significant quality category. Determination of quality costs creates an opportunity to link together strategic goals of a company and the opportunities of quality improvement.
- Methods of classification of the service quality costs, their comparison and improvement are important for ensuring the optimal quality level. Determination of hidden service quality costs and introduction of measures for keeping record of these in the company accounting system can provide for decrease in total quality costs and create opportunities for quality improvement.
- Maintenance of the proper quality level is related to certain costs and respective price of the service, therefore it is important to set the right price for the definite service level.
- Innovation is the process based on scientific, research, technological, financial, social and business activities, as a result of which the owner of innovation gets a tangible competitive advantage over competitors, since it brings to the market new or substantially improved services capable of satisfying consumer demands.

Development of innovative services is always linked to intensive investment including investments in quality, yet with a better use for intellectual capital, therefore increase in the innovative service quality costs is less than quality level increase.

### **Scientific novelty**

1. For the first time in Latvia the quality costs analysis has been performed and service quality and quality costs estimation methodology has been developed, which includes the method emphasizing the importance of creation of the new service traits.
2. More accurate classification of services was developed taking into account the quality costs and noting the service result.
3. The service “quality loop” was developed, which shows the key factors influencing the service, which determine both the customer expectations and the evaluation of the quality of received service.
4. Competitive ability criteria for small and medium-sized enterprises have been developed for successful operation in the market.
5. The impact of perceived risk on the quality of services was determined.
6. The quality costs “iceberg model” was suggested, which identifies hidden quality costs with the purpose to diminish the total costs of quality.
7. A new method of managerial decision making was developed – the quality-unit method. With the help of this method a new service price can be quickly estimated by taking into account the service quality, given limited access to information.
8. An innovative service quality costs information model has been developed.
9. Model for evaluating the economic benefit of quality costs has been developed.
10. Method for evaluating the economic benefit of quality improvement has been developed.
11. The economic benefit of the innovative service – mass signing of electronic invoices with the help of new higher-quality electronic signature was evaluated.

### **Approbation of the research results and their application in practice**

The results of the research paper have been presented at scientific conferences and seminars. The author took part in six scientific grants as a responsible party:

- Latvian Council of Science project No. 09.1607 “Development of Latvian national economy and forecasting its competitive advantage with the help of forecasting and modelling tools and economic aspects of innovative activities”, 2010;
- Latvian Council of Science project No. 09-1144 „Economic aspects of the development of innovative activities in Latvia”, 2009;
- RTU project for Latvian Council of Science – 2008/13 „Economic aspects of hazardous waste management in Latvia”, 2008-2009;
- Latvian Council of Science and RTU project No. R7076 “Development of innovative activities in Latvia based on knowledge management”, 2006;
- Latvian Council of Science and RTU project No. F6967 “Economic evaluation of innovative activities in Latvia”, 2005;
- Latvian Council of Science project No. 98.0897 “Innovation economic feasibility methodology during period of transition”, 2000.

Theoretical and practical results of the research paper are also applied in the **study process** being included in the professional Bachelor's programme courses "Product quality economics" and "Project management", professional Master's programme course "Quality economics" and academic Bachelor's programme course "Project management". The author participated in the development of the study programme for Business College during ES PHARE Business education reform in Latvia from 1996 till 1998 and obtained a Certificate in Project Management within the framework of ES PHARE State administration reform in Latvia in 1999 and in the development of study course and methodical materials for application in electronic environment within the framework of the European Social Fund project "Improvement of the forms for acquisition of professional education by disabled persons with the help of modern information and communication technologies in the first level higher professional education under business study programmes" during the period from 2006 till 2008. The author is member of Latvian Association for Quality.

## **Publications**

**Contribution** to generally recognised reviewed scientific editions:

1. Magidenko, A. Greitane, R. Modelling of information for evaluating innovation quality cost // Scientific Proceedings of Riga Technical University, Series: Economics and Business. Business and Management.- Volume 10. –Riga: RTU, 2005.-p. 58-63.
2. Voronova I., Greitane R. Assessment of stability of marketing activity of an enterprise // Proceeding of the International Scientific Conference "Problems of Development of National Economy and Entrepreneurship", Latvia, Riga, October 13-15, 2005.- Riga: RTU, 2006.- p. 225-233.
3. Magidenko A., Greitane R. Quality costs and role of feedback in production quality management // 6<sup>th</sup> International Scientific Conference „Management and Engineering 08”, Scientific Proceedings, June 19-21, 2008, Bulgaria, Sofia.- Sofia: Technical University, 2008.- p. 75- 77.
4. Greitane, R. Magidenko A. Influence of innovative services on their competitiveness // Scientific Proceedings of Riga Technical University, Series: Economics and Business. Business and Management.- Volume 19. –Riga: RTU, 2009.-p. 47-52.
5. Greitane, R., Magidenko A. Classification of innovative services and competitiveness from quality costs point // 50<sup>th</sup> International Scientific Conference of Riga Technical University, RTU FEEM Scientific Conference on Economics and Entrepreneurship (SCEE'2009), Latvia, Riga, October 15 . – 2010.-CD.-p. 82-85.
6. Greitane, R., Magidenko, A. Economical assessment of quality of innovative services // Scientific Journal of Riga Technical University, Series: Economics and Business. Economy: Theory and Practice. - Volume 20. –Riga: RTU, 2010.-p. 47-50.

## **Other publications:**

7. Greitāne, R., Magidenko, A. ISO 9000 kvalitātes sistēmas ieviešanas izdevumu un rezultātu novērtēšana uzņēmumā // Ekonomiskās problēmas uzņēmējdarbībā. Starptautisks augstskolu zinātnisko rakstu krājums.- Rīga: RTU, 1998, 33.-36. lpp.

8. Greitāne, R., Gertners, G. Izmaksu optimizēšana ražošanas uzņēmumos // Ekonomiskie pētījumi uzņēmējdarbībā. Starpaugstskolu maģistru zinātnisko rakstu krājums.- Rīga: RTU, 1999.-10.-15.lpp.
9. Greitāne, R., Magidenko, A. Produkcijas kvalitātes ietekme uz darba ražīgumu uzņēmumā // Ekonomiskās problēmas uzņēmējdarbībā. Starptautisks augstskolu zinātnisko rakstu krājums.- Rīga: RTU, 2000, 30.-31.lpp.
10. Magidenko, A., Greitāne, R. Inovāciju produkta kvalitātes inženierekonomiskā veidošana un nodrošināšana // Inženierekonomikas nozīme uzņēmējdarbības attīstībā. Starptautiskās zinātniski praktiskās konferences materiāli.- Rīga: RTU, 2000, 15.lpp.
11. Magidenko, A. Greitane, R. Role of Feedback in Production Quality Management Systems // Towards Knowledge- based Economy & Enterprise Management: Diagnostics, Strategy, Effectiveness. Conference proceedings- Riga: RTU, 2007, pages 135.- 136.
12. Greitāne, R. Magidenko, A. ISO 9000 standartu izmantošana kā uzņēmumu attīstības priekšnoteikums // Rūpniecības attīstība pārejas periodā. Starptautiskās zinātniskās konferences referātu tēzes, 1999. gada 10. decembris, Latvija, Rīga.- Rīga: RTU, 1999.- 19.lpp.
13. Greitāne, R., Magidenko, A. Inovāciju produkta kvalitātes inženierekonomiskā veidošana un nodrošināšana // Inženierekonomikas nozīme uzņēmējdarbības attīstībā. Starptautiskās zinātniski praktiskās konferences materiāli, referātu tēzes.- Rīga: RTU, 2004.- 15.lpp.
14. Magidenko, A., Greitane, R. Modeling of quality cost information // 45<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship”, Latvia, Riga, October 14-17, 2004. Abstracts of presentation. - Riga: RTU, 2004.- p. 49.
15. Magidenko, A., Greitane, R. A Method for evaluating the economic effectiveness of upgrading the quality level of innovations // 46<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship, Latvia, Riga, October 13-15, 2005. Abstracts of presentations - Riga: RTU, 2005.- p. 65.
16. Voronova, I., Greitane, R. Assessment of marketing stability of enterprise // 46<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship, Latvia, Riga, October 13-15, 2005. Abstracts of presentations - Riga: RTU, 2005. - p. 93.
17. Voronova, I., Greitane, R. Influence of marketing risk on safety of business // 47<sup>th</sup> International Scientific Conference of Riga Technical University Devoted to the 40<sup>th</sup> Anniversary of Faculty of Engineering Economics “The Problems of Development of National Economy and Entrepreneurship”, Latvia, Riga, September 21.-23., 2006. Abstracts of presentations.- Riga: RTU, 2006.-p.88.
18. Magidenko, A., Greitane, R. Formation and usage of know how resources in production quality improvement // International Scientific Seminar “Development of Innovative Entrepreneurship Based on Knowledge Management”, Latvia, Riga,

- December 8, 2006. Abstracts of presentations. - Riga: RTU Publishing House, 2006.- p. 28.
19. Greitane, R., Magidenko, A. Service quality effect on competitiveness of Latvian enterprises // 49<sup>th</sup> International Scientific Conference of RTU “The Problems of Development of National Economy and Entrepreneurship” (SCEE’2008). Conference Proceedings.- Riga: RTU Publishing House, 2008, p. 55.-56.
  20. Greitāne, R, Magidenko, A. Qualiunit Method, its Nature and use in the Economic Assessment of Service Quality // Programme and Collected Abstracts of International Scientific Conference „Economics and Management ICEM 2010”. Conference Proceedings.- Riga: RTU Publishing House, 2010. –p. 114.-115.
  21. Greitāne, R. Magidenko, A. Economical evaluation of innovative services quality // 51<sup>th</sup> International Scientific Conference of Riga Technical University, RTU FEEM Scientific Conference on Economics and Entrepreneurship (SCEE’2010), Latvia, Riga, October15. Conference Abstracts Proceedings.-Riga: RTU Publishing House, 2010. – p. 30.-31.
  22. Magidenko, A. Inovāciju ekonomiskā pamatojuma metodoloģija pārejas periodā / A. Magidenko, L. Ribickis, K. Didenko, G. Gertners, V. Kozlovs, K. Ketners, R. Greitāne u.c. // The Main Directions of Research in Economics and Law Sciences by the Latvian Council of Science in 2000. – Riga: LCS, 2001. - Nr. 6.- p.81.-88.
  23. Magidenko, A. Inovatīvas darbības attīstības ekonomiskie aspekti Latvijā / A. Magidenko, E. Gaile- Sarkane, K. Didenko, N. Lace, K. Ketners, N. Dubro, R. Greitane // The Main Directions of Research in Economics, Law and Historical Sciences by the Latvian Council of Science in 2009. – Riga: LCS, 2010. - Nr. 15.- p.70.-75.

**Reports on the research paper were presented at the scientific conferences and seminars:**

1. Zinātniskajā seminārā „Ekonomiskās problēmas uzņēmējdarbībā“, referāta nosaukums- ISO 9000 kvalitātes sistēmas ieviešanas izdevumu un rezultātu novērtēšana uzņēmumā, 1997. gada 25. novembris, Latvija, Rīga.
2. Starptautiskajā zinātniskajā konferencē „Rūpniecības attīstība pārejas periodā“, referāta nosaukums- ISO 9000 standartu izmantošana kā uzņēmumu attīstības priekšnoteikums, 1999. gada 10. decembris, Latvija, Rīga.
3. Starptautiskajā zinātniski praktiskajā konferencē „Inženierekonomikas nozīme uzņēmējdarbības attīstībā“, referāta nosaukums- Inovāciju produkta kvalitātes inženierekonomiskā veidošana un nodrošināšana, 2000. gada 24. novembris, Latvija, Rīga
4. 45<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship”, Latvia, Riga, October 14., 2004. Title of report: “Modeling of quality cost information”.
5. Starptautiskajā zinātniski praktiskajā konferencē „Inženierekonomikas nozīme uzņēmējdarbības attīstībā“, referāta nosaukums- Inovāciju produkta kvalitātes inženierekonomiskā veidošana un nodrošināšana, 2000. gada 24. novembris, Latvija, Rīga.

6. 46<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship, Latvia, Riga, October 13, 2005. Title of report: “Assessment of marketing stability of enterprise”.
7. 46<sup>th</sup> International Scientific Conference of Riga Technical University “The Problems of Development of National Economy and Entrepreneurship, Latvia, Riga, October 13, 2005. Title of report: “Method for evaluating the economic effectiveness of upgrading the quality level of innovations”.
8. 47<sup>th</sup> International Scientific Conference of Riga Technical University Devoted to the 40<sup>th</sup> Anniversary of Faculty of Engineering Economics “The Problems of Development of National Economy and Entrepreneurship”, Latvia, Riga, September 21, 2006. Title of report: “Influence of marketing risk on safety of business”.
9. International Scientific Seminar “Development of Innovative Entrepreneurship Based on Knowledge Management”, Latvia, Riga, December 8, 2006. Title of report: “Formation and usage of know how resources in production quality improvement”.
10. International Scientific Dual-Conference „Towards Knowledge- Based Economy” & „Enterprise Management: Diagnostics, Strategy, Effectiveness”, April 12, 2007. Title of report: ”Role of feedback in production quality management systems”.
11. Praktiskajā konferencē „Biznesa attīstība: kā to darīt mūsdienas Latvijas situācijā”, referāta nosaukums- Mārketing: iespējas un riski, 2007. gada 20. novembris, Latvija, Rīga.
12. 6<sup>th</sup> International Scientific Conference „Management and engineering’ 08”, June 19, 2008, Bulgaria, Sofia. Title of report: “Quality costs and role of feedback in production quality management”.
13. International Scientific Conference „Economics and Management ICEM 2010”, April 22, 2010, Latvia, Riga. Title of report: “Qualiunit method, its nature and use in the economic assessment of service quality”.
14. 51<sup>th</sup> International Scientific Conference of Riga Technical University, RTU FEEM Scientific Conference on Economics and Entrepreneurship (SCEE’2010), Latvia, Riga, October 15, 2010. Title of report: “Economical evaluation of innovative services quality”.

### **Composition and volume of the research paper**

The research paper consists of introduction, summary of the content in three main sections, conclusions and proposals, bibliography and appendixes.

**The first section** “Analysis of the concepts of service, quality and quality costs” reviews theoretical aspects of service including existing classifications of services. The author also analyses the service “quality loop” and the service quality model. Quality costs classifications, setting the service costs, their accounting, analysis and estimation are also reviewed within the services context.

**The second section** “Services in Latvian national economy” provides analysis of the dynamics of most characteristic indicators of the service company activities with the focus on small and medium-sized service companies. The author has defined the growth dynamics of the number of certified service enterprises, its effect on the quality of services.

**The third section** “Service quality and evaluation of economic efficiency” describes the developed methodology for evaluating the quality of service and quality costs including methods for diminishing the hidden quality costs, quick service quality assessment and price setting for the purpose of efficient managerial decision making. Method approbation is done by evaluating the quality of the services provided by an information logistics company, related quality costs and economic benefit gained from improvement of the service quality, including assessment of the economic benefit brought by an innovative service.

The content of the paper is covered on 143 pages with appendixes on 14 pages. The paper includes 56 pictures, 17 tables and 6 Appendixes that illustrate and explain the paper content. For development of the research paper 133 information sources in Latvian, Russian and English languages were used.

## **MAIN RESULTS OF THE SCIENTIFIC RESEARCH**

### **1. ANALYSIS OF THE CONCEPTS OF SERVICE, QUALITY AND QUALITY COSTS**

#### **1.1. The concept and classifications of services**

Since the share of services in the GDP both of Latvia as well as of other countries is constantly increasing it becomes vitally important to establish what service is, what types of service exist and what are its characteristic traits. Scientific literature and the quality system standards speak of the product, by which both goods and services are understood, however such approach ignores the differences in the nature of goods and services. There exist numerous explanations of the concept of service:

- service – interaction between the supplier and the consumer as well as internal activities of the supplier to ensure satisfaction of consumer needs (ISO 8432);
- service – any benefit or activity that one party may offer the other party and which is not tangible or obtainable into ownership;
- service – a customer order fulfilled within the framework of a person's business or professional activities for fee or free of charge or any such fulfilment of the agreement concluded with the consumer, according to which some thing is rented, a new thing is produced, an existing thing or its features are improved or refurbished or some work is done, or an intangible work result is achieved;

Services may be classified on the basis of various traits: by the form of property; by the type of market where such service is offered; by the degree of contact with the consumer; by service supplier.

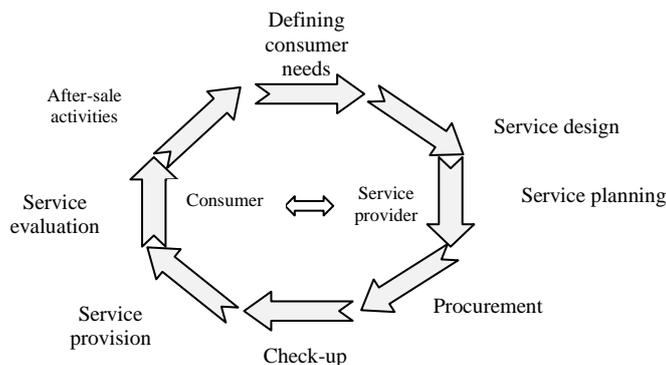
According to the 2<sup>nd</sup> revision of international NACE Classification of Economic Activities in the European Community that is applicable since 1 January 2008 and has replaced the revision 1.1 of NACE classification, services are distributed among various sectors. According to NACE Rev.1.1 classification, services include such economic activity sectors as hotels and restaurants (H), transport, storage and communication (I), operations with real estate, rent, computer services, science and other commercial services (K). It is pretty difficult to apply such classification for the purpose of service accounting and quality costs assessment since a certain number of services within various classes are left without any kind of clearly defined traits.

A great majority of marketing experts single out similar traits characteristic of services:

- service intangibility – service cannot be seen, tasted, heard or smelt until the moment of delivery;
- service inseparability – it is inseparable from its provider/supplier, source, service is provided and consumed at the same moment of time. It cannot be separated from the provider irrespective whether it is supplied by a human or machine;
- service variability – service quality may vary depending on who, when, where and how provides it, therefore it is more difficult to control the quality of service;
- it is not subject to storage – service cannot be stored for further resale;
- there is no property title to service – in contrast to tangible goods service cannot be anyone's property.

Thus, it is difficult to evaluate services due their specific traits. For determining the service quality costs the above five described service traits should be taken into account. For the purpose of introduction of a most appropriate services classification that takes account of the service specific traits the author of the research paper recommends dividing services into 2 groups based of the service result (deliverable): services, which result is tangible and material; services, which result is intangible.

For determining the service quality costs the service “quality loop” should be taken into consideration, which is different from the goods quality loop. In case of services close interaction between the service supplier and consumer should be kept in mind. The more direct and prompt is the feedback, the higher is the probability of achieving lower quality costs. It should be noted that in literature such service quality loops fail to demonstrate the whole process of service origination and provision, during which the service quality is created. The author considers that the service quality loop in its nature is similar to the manufacturing quality loop. For the service quality loop the author distinguishes eight major stages shown in Picture 1.1. It should be noted that the mentioned eight stages of service provision may be inherent both in tangible and intangible services since all the services require development of service specification (design) and planning irrespective of tangibility of the result, moreover, the material and technical base (procurement, supply) for service provision is required as well; all services are subject to check-up (control) stage both in respect of the service safety as well as in other parameters. It should be mentioned that the service provision and evaluation stages are most directly affected by interaction between the service supplier and consumer, which also determines the ultimate service result . Interaction between the service provider and consumer can be seen in the service quality model developed by the scientists V. Zeithaml, A. Parasuraman and L. Berry and published in 1985. Depending on the service “quality loop” the quality model shows consumer expectations in respect of the quality of the service to be provided, expected service and consumer’s perception of the service quality (received service). The model shows the key factors influencing the service, which determine both the customer expectations and evaluation of the received service. According to the scientists’ idea, the process of measuring and improving the quality of service begins with the gap diagnosed between consumer expectations and perception. Communication is the main factor influencing expectations. The new service quality loop takes into account such characteristic traits of the service as intangibility, inseparability from the supply source and impossibility of storage.

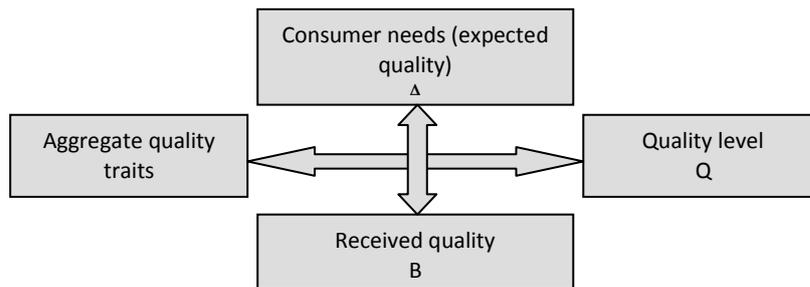


Picture 1.1. Service “Quality Loop” [image created by the author]

With the help of the earlier performed analysis of the service concept, service classification, service quality loop and quality model, analysis of quality, quality costs and theoretic aspects of the existing quality costs is done with the purpose to find out their suitability and applicability in modern economic environment.

### 1.2. The concept of quality and quality costs

The quality costs concept comes inseparable from the quality concept and perception; therefore for the start the quality concept and its development are being reviewed. There is no unequivocal interpretation of the word “quality”; the word is derived from the Latin “qualitas” and the philosophic meaning of the word is a distinctive trait or property of a thing, phenomenon, etc., which distinguishes this one from any other objects. In interpreting the quality concept one should also keep in mind the definition and application of this term in colloquial speech and its definition and application among quality experts and in scientific environment as well as in special literature. From marketing perspective, product quality is the ability to fulfil its consumer functions, therefore a real quality assessment can be made solely by the product consumer. Edwards Deming, the founder of the quality theory, stressed that quality should address not only the current but also future needs of a consumer. Having reviewed quality definitions, we may graphically present quality as shown in Picture 1.2.



Picture 1.2. Graphical presentation of quality definition

The quality definition as shown in Picture 1.2 implies that:

$$Q = \text{optim}, \text{ if } A - B = 0 \quad (1.1)$$

Thus, the optimal quality level is achieved if the quality received by consumer corresponds to consumer needs (see equation 1.1).

$$Q = \text{min or } Q = 0, \text{ if } A - B = \text{max} \quad (1.2)$$

Equation (1.2), in its turn, shows the situation when there is the greatest gap between the quality expected by consumer and the quality he/she has received.

$$Q = \text{max}, \text{ if } B > A \quad (1.3)$$

If the quality received by the consumer exceeds the expected quality the consumer feels satisfied, yet this may create extra costs for the company. In this research paper quality is mainly examined from the positions of economics. Moreover, in the course of analysis of the quality concept one should not forget about such two quality evaluation aspects as *design (projections) quality* and *quality standard compliance*: design (projections) quality is assessed depending on what extent design or plan correspond to specific need. Since there is the possibility to design the service that will fully correspond to specific need yet would appear to be hardly implementable, the second quality aspect is singled out for that purpose – quality

standard compliance, which is assessed by the extent to which the product corresponds to design or plan. It should be noted though that, as a result, consumer needs are quite frequently forgotten.

Consumers have become much more educated in quality issues and therefore more demanding and fastidious. Under modern conditions of globalised economy, quality perception and implementation become increasingly important as quality is one of the most significant elements of competitive advantage. As management experts note, competitive advantage of the products is 70-80% dependent upon quality. The most important component of the quality system is the quality of goods and services. On international level quality requirements are set by ISO quality standards – they regulate the relations between the suppliers of goods/services and product consumers. In order to ensure quality the company is supposed to sustain certain costs, which, similar to other business costs, should be planned, analysed and estimated.

It is worth mentioning that, during analysis of publications in Latvian dedicated to quality issues over the period from 1998 to 2008 the author managed to find just two articles that were discussing quality costs (out of nearly 720 writings dedicated to the subject of quality) in the “Quality” magazine being issued by Latvian Association for Quality already for 10 years.

Definition of the **quality costs** concept is not clear-cut; special literature contains a variety of definitions and explanations. Having summarised various quality costs definitions, the author suggests a comprehensive definition: quality costs are the costs created as a result of the activities aimed at elimination of potential or already existing failures, planned quality checks and preventive measures to avoid internal and external failures. Goods and service quality costs belong to the important cost category, which is also demonstrated by the aforementioned quality costs definitions. It should be induced, however, that in contrast to quality concept evolution over the recent 60 years thanks to growing competition in the goods and services markets, quality costs received relatively little attention both in theory and in practice. It is generally known that product competitive advantage depends not only on the quality level but on the price as well, whereas costs are the core element of pricing. Such secondary attention to quality costs can be explained by the 14 points introduced by E. Deming, promoter of quality management that played a revolutionary role in Japanese economy growth and product quality improvement, yet he put forward the idea to give up assessment of employee performance results. That makes assessment of costs, time and other resources more complicated.

J. Juran and A. Feigenbaum in their principles of quality improvement do not speak about quality costs. Only Ph. Crosby in his quality management principles speaks about determination and analysis of quality costs. K. Ishikawa and G. Taguchi, in their turn, speak about costs reduction without specifying what costs exactly should be diminished. J. Juran was the first to formulate the quality costs classification, furthermore, he paid attention to the costs required to ensure the set (standard) quality level, yet left out the costs required for creation of the new quality traits. Methods for quality costs classification are reviewed in detail in Section 1.3 of the research paper.

In order to clarify the attitude of employees of various companies to quality related activities the author conducted opinion poll among 53 employees at various levels and

interviewed 11 top managers in an international group of companies employing 2500 people and came to the conclusion that the majority of enterprises are engaged in activities aimed at quality improvement. Summarised poll results demonstrated that quality cost issues are important for Latvian enterprises, and according to employees' opinion quality costs accounting is necessary and would have a positive effect on the goods/services quality. Interviews with top-level employees show divergence of opinion on certain points. Survey of the top managers shows that 36% of the companies maintain quality cost accounting, 55% are doing it from time to time and 9% of the companies do not maintain quality costs accounting, whereas Latvian poll results demonstrate that 51% of the companies maintain quality costs accounting and 49% of the companies do not do such thing. Both in the former and in the latter case the poll results are not inspiring because if almost half of the companies fail to monitor their quality costs then there is no use talking about economically justified decision making in the area of quality. The poll also shows certain disagreement on the matter of compliance of the existing quality costs classification to modern business specifics. The majority of top-level managers consider that the classification complies with the present-day situation in business (55% versus 45%), whereas 49% of Latvian company employees hold the view that it does not comply, while 51% think that it does comply with the present-day situation in business. The majority of employees in Latvian companies consider that quality costs should be referred to administrative costs, at the same time 82% of interviewed top managers think that quality costs should be referred to manufacturing costs. Poll results clearly define the trend in the quality costs sphere: in one case it is considered that quality should be mainly put under the economic jurisdiction of management, while in the other case the opinion dominates that quality is being created mainly during production process. Analysis of the poll results, regrettably, leads to the conclusion that the majority of respondents marked that the yield from quality improvement activities is not accounted for (41% in Latvia and 55% of the top managers in an international company) although the company employs a person responsible for quality matters (in 44% of Latvian companies and in 100% the international enterprise). Both the one and the other group of respondents noted that companies do evaluate the product quality level and that quality cost accounting in a company is a necessary thing because it would have a positive effect on the quality of goods and services. Respondents consider that employees rather than equipment and technologies are the main factor influencing the quality of goods/services. The poll showed that quality costs are viewed as an important issue deserving greater attention on behalf of Latvian companies. In Latvia little is done in the sphere of analysis and evaluation of quality costs classification, quality costs determination and accounting. Partial attention to these issues is paid in the doctoral theses of D. Solovjovs and E. Staveckis as well as in the doctoral thesis of J. Priede, however it should be noted that in his paper D. Solovjovs speaks of the quality costs only in connection with the quality management system implementation in a company, whereas E. Staveckis' paper analyses the quality costs of a food production enterprise by using earlier quality costs classification based on the principles developed by A. Feigenbaum whereas others are not reviewed. In J. Priede's doctoral thesis main attention is paid to competitive advantage of Latvian export quality and its evaluation rather than the costs related to ensuring quality to gain competitive advantage. Greater attention to quality costs is paid in

the publications of other countries, for example in publications by the American Society for Quality. It should be noted though that the latest book dedicated to quality costs is Jack Campanella's supplemented work "Principles of Quality Costs: Principles, Implementation and Use", released in 1999.

### **1.3. Analysis of quality costs classification**

American scientists A. Feigenbaum and J. Juran of the 1950s were among the first to study the quality cost issues and to develop the quality costs classification. It is quality costs classification that is significant for determination of the quality costs, that is, determination of the structure and composition of quality costs by grouping them according to specific traits. Definition of costs composition, accounting, analysis and estimation of costs very much depend on correct classification of the quality costs. It should be marked that one common generally accepted classification of quality costs does not exist. Classification introduced by A. Feigenbaum and that is based on the quality costs concept first presented in 1956 in Harvard Business Magazine is still most popular and used by numerous companies in many countries. According to classification developed by A. Feigenbaum, quality costs are divided into three categories:

1. Prevention costs or costs of preventing potential defects, that is costs connected to any activity diminishing or fully eliminating potential defects or probability of losses (costs of preventive measures);
2. Appraisal costs, that is costs of technical control and checkups at all stages of product manufacturing or service provision with the purpose to ensure goods/service quality compliance with the established requirements;
3. Failure (defect, incompliance) costs that are subdivided into two groups:
  - internal failure costs, that is, costs present inside the organisation when the planned quality level is not achieved (until goods/service are sold);
  - external failure costs, that is, costs created during use of goods or after provision of a service when the quality indicators fail to comply with the set requirements.

Quality costs classification developed by A. Feigenbaum is used in international standards, for example in ISO 9000:2000 and is also widely applied today in various spheres, both in manufacturing and service companies and in other areas. This classification is also called a PAF model which is an abbreviation for each of the quality cost categories: P- *prevention* (prevention costs); A- *appraisal* (appraisal costs); F- *failure* (defect/ failure costs).

A. Feigenbaum's classification has also been criticised by its opponents stressing that it comes into contradiction with TQM principles that provide for constant perfection and process improvement, whereas existing classification looks up for the current condition, that is, to ensuring the optimal level of quality while quite a lot of the quality costs are not easily referable to any particular cost category because quality is created and integrated at various stages of the production or service provision process.

In the course of analysis of enumeration of the quality cost elements given by A. Feigenbaum and Ph. Crosby it becomes obvious that it is applicable mainly to goods and does not show the quality elements inherent in services. Various versions of the quality costs

concept include low quality costs and classification based on cost items, which was described by J. Juran:

- 1) material costs that include costs of production: utilisation of materials; costs of labour spent on utilisation; costs of labour spend on corrections; failure costs; excessive control costs; costs associated with investigation of reasons of failure;
- 2) material costs that include costs of sale: discounts on second-rate quality goods; customer complaints; warranty costs;
- 3) intangible costs: delay due to failure; customer good will; moral damage resulting from lack of coordination among departments.

E. Deming – one of the contemporary quality management authorities, in his turn, suggests not placing separate emphasis on quality costs, because this proves very difficult, but rather stay focused on the overall improvement of the company operation and diminishing of all kinds of inefficient expenditures. Determining the quality costs proves difficult because a great share of them is of hidden nature and multi-functional application focused not only on quality but on other spheres of company activity. One cannot fully agree with E. Deming because if quality costs are not earmarked from the total costs it becomes impossible to determine the influence of this cost group on the product price and turnover.

According to estimates made by various authors the ratio of visible and hidden costs may reach 10/90. Therefore the opportunity to diminish quality costs is to make hidden costs “visible” to the greatest possible extent so that it would be possible to determine and account for these costs, analyse and assess them, since the costs that are not visible are hardly manageable. The existing enumeration of visible and hidden quality costs is suitable for goods production process. The service quality costs iceberg is of a different nature because of the difference between the production and service provision process.

Costs classification that has been described by the only Latvian magazine dedicated to quality matters – “Kvalitāte” (Quality) is similar to that of A. Feigenbaum’s classification. None of these costs classifications can be directly referred to services and service costs classification in small and medium-sized enterprises for the following reasons:

- 1) preventive costs are mainly associated with quality management that is a responsibility of a separate person or a structural unit within a company, while the majority of small and medium-sized companies do not have employees with such functions;
- 2) appraisal costs are for the most part comprised of the wages of personnel engaged in material checkups and testing and costs of materials, while in case of many services such costs do not exist at all or their structure is different;
- 3) failure costs are mainly associated with correction of defective goods and performance of warranty obligations, whereas in case of many kinds of services defects cannot be repaired at all but rather compensated with extra benefits to customer.

#### **1.4. Quality costs determination and accounting**

In order to perform quality costs analysis and determine the optimal costs amount in a service company it is necessary to earmark the quality costs associated with the company activities and ensure these are properly grouped. The main reason for collecting information about quality costs is to ensure the company employees with the management tool.

The requirements the company sets in this respect are for internal use. After the quality costs qualification system is set the quality costs information source should be selected. Some information may be easily available, some can be determined without any particular difficulty yet some information may be not as easily determined or prove indeterminable.

Based on A. Feigenbaum's classification, costs may be determined in the following way:

- control costs – the major part of control costs are represented by wages of inspectors that may constitute up to 90% of the total control costs; besides, the amount of these costs can be determined with a sufficiently high accuracy. The rest of control costs are the costs of utilised materials and technical maintenance. These costs can be determined directly. Therefore control costs are pretty easily determinable. It should be noted that in case of services the situation may be different since different is the nature of service itself, which is mentioned in section 1.1 of the paper. Only for certain kinds of service it becomes possible to use such inspectors (for example, in case of material services); in the majority of cases though the service provider itself controls the quality of provided service.
- internal costs of faults elimination – this cost group can be determined with a certain difficulty, however, despite the above said the following costs prove determinable:
  - a) costs associated with return of products (useless work) – wages; costs of materials; overheads;
  - b) costs associated with fault repair (work errors) – wages; costs of materials; overheads;
  - c) costs associated with repeated checkups and control – wages; costs of materials; overheads;
  - d) costs of overtime hours to compensate for the loss of time;
  - e) lost profit resulting from decrease in the product grade (class).

It proves more difficult to determine the costs associated with the analysis of the origin of faults; work with the returned products and preparation of production line for defect repair. Since each employee involved in this process is unlikely to solve these problems during the whole of the working day, only the time actually spent on this task and the achieved results should be taken into account:

- external costs of faults elimination – some part of external costs is related to product returns either immediate or during the warranty period. Costs associated with after-sale product returns can be determined in the same manner as in case of internal faults elimination. Other external costs are not so easily determined, these may be as follows:
  - a) wages, overheads and other costs associated with investigation of consumer dissatisfaction and complaints;
  - b) wages, overheads and other costs associated with servicing dissatisfied consumers;
  - c) extra transportation costs;
  - d) costs associated with case investigation, including litigation and payment of indemnity.

The mentioned costs may be connected to operation of various units/departments of a company, for example design & development, technology, procurement, legal, quality management. Costs can be determined by taking account of the actual time spent by employees on solving the problems. At the same time, costs associated with external faults are not so easily determined – spoiled company image, decreased customer loyalty and change of attitude. Certain enterprises set these costs at 2.5% of the total quality costs whereas many companies ignore such costs since they can be only approximately determined. It is the author's opinion that such costs in case of a service company are very essential because customer loyalty is one of the main criteria in selecting a service company and in case of loss of consumer loyalty the outcome for a small service company can be pretty serious and lead to the situation when the company will be forced to withdraw from the market.

- Preventive costs – are only relatively determinable because employees of many units within a company may be involved in preventive activities devoting to such activities only a share of their working time. Preventive costs are created: in production; sales and marketing; design and development; process planning; research; laboratory tests; data processing; training and in other spheres. Preventive costs are mainly associated with the work of the company quality assurance unit employees. The largest share of preventive costs is represented by wages and overheads and the accuracy of determining these costs depends on how precisely the time amount consumed by fulfilment of these tasks is accounted for. Preventive costs associated with outsourced services: maintenance of equipment, calibration and checkups of measuring devices, consultations, administration of training courses – are directly determinable costs.

To the author's opinion, in case of a service company preventive costs and their determination are one of the most significant elements in quality costs structure, which ensure that provided services correspond to consumer needs.

Quality costs may be also determined with the help of ABC method. This costing model is used for calculation of total quality costs first by assigning the cost accounting object. Under this system the costs are subdivided into homogeneous groups and classified by levels:

- product unit costs;
- batch costs;
- costs of administration;
- costs associated with organisation maintenance;
- costs of various service processes.

Such subdivision into groups may become problematic for smaller companies. In the course of research conducted in Canada two major problems in connection with ABC use were discovered:

- difficulty with determining process operations;
- difficulty with selecting the distribution basis for assigning indirect costs.

In choosing the basis for assigning indirect quality costs one should keep in mind that it should be directly related to the cost groups. By evaluating comparisons of the quality costs criteria and taking into account experience of other countries it could be concluded that it is not feasible to use ABC accounting system for estimation of costs in small companies because it is labour-consuming, besides the processes in the services sphere are constantly changing

and improving. Therefore it can be stated that in small enterprises operating in the services sphere it would be more efficient to use the added value criterion as the cost assignment basis for determining and analysing quality costs.

To ensure that quality costs accounting is maintained in small and medium-sized companies the company management should demonstrate personal interest in costs determination and be capable of substantiating the necessity to implement quality costs accounting to the company CFO and head of accounts. This task is quite frequently becomes more complicated when the accountant is not the company employee and accounting services are being outsourced.

### **1.5. Quality costs analysis**

Quality costs analysis is essential for managerial decision making in order to evaluate the achieved quality and detect the problems interfering with achievement of quality goals. Justification for quality costs accounting can be found by analysing quality costs for a certain period (for example, for the previous year). Results of such analysis normally can persuade the company management to perform quality costs summarisation and assessment on a regular basis thus creating the opportunity to manage the quality improvement activities by making them more efficient and effective. The company management has access to all data related to costs, investments and losses associated with quality improvement and sustenance. For this reason, it proves easier to find the weak spots in quality sustenance and assurance. Research proves that those managers who have access to quality costs data make different decisions compared to those who lack such access. If quality costs are not visible the company management cannot use such quality information in the decision making process. Moreover, information on quality costs makes it possible to find out the effect of the quality system on the company indicators, for example, return on investment and some other.

Quality costs analysis helps to solve the following tasks:

- evaluate quality problems from the financial perspective thus facilitating managerial decision making;
- rank quality problems and their elimination projects by their economic efficiency;
- evaluate efficiency of the company quality management system;
- select the quality improvement course that would contribute to achievement of company strategic goals;
- enable to detect hidden reasons of low quality of the goods/services.

Depending on the goal of quality costs analysis various cost analysis methods can be used:

- 1) functional value analysis – this method is normally used at the stage of design, technological planning and preparation for production.
- 2) technical rationing – this method is used to determine the cost both of the new and improved products as well as to determine the costs of warranty service and maintenance;
- 3) index method – is also used to determine the effect on the costs produced by changes in quality. For application of this method quality indicators should have numerical expression however not all quality indicators can be presented in quantitative form;

- 4) scorecard – product quality indicators are expressed by scores taking into account the significance of each indicator in the overall evaluation system.

For costs determination and analysis any of the seven “quality tools” (statistical methods) can be used as well: control sheet, cause and effect diagram; Pareto analysis; control cards; histograms; dispersion diagram; process flow chart. Pareto diagram and cause and effect diagram are suitable methods for determination and analysis of quality costs.

Considering the fact that quality management systems were introduced in Latvia not so long ago and that initially ISO quality standard 1994 version did not provide for quality cost accounting (quality cost accounting requirement was included in the later version – ISO 9000:2000), quality costs analysis may be too complicated and labour-intensive at the beginning, which under the given economic situation does not contribute to the development of quality costs accounting and analysis in Latvian enterprises. As J. Juran stated, the quality costs are “the gold in the mine” and the author fully agrees with this statement. For the quality costs to become the real gold in the mine a company should introduce the system for accounting, analysis and assessment of these costs.

### **1.6. Quality costs assessment**

Assessment of quality costs is the next logical step following costs analysis. If a company is determining costs for the first time they generally make up 20-30% of the turnover. The book “Total Quality Management” by J. Ross describes the research during which managers of 94 enterprises were interviewed and it was discovered that only 31% of the companies conducted regular measurement of quality costs and even in that case productivity was regarded as a more important profit driver compared to quality. The research also demonstrated that the main reason for non-assessment of costs is lack of determination on behalf of the company management. If a company is engaged in continuous improvement of quality then costs may be reduced by a couple per cent within a very short period of time since largest and sometimes most expensive faults get easily detected and eliminated.

While making costs assessment some part of the quality experts note that reduction of quality costs leads to increase in company profit. The author of the research paper considers that in case of a service company ill-considered approach to reduction of quality costs may cause reduction of profits. In case of quality costs increase of one quality costs group causes decrease of another quality costs group. Increase of preventive costs is one of the effective ways how to decrease total quality costs, which leads to decrease in quality control costs and the costs associated with product defects. Total Quality Management (TQM) speaks about the “tenfold cost law” that reflects the relationship among preventive, appraisal and fault costs. Thus, one monetary unit allocated for preventive costs decreases appraisal costs by ten monetary units and by 100 monetary units decreases the fault costs. The author considers that this law should be taken for an axiom because diminishment of costs may be influenced by time and other variable factors. Experience of foreign enterprises shows that if \$1 is invested in preventive activities this decreases the fault costs by \$15. Two quality costs strategies are used in theory and practice:

- **traditional strategy** that suggests determination of economically justified (optimal) deviations based on the assumption that too large or too small defect level leads to increase in company costs.
- **“zero defect strategy”**, which author Ph. Crosby considers that quality costs are the price paid for incompliance with “zero defects” level. This strategy is popular in many Japanese companies. One thing should be kept in mind though: it is not always possible to ensure “zero defects” level or else maintaining the “zero defects” level is associated with large investment in production or service provision thus making the product price uncompetitive.

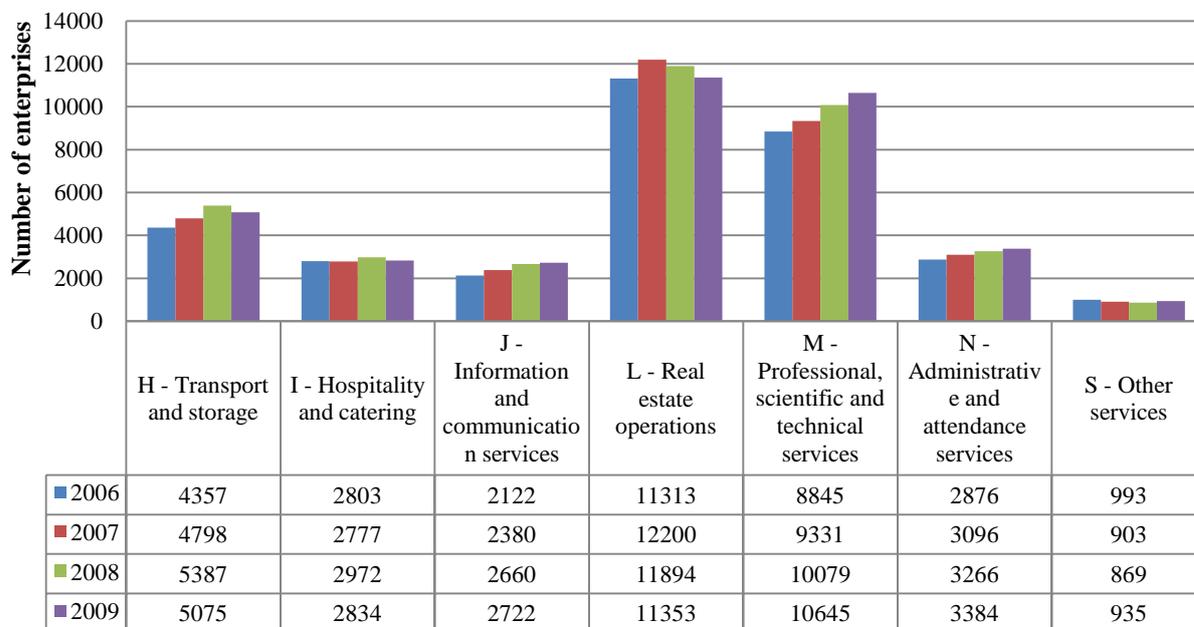
In case of many services Ph. Crosby’s “zero defects” strategy is more applicable because already for the first time the service should be provided without any faults since there is no opportunity for redeeming errors or the consequences are too serious, for example, errors in passenger air travel, medicine or other similar spheres. To summarise what has been earlier said about the quality costs, the author concludes that quality costs cannot be viewed in isolation from the quality level because of the correlation existing between these two values.

## **2. SERVICES IN LATVIAN NATIONAL ECONOMY**

### **2.1. Dynamics of the service companies and their most characteristic indicators**

Services play a significant role in Latvian national economy: their share in the country gross domestic product (GDP) reaches approximately 74%. Besides, if we compare the number of innovative companies operating in various sectors, the proportion of innovative service companies among these is pretty high and constitutes 17.8 % of the total number, whereas the proportion of innovative manufacturing companies reaches 14.7% of the total number. The number of people employed by the companies active in innovation sphere is also larger in service companies, accordingly – 45% and 31.6% in manufacturing. The above mentioned indicators only justify the urgency of competitive advantage of the services not only in Latvian market but also in the global market because in other countries (USA, Germany, Finland, etc.) the share of services in GDP is also markedly high. It wasn’t for no reason that the world famous economist Theodor Levitt, Professor of Harvard Business School said: “There are no such things as service industries. There are only those industries whose service components are greater or less than those of other industries. Everybody is in service”. Regretfully, it should be noted that official statistics based on NACE classification refers to services quite a limited number of activities (see section 1.1); therefore it becomes difficult to get a complete idea about this sphere of activities. If we compare the number of service companies over the period from 2006 till 2009 the figures show a slight growth trend. The highest growth rate in the number of companies is seen in section S – other services and section M – professional, scientific and technical services, accordingly by 7.6 and 5.6% compared to 2008 figures. A 3.6% increase is noted in administrative and maintenance services as well as information and communication services – by 2.3% , general services sector demonstrated a downward trend – the number of companies there decreased within the 4.5- 6% range, see Picture 2.1. Changes in the number of companies and the volume of turnover are connected to the number of people employed in

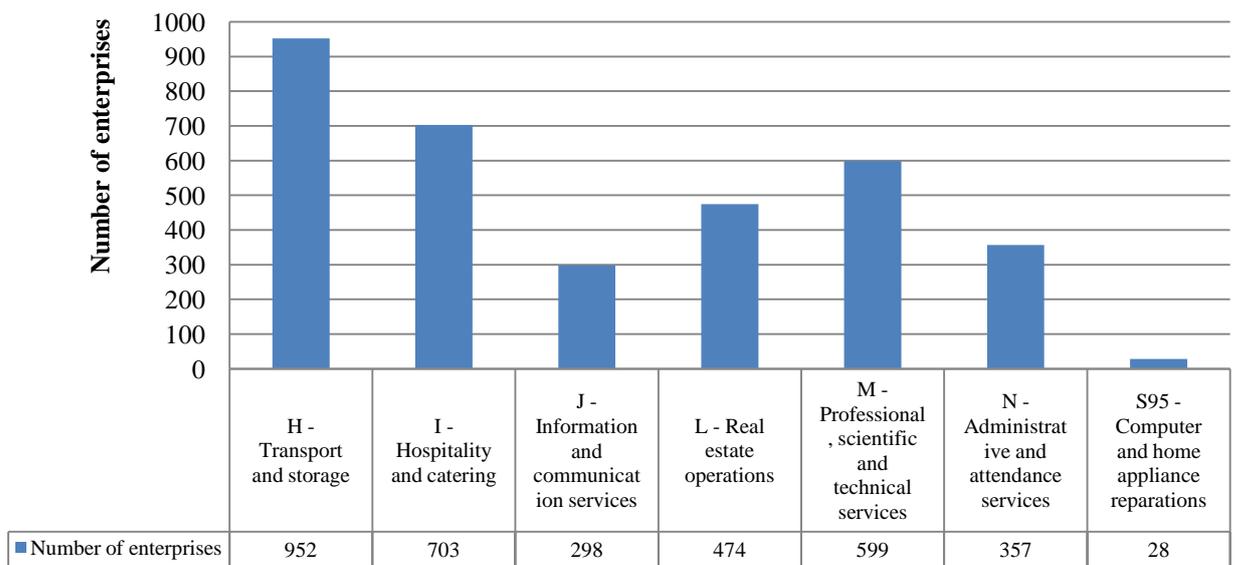
that sphere. The largest decrease in the number of employed persons was registered in hotel and public catering sectors – by 23% as well as in professional, scientific and technical services – by 15.3%. Analysis of the added value and the staff costs of the service companies leads to the conclusion that in this area as well the wages growth rate in the sector is higher compared to labour productivity rate.



Pic. 2.1. Dynamic of number of service enterprises (picture made by the author, data source: Central Statistical Department of Latvia)

The biggest difference between the added value and staff costs is registered in hotel and restaurant business because during the period of economic growth the wages were considerably higher however with approach of economic crisis both in Latvia and in the world the number of tourists decreased dramatically and the occupancy rate in hotels and similar establishments dropped; besides, a drop in personal income lead to lower restaurant attendance rate and lower spending to that effect. The frequently mentioned discrepancy between the price and quality in hotel and public catering spheres is worth mentioning as well. Improvement of the quality of service and decrease in quality costs is one of the ways how to increase the added value. According to CSB data, if per hour labour costs in various areas are compared (in the 4th Quarter of 2009) in services sphere it is the highest for information services – 6.76 LVL, scientific services – 4.73 LVL, whereas the lowest labour cost rates are for hotel and public catering services – 2.35 LVL. The largest share of the service companies belongs to micro or small companies. Pursuant to the Law on Control of Entrepreneurship Support, which provides definition of a small and medium-sized enterprise, micro company is the company with the number of employees between of 1-9 and annual turnover and the size of balance sheet below EUR 2 m. At the same time, small enterprises according to the definition are those with the number of employees between of 10-49, the annual turnover and the size of the balance sheet below EUR 10 m, while medium-sized

enterprises are the companies with the number of employees between 50 & 249, with the annual turnover up to EUR 50 m and the balance sheet size below EUR 43 m. The largest number of micro companies is registered in real estate sphere and in provision of professional, scientific and technical services. Adoption of the Micro Company Law might trigger further increase in the number of micro companies because it provides for a significantly simplified accounting procedure and decreases the tax burden. The total number of companies operating in the services sphere (according to NACE 2<sup>nd</sup> Rev.) is 33166 or 89 % of the total number of service companies. The number of small companies is also relatively large – 3411 entities (see Picture 2.2).



Pic. 2.2. Number of small service enterprises in 2008 (picture made by the author, data source: Central Statistical Department of Latvia)

Taking into account the large number of small and medium-sized companies (further – SME) active in the services sphere the main focus of this research paper will be the quality costs issues specifically in relation to SME.

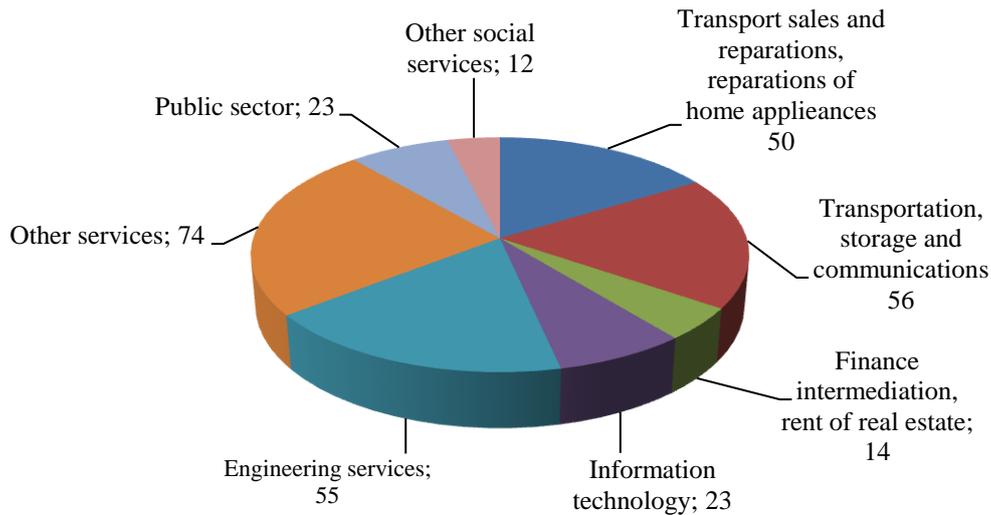
## 2.2. Dynamics of the companies providing certified services; certification bodies

In Latvia, the system of quality assurance is regulated by the *Compliance Evaluation Law*, *Standardisation Law* as well as the *Law on Unity of Measurements* and the relevant Regulations of the Cabinet of Ministers arising from these laws. The limited liability company “Centre for Standardisation, accreditation and metrology” Standardisation bureau (LVS) pursuant to *Standardisation Law* as a national organisation for standardisation supervises and coordinates the activities of Latvian business entities and organisations in standardisation sphere. Further process of translating European standards into Latvian and providing to local entrepreneurs easier access to the information connected to standards and various standard-related aspects opens an opportunity to raise the quality of goods and services. Entrepreneurs’ understanding of the quality costs that help to sharpen the company’s competitive edge may become a significant prerequisite for successful and profitable business. Narrowed activities of Latvian Association for Quality in 2009-2010 due to worsened economic conditions, which

resulted in curtailment of funding, allocated for the Association as a non-profit organisation and limited opportunities to publish the “Quality” magazine and organise Latvian Quality Award events deserve negative appraisal.

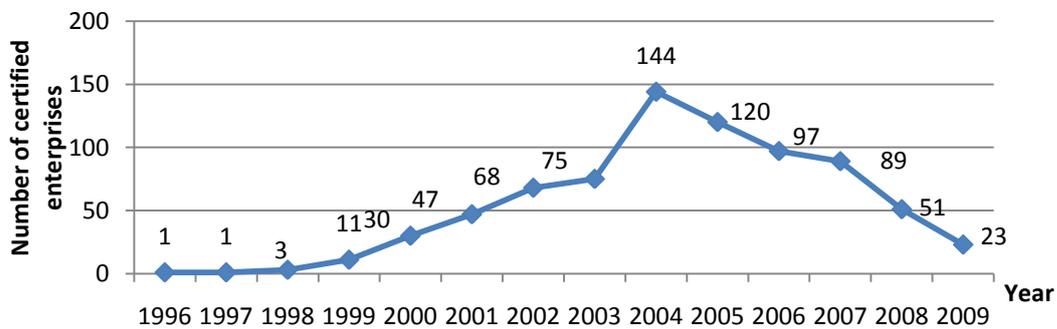
The indicator that demonstrates company activities in the area of quality system implementation and certification is the number of certified companies. *Certification* is the activity of an independent third person that confirms compliance of the product, process or person to the requirements specified in regulatory norms or standard. Certification is carried out by a certification body that in the course of certification audit evaluates compliance of the implemented system to standard requirements and in case of positive decision issues a certificate. The certificate thus issued means confirmation of a competent body that the system implemented by the company complies with the requirements of international standard. According to Quality Association data there are eight certification entities accredited in Latvia: In-sert; Lloyd’s Register Quality Assurance; Inspecta Latvia; Bureau Veritas Latvia; Det Norske Veritas Latvia; TUV Nord Baltik; BM TRADA Latvija; limited liability company “Union of Technical Safety Experts of Manufacturers of Latvia”, TUV Rheinland group. Certification of quality systems is a voluntary procedure. If the mentioned indicator is compared in all three Baltic States, it can be concluded that for Latvia it is the lowest – 500 certified companies in 2008, which is almost 39 % less than for Lithuania. The highest activity in certification according to ISO 9001 standard requirements was marked in 2006 – 625 enterprises were certified, 2007 has seen a sharp decline in the number of certified companies – just 342, which was a 45% decrease compared to the previous year. In Lithuania and Estonia, in contrast, the number of certified companies is increasing every year.

Summarisation of the information available on the companies that provide certification services allows drawing the conclusion that approximately 307 enterprises and organisations have implemented the quality standards, which makes up about 0.8% of the total number of service companies (see Picture 2.3). In 2009 the number of certified companies was 23: they received ISO 9001:2008, ISO 14001, ISO 22000:2005 and ISO 13485:2003 certificates. In 2009 not a single company from the services sphere was certified. Service companies started obtaining quality standard certificates only beginning with 2000, whereas companies active in other spheres began to do that already in 1996 when the first certificate was issued. Unfortunately, it has to be admitted that according to Quality Association (further - QA) data (according to NACE Rev. 1.1), not a single company in hotel and restaurant services sector was certified. The largest number of certified companies is found in transport, storage and communication spheres, which may be explained by the fact that these companies operate on an international scale and in compliance with the requirements of cooperation partners.



Pic. 2.3. Number of certified service enterprises in Latvia (picture made by the author, data source: Latvian Quality Association)

Dynamics of the number of certified companies (according to ISO 9001:2000, ISO 14001:2004, OHSAS 18001:1999 and HACCP DS 3027E:2002 standard requirements) shows that the highest activity was noticed in 2004 when 144 enterprises were certified (see Picture 2.4).



Pic. 2.4. Dynamic of number of certified enterprises in Latvia (picture made by the author, data source: Latvian Quality Association)

Analysis of service companies' certification dynamics leads to the conclusion that the highest activity was registered in 2004 and 2007. Beginning with 2008 there was a sharp decrease in the number of certified companies, which beyond any doubt is in direct relation to the economic situation both in this country and in the world; decrease in demand resulted in decreased company profits and less funds available for the process of certification, which by no means is a cheap one. Depending on the company size the figure is in the range of several thousand or even more.

Companies operating in transport, storage and communication service areas as well as engineering and other spheres of service provision (scientific research, legal and accounting, design and advertising, etc.) take most active part in the process of certification. The largest

number of service companies certified during one year – 17 (2004). The number of certified companies operating in engineering sphere as well as in other areas is to a great extent related to active growth of construction industry within 2004 – 2008 and overall improvement of economic situation in Latvia during that period.

Decrease in the number of certified service companies should receive negative assessment since this may serve as a reason for deterioration of the provided services with subsequent unfavourable impact on the company competitive abilities both in the local and foreign markets.

### **3. EVALUATION OF THE SERVICE QUALITY AND ECONOMIC EFFICIENCY**

#### **3.1. Methodology for evaluation of the quality of services and quality costs assessment**

Development of the new, innovative services is one of the most important strategic tasks in gaining competitive advantage both of the state as a whole and its separate enterprises. Development of innovative services now, at the times of economic downslide is of special importance for Latvia as it presents an opportunity to increase competitive advantage of Latvian SME. This trend in service development is acknowledged by C.K. Prahalad and M.S. Krishnan, authorities in business strategy, Professors of the University of Michigan. Market globalisation trends should be taken into account by SME as well trigger development of the new services. The service cost is important yet quality, innovative approach and speed are equally important.

Many SME have a chance to gain competitive advantage through specialisation, by offering customers/buyers high quality service fully corresponding to their needs rather than just focus on low price and satisfactory quality. Quality and the costs associated with creation, sustenance and improvement of quality prove to be essential indicators of the competitive advantage therefore based on the performed analysis of the existing quality and quality costs concepts and classification analysis referred to in section 1 of the research paper the author proposes own improved quality and quality costs assessment methodology that is more suitable for services. In assessing the quality and quality costs **five major principles** should be taken into consideration:

- Costs minimisation – all quality related activities should be focused on diminishing of the hidden share of quality costs and optimisation of total costs;
- Continuity of costs assessment – for any activity in the area of quality improvement to become economically justifiable quality costs assessment should become a focused and uninterrupted process;
- Compliance with the quality level – ensure that the quality level growth rate is higher than the quality costs increase rate;
- Active use of feedback – for the service quality to comply with the consumer needs it is essential to maintain a constant focus on customer satisfaction by making use of the feedback which fulfils both the quality assurance function and new services or new service traits initiation function;
- Balance among quality, costs and time – for the company to be in the position to offer the service that would cater to the changing market demand both in terms of price and

quality the company should use the least time-consuming quality and costs assessment methods possible.

For assessment of quality and quality costs the authors suggests using a number of **methods**:

- Service quality costs “iceberg” method – helps to identify hidden service costs and make them recordable in an accounting system;
- Quality-unit method – this method can be used for quick estimation of the new service options by using the price and quality criteria and thus make appropriate managerial decisions;
- Innovation quality costs information model – this model takes account of the quality development, assurance and sustenance costs at all stages of the service life-cycle that form the “quality loop” including also the costs of providing and maintaining the feedback.
- Method of evaluation of economic benefit of quality improvement – this method can be used for evaluation of economic benefits of both the existing and the new services. Economic benefit from improvement of the service quality level is estimated for the whole period of time proceeding from comparison of the results and costs per one quality unit with the help of a discounted net revenue method;
- Quality costs economic benefit model – this model is used for quality analysis for estimating whether by making small relative quality cost adjustments relatively larger quality level improvements can be achieved.

The developed methods can be applied in small and medium-sized service companies. Application of these methods is not limited to any particular type of service. The author does not discard the existing quality costs classifications yet suggests paying more attention to the influence of marketing on quality costs as well as on the costs associated with creation of the new traits and accounting costs. The existing approaches to quality and quality costs accounting are mainly focused on maintaining the existing quality level, that is, the quality in compliance with the standards, however these fail to include the costs associated with creation of the services or new service traits. Therefore quality costs should also include the costs of market research and service design as well as the costs of maintaining the feedback.

**Assessment of the quality level** forms an integral part of the developed methodology and consists of the seven major stages:

- Selection of the service traits subject to assessment with due account for the existing and future consumer needs;
- Selection of the service reference standard, which is the company or its competitor’s existing service;
- Assessment of the service traits by making use of the most appropriate method;
- Selection of method for evaluation of the trait significance with due account for the available information;
- Determination of the service trait significance ratio with due consideration of consumer needs and competitors’ offering;
- Determination and analysis of the quality costs of the new service traits with due account for the projected service price;
- SWOT analysis for quality costs management.

Detailed description and application of the methods included in the methodology are provided in subsequent sections.

## 3.2. Methods for quality and costs assessment

### 3.2.1. Service quality costs “iceberg”

Classification of services by dividing them into two groups according to the service result – material and intangible services – makes understanding of the quality of services easier. Material services hold a larger share of real quality whereas presence of perceived quality is more characteristic to intangible services. Perceived quality is the consumers’ notion of what they think of the product quality and which is not based on any test or check-up results. Consumer normally defines real quality after the purchase in the course of the service use. Companies are motivated to provide such level of the service quality so that the real quality would be equal to or higher than the perceived quality; in the opposite case the consumer would feel frustrated and repeated purchase of the service would not happen.

In case of innovative intangible service the *perceptible risk* is higher – the extent of risk inherent in the purchased service or goods according to the consumers’ idea irrespective of the fact whether such idea is right or wrong (this is purely the question of consumers’ perception). There are six types of such perceived risk:

- functional risk (is the service the same as expected?) – the company should eliminate the buyer’s/customer’s doubts of whether the company possesses the proper resources for provision of quality service (equipment, technologies, methods);
- physical risk (can the service bring any harm?) – the company should be able to provide service quality guarantees, confirm safety of the service;
- financial risk (can I afford the service?) – the company should demonstrate the benefits the customer/buyer is going to obtain by using the service;
- social risk (what would others think of me?);
- psychological risk (am I correct in doing this?) – the company should be able to persuade the customer about the correctness of the decision in respect of the service purchase, demonstrate interest in the customer after the service has been purchased, ensure the customer with the necessary information basis, customer service contact phones, etc.;
- time risk (how much time is required for acquisition of service?).

To mitigate the perceived risk of innovative services thus minimising the buyers’/customers’ doubts about the service quality it is possible to use the same approach as used in the business to business market.

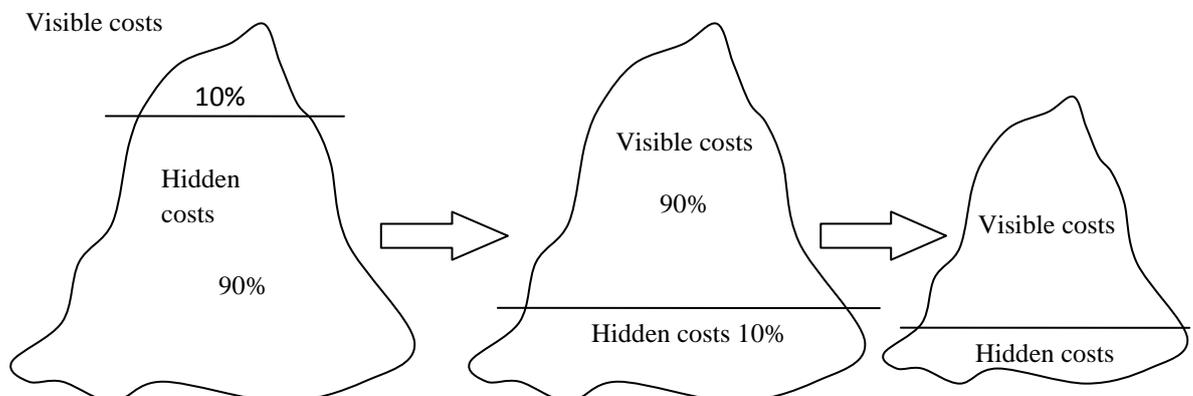
- Demonstration of the expected result is service visualisation that is done with the help of the similar, earlier provided services as well as through development of the expected result model, project, sketch design;
- Service materialisation may be in the form of materialised cooperation result – a diploma, a certificate or as some service extras – supplementing the service with some goods – presents;

- Quality of the resources is confirmed by way of presenting diplomas confirming employee qualification or certificates for the materials, demonstration of equipment used during service supply;
- Indirect demonstration of the service quality is done through presentation of information confirming high quality work of the company: competition awards, diplomas, membership in associations, etc.;
- Demonstration of the quality control is done directly or indirectly by informing the customer about the internal quality standards implemented in a company (for example, customer service standards);
- Modelling of the service process is done by offering a customer service for free for some fixed period of time, breaking service into phases and offering successive use, preparing a detailed description of future cooperation and providing a personal manager/consultant, offering customer help-line contacts, etc.

Mitigation of the perceived risk associated with the company operation refers to the service quality costs. Perceived risk may increase the hidden service quality costs; therefore when innovative services are developed and promoted in the market a close information link with the consumers should be established.

Classification of the services into the two above mentioned groups according to the author's opinion makes determination of costs easier and aligns them with service companies' competitive advantage criteria. For the services, which result is tangible a large share of quality costs is directly related to assurance of the quality of the service result whereas for the services with intangible result the most important quality costs generation stage is the service provider (qualification, experience, etc.) and the process of service provision as such (attitude, commitment). Besides, results of the material service in case of any complaints can be redone and repaired, while in case of intangible service result immediate or prompt elimination of faults is actually impossible.

Therefore the costs required for assurance of the quality of innovative service are changed in the same way as their proportions, which means that in case of intangible service the share of hidden costs is larger as well and may reach 90% of the total quality costs. The existing and preferable ratio between the visible and hidden quality costs is shown in Picture 3.1.



Pic. 3.1. Method of quality costs "iceberg"

In case of intangible services the share of such costs as lost external customers, loss of customer loyalty and resulting lost opportunities, is increased. Research has demonstrated that consumer change their suppliers five times more frequently due to bad service rather than for the reasons of goods quality or price. Besides, it proves difficult for the companies to find out the reasons of customer dissatisfaction since 98% of dissatisfied customers never voice their complaints to the company thus the company receives no feedback.

SME are capable of making visible a certain share of hidden quality costs and define these as quickly as possible. This is exactly the task of the quality costs management to achieve the reverse proportion - 90% of visible costs and 10% of hidden costs thanks to SME competitive advantage criteria:

- Commitment to the customer's/buyer's needs and stimulation of these;
- Expert knowledge of the service staff;
- Speed with which the service is provided;
- Service quality and service quality level;
- Price flexibility, including minimisation from the customer's point of view;
- Service modification according to customer needs;
- Service availability (affordability).

For diminishing of hidden quality costs the author suggests the following measures summarised below in Table 3.1.

Table 3.1

List of hidden service quality costs

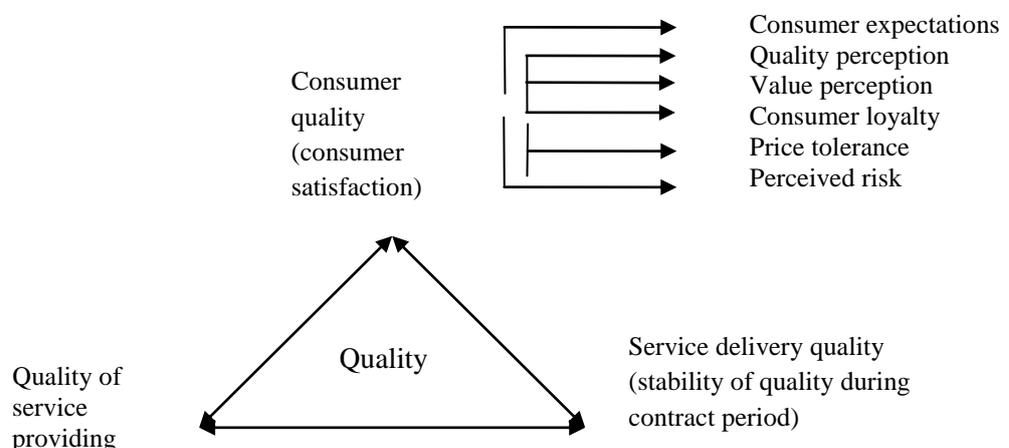
Quality costs	Measures for diminishing the share of hidden service quality costs
1	2
1. Unjustified project changes	Project documentation, documentation of introduced changes
2. Frequent rearrangement of equipment	Planning of service types
3. Costs of transport	Use of journey sheets, for bigger companies – GPS (global positioning system) system for vehicle monitoring
4. Loss of trust and increased perceived risk	Creation of customer data base, for bigger companies – implementation of CRM (Customer Relationship Management), conduction of customer satisfaction research
5. Customer discounts	Develop discount rules and agree upon with the customer managers, sellers
6. Excessive operation costs	Regular inspection, distribution of functions
7. Incorrect disposal procedure	Development and observation of sale procedures
8. Insufficient information about competitors	Regular market analysis
9. Mistakes in answering to customer applications	Development and implementation of the procedure for registration and processing of applications
10. Costs of procedure acceleration	Registration of changes
11. Response to complaints	Creation of complaints register, setting the maximum response time (not longer than 3 days)
12. Loss of the market share	Use of customer data base

Table 3.1 (continued)

1	2
13. Lost opportunities	These can be determined either by keeping count of customer phone calls or the number of visits to the company web-page or office and comparing to the actual number of purchases or following the competitors' offerings and demand for their service
14. Too sophisticated costs structure	Standardisation of costs accounting
15. Non-compliance with delivery terms	Can be expressed as % of the average order value (as it is related to the customer loss risk)
16. Too long cycle	Can be expressed as % of the lost profit due to loss of customer or lower service price due to time-consuming procedure of fulfilment
17. Useless stocks	Normally not applicable because work is done to order
18. Additional stock-taking	Seldom
19. High employee turnover	Keeping record of employee training and other activities related to skills upgrading and determination of costs per one employee
20. Too much overtime	Work planning, keeping record of overtime
21. Lack of planning	Is formed as a sum of the previous quality items (1+2+15+16+20)

Implementation of the measures mentioned in Table 3.1 provides an opportunity for the service companies to identify hidden costs and ensure that the company is keeping track of these costs thus achieving a reverse proportion – 90% of visible quality costs versus 10% of hidden quality costs. Making all quality costs visible does not seem possible the same as it is impossible to make a list of 100% envisaged risks. Implementation of quality costs accounting and introduction of the above mentioned measures allows diminishing the total amount of service quality costs.

If we take a closer look at one of the competitiveness criterion – the quality of service, it can be said that it consists of the three interrelated basic elements: quality of service supply (quality sustainability); quality of service provision and quality obtained by consumer, which is shown in Picture 3.2. It should be noted that all the three elements influence each other, which may result either in increase or decrease of the service quality.



Pic. 3.2. Elements of service quality

In the process of development of innovative services it should be kept in mind that the consumers and service providers have different perception of quality: companies use to express through price the value of the service they provide whereas from the consumers' perspective the value of the quality is made up of such service traits that correspond to their needs and expectations, thus certain service components may turn out unnecessary while some may be missing. Thus a consumer may get an impression that he/she pays for the things that appear unnecessary or for those, which are nonexistent.

In the process of assessing the quality costs of the new services one should bear in mind avalanche losses caused by mistakes made at various stages of the service life-cycle. The necessary costs grow in order of magnitude at every next stage of the cycle. If the costs of error elimination at the design stage is taken for 1 then the costs at the production, start-up and operation stages increase 10, 100 and 1000 times accordingly. It means that for innovative services measures directed at elimination of poor-quality work are compulsory already at the very first stages of service creation.

The author considers that the innovative service quality costs model should reflect the quality development, assurance and sustenance costs during all stages of the service life-cycle forming the quality circle by including also the costs necessary for after-sale activities. Quality costs may be calculated with the help of a quality costs information model. Such model can be build by using the quality loop that includes 12 most significant cost factors and provides a new quality costs classification and costs system for innovative products:

$$IM = f(I_s, I_{ip}, I_r, I_k, I_t, I_a, I_{jit}, I_d, I_{nep}, M_Q, M_I, AS) \rightarrow \min \quad (3.1)$$

if  $Q \geq Q_v$ ,

- kur
- IM – model of innovation quality costs information;
  - Q – quality;
  - $Q_v$  – required quality;
  - $I_s$  – costs related to implementation of quality system, operation etc.;
  - $I_{ip}$  – costs related to changes in profit of enterprise (from quality prospective): new requirements to designing, to development of technological processes and other activities related to innovations;
  - $I_r$  – production costs related to changes in quality, equipment etc.;
  - $I_k$  – costs of quality control (technical control, provision of measuring and testing, accreditation of laboratories, certification of services etc.);
  - $I_t$  – costs related to the market: work with suppliers, marketing costs, market researches, sales support etc.;
  - $I_a$  – quality education of personnel;
  - $I_{jit}$  – costs related to new IT in quality area;
  - $I_d$  – costs related to visible and hidden defects;
  - $I_{nep}$  – unpredicted costs related to operation of quality system etc.;
  - $M_Q$  – costs of methods used for quality assessment;
  - $M_I$  – costs of methods used for assessment of quality costs;
  - AS – feedback.

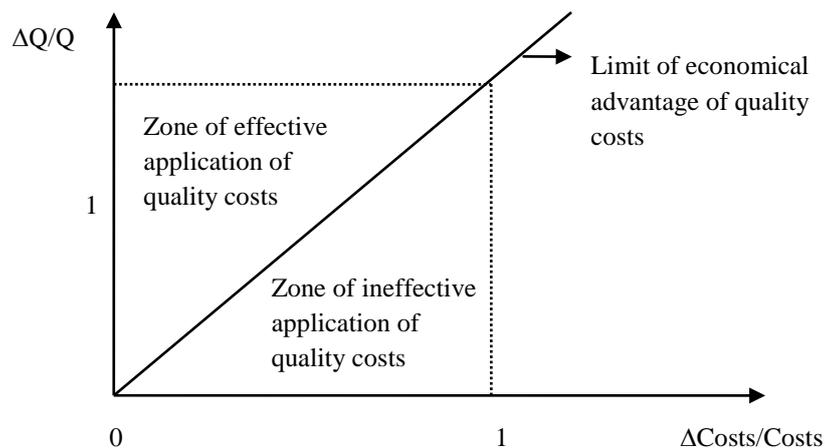
All the 12 factors of the quality costs information model can be determined with the help of information resource calculations. The model accuracy depends on the information sources. The above mentioned factors show only the cost price and the investment part and in the cost equation (3.1) add up to the quality costs amount. The quality level of the services provided and the goods produced by Latvian companies is insufficient; production of innovative goods and supply of innovative services marked by a high degree of quality is the economic goal and strategy of Latvia. To achieve this goal systematic work should be done in Latvian economy aimed at solving the quality improvement issues. One of the issues is diminishing of quality costs with simultaneous increase of the quality level. The basic requirement here is to ensure that increase in additional costs ( $\Delta\text{Costs}$ ) is relatively less compared to increase of the additional quality ( $\Delta\text{Q}$ ) level, namely:

$$\frac{\Delta\text{Costs}}{\text{Costs}} < \frac{\Delta\text{Q}}{\text{Q}} \quad (3.2)$$

where  $\Delta\text{Costs}$  – costs of changes;

$\Delta\text{Q}$  - changes of quality level

The condition should be fulfilled that upon making little relative quality cost changes relatively larger quality level changes are achieved. This requirement can be illustrated by Picture 3.3. For model *approbation* one of the Latvian information logistics companies was used – A/S „Itella Information” that has been operating in Latvian market since 1998 and belongs to the group of medium-sized enterprises according to the definition given by the Law on Control of Entrepreneurship Support. In the process of analysis of the three services provided by the company: paper invoice, electronic invoice and electronic invoice with electronic signature is can be concluded that in all the three cases – paper invoice, electronic invoice and electronic invoice with electronic signature – the condition of the equation (3.2) is fulfilled.



Pic. 3.3. Model of economical advantage of quality costs

During assessment of the new service quality costs and increase in the quality level time factor should be taken into account, as shown in formula (3.3).

### 3.2.2. Evaluation of economic benefit of the service quality increase

Innovation quality costs are high; for diminishing these costs a quality costs management subsystem – a part of the quality management system, should be created. Operation of the quality costs management subsystem should be organised by making use of the quality costs models suggested above.

One of the ways how to achieve an increased quality growth compared to costs growth is to introduce the quality costs accounting system in SME. It is important to determine the quality level both for the existing and the new innovative services.

Innovation is the product (service, process) that is characterised by a higher quality in comparison to the already existing or the reference standard product. Therefore evaluation of the economic benefit of innovation is deemed important considering the quality level to be a relative indicator. The author suggests calculating economic benefit of quality increase with the help of the method based on the 5-factor model shown in the equation (3.3).

$$E = f(\text{Costs}, C, Q, A, t) \rightarrow \max, \quad (3.3)$$

where E- economic gain during whole time period;

f – target function of economic gain;

Costs – costs of production and sales which includes capital investment to ensure quality level of all production in year i (k) and respective costs of whole production in year i

Costs<sub>1</sub> – total costs of service before increase of quality (in a year);

Costs<sub>2</sub> – total costs of service after increase of quality (in a year) or costs of innovative service;

C – price of the service before (C<sub>1</sub>) and after (C<sub>2</sub>) quality increase;

Q – quality level before (Q<sub>1</sub>) and after (Q<sub>2</sub>) quality increase;

A – annual volume of service before (A<sub>1</sub>) and after (A<sub>2</sub>) quality increase;

t – discount factor (time) of the calculation.

The method provides that it is important to determine the quality level. Since quality is an aggregate of traits, estimation of the changes of each trait should be done by comparison to the standard reference or the existing product. The trait significance ratio ( $\alpha_i$ ) should be specified assuming that  $\sum \alpha_i = 1$ . Service traits significance ratios are determined by an expert method, as for example, by applying the pair comparison method. The quality level is calculated with the help of the formula (3.4).

$$Q_1 = \alpha_1 \frac{I_{11}}{I_{1et}} + \alpha_2 \frac{I_{21}}{I_{2et}} + \dots + \alpha_n \frac{I_{n1}}{I_{net}}; \quad Q_2 = \alpha_1 \frac{I_{12}}{I_{1et}} + \alpha_2 \frac{I_{22}}{I_{2et}} + \dots + \alpha_n \frac{I_{n2}}{I_{net}}, \quad (3.4)$$

where Q<sub>1</sub> – quality level before quality increase,

Q<sub>2</sub> – quality level after quality increase,

I – specific indicator of service features before and after quality increase (natural units, abstract units etc.)

For determining the quality level another approach may be used: when a complex quality index is determined as a product of multiplication of quality traits, see formula (3.5).

$$, \tag{3.5}$$

In his work “Cost ratios and product quality assessment” Prof. A. Magidenko demonstrated that the derivative of the quality traits almost fully rules out the impact of the significance ratio thus separate quality traits lose their importance. Therefore in order to determine the quality level a weighted average arithmetic complex quality ratio is applied that is calculated according to the formula (3.4).

For describing the changes of the service quality level from  $Q_1$  to  $Q_2$  an indicator is introduced that is denominated as  $\gamma$  and calculated by the formula (3.6).

$$\gamma = Q_2/Q_1, \tag{3.6}$$

Economic benefit from increase of the new service quality level is to be calculated for the whole time period proceeding from the comparison of the results and costs per one quality level unit by using the discounted net revenue and equivalent annual annuity (EAA) methods with the help of the formula (3.7). The  $C/Q$  ratio shows the service quality unit price while  $Costs/(Q * A)$  shows the service quality unit costs.

$$\frac{E - \frac{C_1}{Q_1} - \frac{C_2}{Q_2}}{A_1 - A_2} \tag{3.7}$$

where E- present value of average annual economic gain;

$Q_1$ - service quality level before quality increase;

$Q_2$ - service quality level after quality increase;

$C_1$ - service price before quality increase;

$C_2$ - service price after quality increase;

$A_1$ - annual volume of service before quality increase in natural units;

$A_2$ - annual volume of service after quality increase in natural units;

$Costs_1$ - total service costs before quality increase (annual);

$Costs_2$ - total service costs after quality increase (annual);

$D_t$ - discount factor in year n.

Applying formula (3.6) and (3.7), derive formula (3.8)

$$\frac{E - \frac{C_1}{Q_1} - \frac{C_2}{Q_2}}{A_1 - A_2} \tag{3.8}$$

Applying precondition  $A_1=A_2=A$  derive (3.10)

$$\frac{E - \frac{C_1}{Q_1} - \frac{C_2}{Q_2}}{A} \tag{3.9}$$

With the help of the above mentioned formulas it becomes possible to evaluate the economic benefit from the company activities aimed at raising the service quality level;

besides, the obtained results are mutually comparable, which makes it possible to evaluate introduction of which service would bring the company the largest economic benefit. Comparison may be done on a company group or industry scale.

For *approbation* of the method an information logistics company was used as well as the services provided by the company including an *innovative service – mass signing of electronic invoices by using electronic signature*. The service – mass signing of electronic invoices by using electronic signature is an innovative kind of service. Until now, none of the companies in the Baltic States provided a service of such kind. The target market for this kind of service is represented by the companies issuing invoices in large quantities. The main advantages of the service are speed because 52 invoices can be signed per one second, and the acceptability of invoice because the invoice is issued in compliance with the laws “On Accounting” and “On Electronic Documents”.

### Calculation of economic benefit brought by improvement of the quality level

Three kinds of service provided by the company were used for calculation and the basic data are summarised in Table 3.2. The service price and costs are not shown separately for confidentiality reasons. For determining the costs of the services the company is using the order costs system and calculates the costs with the help of the total production cost price calculation method.

Table 3.2.

Basic data characterizing economic gain of service enterprise

Data	Services		
	Printed (paper) invoices	Electronic invoices	Electronic invoices with electronic signature
1	2	3	4
Annual turnover in natural units			
2007.	2000000	1000000	-
2008.	1630000	1441020	-
2009.	1630000	2435308	-
2010.	1304000	3000000	1200000
Quality Q (see tab. 3.3. and 3.4.)	1,059	1,322	1,375
Annual revenue ( $C_1 \gamma A_2$ ) taking into account quality level, Lats			
2007.	-	268385	-
2008.	-	377453	-
2009.	-	638399	-
2010	-	124800	-
Annual costs respective to quality level ( $Costs_1 \gamma$ ), Lats			
2007.	99840	-	-
2008.	81369	-	-
2009.	81369	-	-
2010.	-	90480	-
Annual gain from quality increase ( $C_2 A_2 - Costs_2$ ), Lats			

Table 3.2 (continued)

1	2	3	4
2007.	-	71000	-
2008.	-	102312	-
2009.	-	172906	-
2010.	-	-	85200
Discount factor, %	10	10	10

The service quality levels are determined with the help of an expert method. Another expert method – pair comparison method is used for determining the service trait significance ratio. Results are summarised in Table 3.3, which provides an expert's (the company Chief Commercial Officer) evaluation. The expert defined acceptability as the most important service quality trait, that is, readiness of the recipient to acknowledge the invoice as valid and its delivery method as secure.

Table 3.3.

#### Matrix for comparison and determination of importance of quality features

Quality feature ( $I_i$ )	$I_1$	$I_2$	$I_3$	$I_4$	Number of feature advantages	Importance of feature $\alpha_i$
Lead time $I_1$	-	$I_1$	$I_3$	$I_4$	1	—
Perceptibility $I_2$	$I_2$	-	$I_3$	$I_4$	1	—
Security of delivery $I_3$	$I_3$	$I_3$	-	$I_3$	3	—
Acceptance $I_4$	$I_4$	$I_4$	$I_4$	-	3	—
Total					8	1,0

Electronic invoice was used as the basis for determining the quality of the electronically signed invoice; at the same time, the paper invoice was used as the basis for determining the quality of electronic invoice. Quality traits as defined by the expert are summarised in Table 3.4. The quality level of a paper invoice is denoted by  $Q_1$ , the quality level of an electronic invoice – by  $Q_2$ , and the quality level of an electronically signed invoice is denoted by  $Q_3$ .

Table 3.4.

#### Evaluation of service quality level

Features of service quality	Services			Importance coefficient of features $\alpha_i$	Result		
	Paper invoice	Electronic invoice	Electronic invoices with electronic signature		$Q_1$	$Q_2$	$Q_3$
Lead time, days	4	1	1	0,125	0,031	0,5	0,125
Perceptibility, points	8	8	8	0,125	0,125	0,125	0,125
Security of delivery	0,8	0,99	0,99	0,375	0,303	0,463	0,375
Acceptance, points	8	5	10	0,375	0,600	0,234	0,750
Total				1,0	1,059	1,322	1,375

In order to achieve a comprehensive assessment of the quality traits n number of experts is used and the quality level is defined as an arithmetic average of expert evaluations.

By inserting numbers in the formula (3.8) the economic benefit from the service quality level improvement over the three years period (2007, 2008, and 2009) is derived:

$$\frac{\frac{\frac{\text{---}}{\text{---}}}{\text{---}} + \frac{\frac{\text{---}}{\text{---}}}{\text{---}}}{\text{---}}$$

Thus, during the period of three years thanks to improved quality of the service provided to the company customers “Itella Information” the obtained economic benefit was 225341 LVL thanks to the fact that the service quality level grew at a higher rate than the associated service costs. At the same time, the economic benefit from the innovative service – mass signing of electronic invoices by using electronic signature in 2010 will comprise:

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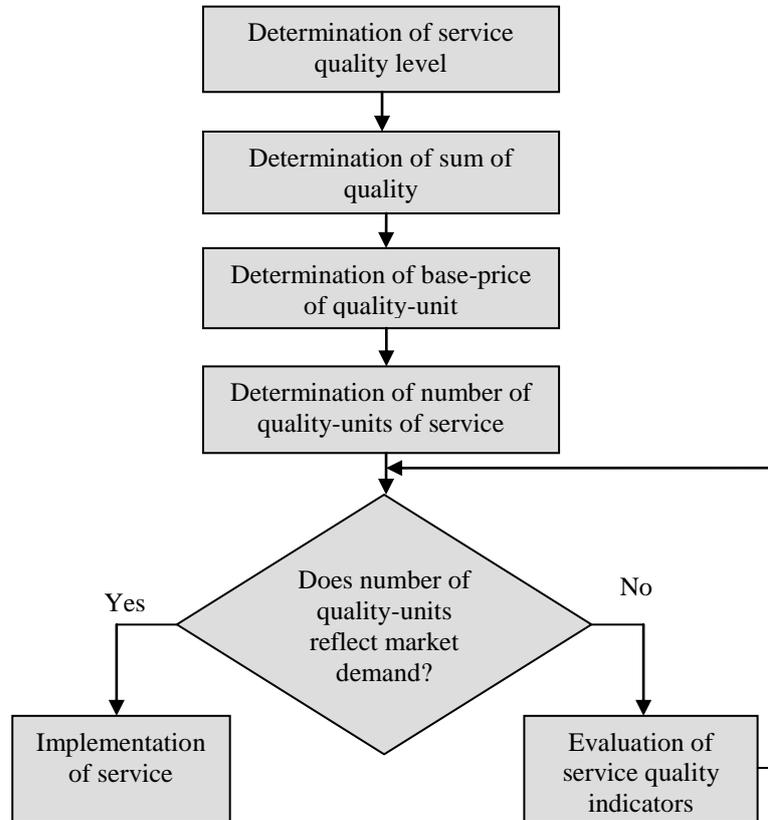
The calculation result demonstrates that implementation of an innovative service in a company is going to be economically justified and profitable.

By recording the results (change in price for the purpose of improving the quality level), the costs, product volume and time factor, it is possible to calculate the economic benefit brought by improvements in the quality level of a new service.

### **3.2.3. Method of quality-units, its essence and application for economic assessment of the service quality level**

Taking into account the changing market conditions and changes in consumer needs, companies should be capable to react quickly and offer the services that correspond to the current market needs. The companies capable of such thing are going to keep a sharp competitive edge. Development and implementation of the new services asks for a comparatively large amount of time. Therefore the model is suggested that would help to make relatively quick appropriate managerial decisions in respect of the new service introduction. Quality-unit method is a new method. With the help of this method it becomes possible to assess the service quality costs and, if necessary, set the service price as well. The quality-unit method is viewed as one of the methods belonging to cost ratios and units system. The prime origin of the system stems from the approach developed in the 1960s at Riga Polytechnic Institute, Department of Economics and Organisation of Production. The system of cost ratios and units was developed under the leadership of Professor L. Gamrat-Kurek. The chronology of the method development till the present days is seen in the work by A. Magidenko and E. Gaile-Sarkane “Info-unit method” included in 2003 RTU issue of scientific publications. The quality-unit method is the 26<sup>th</sup> in succession that belongs to the cost ratios and units system. Quality-unit reveals the costs that are necessary for achieving the service

relative quality level equal to 1. Thereby, the service quality can be expressed in quality-units showing the relation between the quality and price of the service. The smaller the number of the service quality-units the more competitive advantage the company gains from the price perspective. Algorithm of the quality-unit method application is shown in Picture 3.4.



Pic. 3.4. Algorithm of application of qualiunit method

If the number of quality-units derived from calculations fails to correspond to the market needs (the quality level is too low) proper measures are taken to evaluate the quality of the service and its further adjustment in order to fit market requirements.

In order to use the quality-unit method the following should be done first:

1) the service quality level should be evaluated by using the formula (3.4).

2) the service quality sum should be established by using the obtained service quality level value and the existing service by using the formula (3.10);

$$QS = A, \quad (3.10)$$

where QS- sum of service quality,

$q_i$  – quality level of service  $i$ ,

A- volume of service in natural units.

3) the quality-unit base price should be set by dividing the total value of the service volume by the quality sum, by using the formula (3.11);

$$QV_{cb} = \frac{A}{QS}, \quad (3.11)$$

where  $Q$  - price of base quality-unit,  
 $QS$  – sum of service quality  
 $AV$  – total value of service volume.

4) the number of the service quality-units should be determined by using the formula (3.12);

$$QV = \frac{AV}{C}, \quad (3.12)$$

where  $QV$ - number of service quality-units,  
 $C$  - service price,  
 $Q$  - price of base quality-units.

5) make assessment of the number of quality-units on the following condition: the smaller the number of quality-units the more competitive the service may be from the price perspective.

For calculation of the quality-unit price per quantity the data of information logistics service (electronic invoices, direct debit, invoice printout) companies operating in the Baltic market over one year period were used. Information and calculation results are shown in Tables 3.4 and 3.5.

Table 3.4.  
 Example of calculation of service quality sum for information logistics services

Service	Quality level $Q_i$	Volume, pieces $A_i$	Quality sum $QS_i (2*3)$
1	2	3	4
1.	1,08	50500100	54540108
2.	1,03	144429795	148762689
3.	1,05	148359490	155777464
Total		343289385	359080261

Based on the data about the annual volumes of the services provided by information logistics companies the quality sum of each kind of service was determined. The total service quality sum  $QS$ , as seen in Table 3.4, is used for calculation of the base quality-unit price and their quantity (see Table 3.5). On the basis of calculations it was established that the information logistics service base quality-unit price equals 0.075 EUR/1quality-unit, which can be used for making price projections being aware of the offered level of the service quality.

Table 3.5.  
 Example of calculation of price and number of quality-unist for information logistics

Service	Price of service, EUR	Volume, EUR	Price of base quality-unit $Q$ , EUR	Number of quality-units $QV (2/4)$
1	2	3	4	5
1.	0,04	2020004		0,53
2.	0,10	14442980		1,33
3.	0,07	10385164		0,93
Total		26848148	$26848148/359080261=0,075$	

Thus, for example, by offering the service with the quality level that is 50% higher than that of the base service, the projected price can be determined by the formula (3.13). Thereby, the projected price of the new service is:

$$= Q \times \quad (3.13)$$

where price of new service,

Q - price of base quality-unit,

– level of quality of new service.

Thus predicted price of new service is:

$$1,5 \times 0,075 = 0,113 \text{ EUR}$$

If the company provides different kinds of service the quality-units can be calculated individually for each of kind of service. By making use of the obtained information and by supplementing it with the whole service range the quality level and the matching quality-units scale can be created, which could be further applied in a company for making decisions in respect of new service implementation. The quality-unit method proves applicable in practice for evaluation of the new service options based on multi-factor approach since it takes account both of the quality level of the projected service and the projected price. Therefore, service suppliers are given an opportunity to quickly adapt to the changing market demand by providing the services of the appropriate quality level and for the appropriate price.

Upon summarising the results of the research paper it should be noted that economic assurance of quality improvement is focused on the methodology easily applicable in practice by small and medium-sized enterprises.

## CONCLUSION AND PROPOSALS

As a result of the research work analysis of theoretical and practical viewpoints on services, quality and quality costs was performed from the perspective of their applicability in respect of small and medium-sized enterprises. By making use of the analysis results the methodology for assessing the service quality costs has been developed. The summarised results of the research lead to the following final **conclusions**:

1. The proportion of services in the sectoral structure of Latvian national economy is the largest and the competitive advantage of the services both in the local and the foreign markets is also dependent upon the quality of services. Assurance of specific level of the quality of services, in its turn, is linked to certain costs and the resultant service price.
2. The classification based on NACE Rev.2.2 used in statistics does not refer many business activities to the category of services, which are nevertheless treated as belonging to the services industry in other information sources, for example, in the EU market monitoring survey. Recreation and sports services or financial services may be used as an example. Thus, the available statistic data are incomplete.
3. Application of the quality postulates introduced by the scientist E. Deming in the operation of small and medium-sized enterprises would contribute to the service quality if attention is paid to the following: constant improvement of the quality of goods and services; turning quality into the product integral feature; discontinuation of the business based purely on price; employee training and development as well as elimination of the barriers among the company structural units and employees.
4. American scientists A. Feigenbaum and J. Juran in the 1950s were the first to provide classification of costs; this classification is used today as well and applied to the services without due regard to the fact that in the 50s of the last century the dominating role in the world economy belonged to manufacturing.
5. According to the existing quality cost classifications, the costs associated with assurance of the existing quality level are treated as quality costs, that is, split the costs into the preventive costs, appraisal costs and fault costs, however, attention is not paid to the costs associated with creation of the new quality traits and accordingly creation of the services that would gain competitive advantage from the quality and costs perspective.
6. Difficulties associated with determination of the quality costs arise from the fact that a great share of quality costs are of hidden nature and multi-functional application and focused not only on quality but on other spheres of the company activity. Without distinguishing the quality costs from the total costs it proves impossible to determine the influence of this cost group on the product price and turnover.
7. In Latvia, quality costs classification, issues of quality cost determination and accounting have not been properly analysed and generally received little attention. The service quality costs issues have not been properly analysed either, maybe with the exception of healthcare, which has received more attention to that effect.

8. Along with the development of global entrepreneurship, quality costs summarisation, analysis and optimisation contribute to total costs reduction and start playing an increasingly important role in strengthening the companies' competitive advantage.
9. At times of economic downslide the rate of slowdown in the services sector was less than the overall economy slowdown rate therefore service companies also occupy an important place in the recovery of national economy.
10. The largest part of the service companies in Latvia are micro and small companies. About 0.8% of the total number of service companies have introduced the quality standards. The largest number of certified companies is found in transport, storage and communication sectors, which can be explained by the fact that these companies conduct their business on an international scale and are supposed to comply with the cooperation partners' requirements.
11. The developed methodology of assessment of the service quality and costs is applicable not only in small and medium-sized enterprises with the already existing quality management system (the methodology is compatible with the ISO 9001:2000 standard) but also in the companies where the quality management system have not yet been implemented.
12. The companies engaged in introducing the innovative services in the market should follow the quality costs growth rate, which must not exceed the quality growth rate so that implementation of the innovative services would produce a positive economic effect.
13. For evaluation of the innovative services a multi-functional approach should be used with due account both for the service quality and price since both these factors are essential for providing a competitive edge to the company.
14. Developed theoretic approaches to assessment of the service quality and associated costs provide an opportunity, by evaluating the level of quality from the economic benefit angle, to assess a new service in the Latvian market – mass signing of electronic invoices by using electronic signature as well as other services.

Based on the conducted research results the author puts forward the following **proposals**:

1. For the purpose of more accurate service classification, which makes use of the service traits (features), the author of the research paper recommends to divide services into two groups based on the service result: the services with the tangible result and the services with the intangible result. Such division makes determination of the quality cost groups easier. As for the services with the tangible result, a great share of quality costs here is directly associated with assurance of the quality of service result, as for the services with the intangible result, the most significant quality costs creation stage here are the service provider and the process of service as such.
2. For determining the quality costs the perceived risks should be taken into account. Mitigation of the perceived risk associated with the operation of a service company is referred to hidden quality costs. Perceived risk may lead to increase of hidden service quality costs; therefore during development and introduction on the innovative services in the market a close information link with the consumer must be ensured.

3. Taking into consideration the existing company competitiveness criteria and SERVQUAL methodology, the author recommends to use the following SME competitiveness criteria: commitment to and stimulation of the customer/buyer's needs; expert knowledge of the members of staff; high speed of service provision; service quality and the service quality level; price flexibility including minimisation from the customer viewpoint; service adaptation to customer needs and service availability (affordability).
4. The task of the quality management is to achieve the reverse proportion of hidden and visible costs: 90% of visible costs versus 10% of hidden costs thanks to SME competitiveness criteria and measures aimed at reduction of hidden costs.
5. In case of medium-sized enterprises, analysis of the quality costs and subsequent activities may be performed by a CFO; in small enterprises this can be done by an accountant while coordination of the work should be the responsibility of the production manager or Chief Commercial Officer.
6. Quality costs may be calculated with the help of the quality costs information model. This model can be created by making use of the "quality loop" including the twelve significant cost factors and ensure new quality costs classification and cost system for the innovative products. The innovative services quality costs model should reflect the costs of quality development, assurance and sustenance at all stages of the service life-cycle forming the "quality loop" by including also the costs associated with after-sale activities and the costs for maintaining the feedback.
7. The feedback can be used both for quality assurance, when deviations from the reference quality standard are registered, and for initiation of the new services or new service traits based on the market research and analysis of the achieved quality level.
8. For the quality improvement measures to be economically justified the quality costs growth rate should be less than the quality level increase rate.
9. Innovative quality costs are large; thus, in order to reduce these costs the quality costs management subsystem should be created, which is part of the quality system. Operation of the quality costs management subsystem should be organised on the basis of the earlier proposed quality costs models.
10. Increase of economic benefit brought by the new service quality level should be calculated for the whole period proceeding from comparison of the results and costs per one quality level unit by using the net discounted revenue method.
11. For evaluation of the new service options based on multi-factor approach the quality-unit method may be used, which takes into account both the quality level of the projected service and the projected price. Application of the method allows for quick and efficient evaluation of the developed services and selection of the most marketable of these from the quality and price perspective.
12. The methodology for assessing the service quality and quality costs can be adopted by small and medium-sized service enterprises in accordance with their business specifics and used for increasing the competitive advantage.

The proposals developed in the course of the research work provide an opportunity to increase the competitive advantages of small and medium-sized service companies both in the local and international markets by introducing the services that correspond to consumer needs. Theoretical and practical results of the research work can be also applied in the study process in the courses related to entrepreneurial economics.