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**ENGLISH BUSINESS GAMES
FOR «QUALITY MANAGEMENT»**

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FOR «QUALITY MANAGEMENT»**

(Деловые игры на английском языке. Учебное пособие для магистрантов
специальности «Управление качеством»)

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ENGLISH BUSINESS GAMES FOR «QUALITY MANAGEMENT» (Деловые игры на английском языке. Учебное пособие для магистрантов специальности «Управление качеством») / А.К. Устюжанина, И.В. Плотникова; Национальный исследовательский Томский Политехнический Университет. - Томск: Изд-во Томского Политехнического Университета, 2014. - 82 стр.

Пособие содержит практические задания и деловые игры на английском языке, посвященные вопросам контроля и управления качеством. Задания, направленные на развитие умений устной речи на английском языке по профессиональной тематике, формируют у студентов навыки использования английского языка в профессиональной деятельности и научной коммуникации. Пособие также включает в себя приложение-гlossарий, раскрывающий основные понятия экономики качества и управления персоналом (суть и практическое применение которых студенты изучают в процессе деловой игры).

Предназначено для студентов вузов, обучающихся по специальности «Управление качеством».

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Introduction

The tutorial «English business games for Quality management» is intended for the Master students of the speciality «Quality management» in non-linguistic high schools. The manual is designed for students having studied the basic course of English in TPU, aware of the basics of English grammar and vocabulary, and preparing for an active professional career with the use of a foreign language. The structure of the tutorial and the proposed tasks are chosen with an account to the content and themes of the professional English language work program for this speciality in TPU.

The manual contains the theoretical and practical part.

The theoretical part studies the scientific-methodological basis for the necessity of business games usage at the lessons of professional English. The gaming technique gives a series of advantages and represents one of proven tools of foreign language teaching intensification.

The practical part contains specific gaming tasks relating to the topics «The Economics of Quality» and «Personnel management». The tasks enable the students to study the basic problems of quality management and other related topics and scientific fields: issues on the interrelations between the nature and industry, problems of environmental protection and human security in the professional activities. The manual is intended to reveal the main notions of the economics of quality and personnel management in the gaming form which is very suitable for young people. Business games are just games but they represent real professional situations and reflect real life problems. This approach helps students to acquire the first experience of dealing with the professional tasks in the quality management sphere — similar to those which are coming in their future profession.

Business games train students to negotiate, to plan and present the activity

of the enterprise to the audience, to communicate on professional topics, ask and answer questions in the course of discussion.

The tests on the self-esteem which are attached to the tasks allow the students to form an objective image of themselves as specialists and to determine for themselves the criteria which the future specialists of quality management should aim for.

The manual also has tasks for thematic discussions concerning quality issues, in the course of which the students should acquire the correct idea of the studied notions and train to express their point of view in English.

Working with the proposed material enables students not only to improve their practical use of English but also to enlarge their understanding of different aspects of quality management.

The tutorial is designed for 20 hours (10 lessons) of classroom work.

Business game as a way to quality management

Games are useful at any English lessons, but their role is especially important for future managers studying English. With the use of business games the future specialists in quality management will train their abilities to deal with problems, choose optimal variants, take decisions, be responsible for different tasks — and also analyze and discuss the results of their work and assess themselves.

The use of games as an educational technique is an efficient instrument of managing the learning activity, stimulating the intellectual activity of students and allowing to make the learning process exciting and entertaining. D.B. Elkonin in his book “The psychology of games” [1987] gives the following notion of a game: “A game is a primary spontaneous school, apparently a chaos, which gives an opportunity to get acquainted with the world and traditions of people's behavior”. A game is a powerful motivation to learn foreign languages and an efficient tool for a language teacher. An educational game is an organized task which requires an intense emotional and mental strength. The positive fact is that this way students speak a foreign language – so, the gaming method contains large educational potential. For students a game is first of all an entertainment. A game at the lesson contributes to the important methodological problems [Gutareva, Ustyuzhanina 2013]:

- it creates a psychological readiness of students for speech communication;
- it provides a natural necessity to discuss the studied notions and apply them in a gaming situation;
- it trains students to choose the right variants of English speech.

Business games, proposed in this book, are feasible for almost every student — even for those who have not so much knowledge in the language. What's more, a moderate student may become the first in a business game:

inventiveness and ingenuity here are very important. The sense of equality, the atmosphere of enthusiasm and joy — all this gives the students an opportunity to overcome their shyness which interferes with the free usage of words in speech, reduces the fear of mistakes, and has a beneficial effect on the result of learning. A business game is all "for fun", there is a possibility to hide oneself behind the other's mask and thus to absolve oneself of responsibility for mistakes and to represent the situation as “me – it is not me, but the character which I am playing”. All this creates a very important psychological base for the effective study of professional English.

Business games and practical tasks for students of «Quality management»

Lesson 1

HR management at the enterprise

Task 1. «The best HR-approach»

Divide into groups of 3-4 students. Study the table of the American and Japan approaches to the HR management at an enterprise. Answer the question: what system is better?

Describe the approach to HR-management specific to your country. What approach is it closer to? Make an analogous table about it.

Present the results before the group. Don't forget to give specific examples.

Table 1. «Japanese and American approach to the HR-management»

Criteria of work organization	Japanese approach	American approach
Basis of work organization	Harmony	Efficiency
Attitude to work	The main thing is the performance of duties	The main thing is realization of tasks
Competition	Practically absent	High
Guarantees for workers	High (lifetime employment)	Low
Making decisions	Upward	Downwards
Relationships with subordinates	Family	Official
Method of recruitment	After graduation	According to the business skills
Payment for labor	Depends on the employment period	Depends on the results

Task 2. «New Head» (individual task)

Read the problem situation, then propose your decision.

Imagine you are the new Head of Business. Not all the colleagues know you. There are two hours before the lunch break. In the corridor you see three workers from your department engaged in lively conversation. They don't pay attention to you. When you go back in 20 minutes, you see the same picture.

What would you do?

1) you interrupt their conversation, say that you are the new Head, and that they should return to their work just now;

2) you ask them, who is their immediate boss, and then you call him into your office;

3) first of all you ask them what they are speaking about and whether they have any complaints to the administration, then you propose them to go to their workplaces;

4) first of all you present yourself, then you ask how things are going in their team, how they are loaded with work, what hinders their work. Then you take these workers as “interesting”.

Lesson 2

Personnel management strategy

Task:

Divide into groups of 4 students. Each group works at the situation and proposes their variant of personnel management strategy. In each group one of the students is the head, who summarizes the ideas and distribute tasks for presentation.

Time for preparing: 30 min.

Presentation and discussion: 20 min.

Situation:

A big enterprise employs about 200 people. You should build the system of strategic personnel management for the next 5 years. Take into account all the 5 following points (each of them needs some improvement).

The current state of the labor potential at the enterprise:

1. The average age of the production staff is above 45. The production management is above 50. The average age of the administration is 36.
2. The production staff is characterized by mono-professionalism (58 %) accompanied by obsolescence of knowledge. 70 % of the administration staff have taken an advanced training corresponding to modern requirements.
3. The corporate culture is not well developed.
4. The social status of the staff is characterized by score of 3 points (on a 5-point scale).
5. The personnel management is in general at the stage of improvement and introduction of modern personnel management technologies. There is a real need in the further development of its system.

The following conditions in the society are expected for the next 5 years:

- The basic technologies will remain the same. New modern equipment will be used.
- A fierce competition in the market and excess of supply over demand will cause a decline in world prices.
- In the next 5 years the labor markets will fully provide the needs of the enterprise in the production and administrative personnel. Though there will be a shortage of administrative specialists in the age under 35 with working experience in modern specialties.

Lesson 3

The activity of personnel management service

Business game “Functional distribution of labor in the organization management” (for groups of 9 students)

Situation:

A new enterprise is created. It should include the following departments:

1. The Law
2. The Security
3. The Finance
4. The Marketing service
5. The HR
6. The Employee Assistance
7. The Laboratory of Sociological Research
8. The Accounting

Task: The HR department should make a project of functional labor distribution. Build a scheme of functional interconnection of your department with the other management departments of your enterprise. Present it in the

form of a table with letters (as follows).

Time for preparing: 30 min.

Discussion: 20 min.

Legend to the table:

R – this department is **responsible** for this function, it organizes its performance and makes the final documentation

P – this department **presents** the benchmark data necessary for this function performance

C – **coordinates** the documents or separate questions during the function performance.

D – takes **decisions**, approves, signs documents.

Each participant of the game (they can be 9, each has the table to fill in) is the head of one department. Also one of the students is the Head of the enterprize. Each “head” puts down letters into the table – according to the degree of his department involvement into this function performance. If a department doesn't participate in this function, you leave the cell empty. The Head also puts letters – marking his role towards the other departments. Then students compare their results and build the general scheme of functional interconnections. The result is presented to the teacher.

Table for the game

Functions of personnel management	Functional units and officials									
Recruitment and placement of staff										
Building of staffing plan										
Registration of employees receiving, transfer and exemption										
Study of the employee turnover causes										
Control of the correct use of the staff										

Creation of the personnel reserve and its training										
Record-keeping of personal files										
Paperwork for rewarding										
Work at the staff professional promotion (career)										
Consideration of papers, complaints, petitions										
Labor motivation of the staff										
Improvement of personnel management methods										
Analysis of the professional and educational composition of the staff										

Lesson 4

Personal life quality management

(individual task)

Situation: you work in the HR. You know that some structural changes are expected at the enterprise, so you can get a sudden promotion.

Task: you should assess your life situation, possibilities and perspectives of promotion. In order for it you build your personal career plan. It includes not only your work but also your personal life and psychological condition. Time for preparing: 30 minutes. Then you can present the results to the group. Work in pairs is also possible (the partners exchange their results and plans of life improvement).

Personal life plan

1. Job

- Do I have a clear picture of the aim of my job?
- Does it contribute to my other life aims?
- What is my main motivation for work?

- What are my career aims?
 - What can help me to make a career?
2. Finance
- What is my personal economic situation?
 - Do I have my personal budget? What is it, and do I fit within it?
 - What actions can I take to improve it in a pinch?
3. Physical condition
- What is my overall physical shape?
 - What is its assessment based on? Is it my personal view, the others' opinion or the results of some objective tests?
 - Do I visit doctors regularly?
4. Social position and human relations
- Do I respect the others' views?
 - Am I interested in problems of other people? Do I take care about them?
 - Am I sincerely interested in the other opinions?
 - Can I listen to the others?
 - Do I appreciate the people I communicate with? How can it be practically proven?
 - Do I contribute to the development of people I communicate with?
 - How do I take care about friendship in my life?
 - How can I improve the relations of feedback?
5. Psychological state
- What is my psychological state now? What stresses bother me?
 - Should I change my job now?
 - What should I change in my way of life – hobby, circle of communication, habits?

- Do I need a help of psychologist?
6. Family
- Do I have conditions to make a family?
 - Should I have one more baby?
 - Do I pay enough attention to my children and wife (husband)?
 - What is better to do in the family circle?
 - Where to go for holidays?
 - Where is it better to go for children to study?
 - How to help my adult children who have their families?

Having analyzed your answers now make a **table of self-improvement**:

Spheres of improvement	action	time
1. Job		
2. Financial condition		
3. My health		
4. Social interaction, friendship, hobbies		
5. Psychological state and motivation		
6. Family life		

Lesson 5

Motivation of the staff

Business game “Staff motivation”

Task:

Analyze any 3 problem situations at the enterprise (of the following 10). Use the **scheme of motivational analysis** given below). Find out their **causes** (obvious and hidden). Suggest the **ways of staff motivation** to resolve the conflict situations with a maximum benefit for the enterprise. You can formulate the possible causes yourself – so, the decisions can also be different.

Problem situations

1. A valuable specialist in marketing is enticed by a competitor.
2. The organization is at the initial stage of team building. People get "lapped" to each other with great difficulty. There are many disagreements.
3. The department-winner of the last year in-house competition took the penultimate place this year.
4. In the planning department loud scandals arise between employees for the third time.
5. There is a leak of information from the CEO office to a competitor.
6. Women employees prevail in the company, the interpersonal relationships are strained.
7. Young employees constantly take part in research projects on the side.
8. The Corporation management constantly gets anonymous letters about the CEO.
9. The workers of you company are against the merge with another large company.
10. An experienced professional (10 years of work) began to perform tasks much worse.

Scheme of the motivation analysis

1. Analysis of the situation:

- what is its place and time?
- who are the participants?

2. Defining the problem:

- formulate the problem;
- name the causes and motives of people

3. Setting the motivation objectives.

4. Plan of the staff motivation building:

identifying the needs of workers;
defining the needs hierarchy;
analysis of the needs change;
finding of the motivation strategy.

5. Implementation of motivation

- creating conditions that meet the needs;
- providing a reward for results;
- assuring that the aim is possible to achieve.

6. Motivation management

- control after the motivation process;
- comparison of the results with the required ones;
- correction.

Task performance:

The students divide into teams of 4-5. The roles: coordinator-manager, coordinator-assistant, 1-2 speakers. There are also 2 independent experts who will assess the final results.

The coordinator-manager sets the tasks before his team. The students think for 10-15 minutes and write down their thoughts and suggestions. Then the ideas are presented before the team, the coordinator organizes it in a system.

The reporters present the results before the whole group. The experts assess it.

Lesson 6

Quality and competitiveness

The aim of the practical task proposed at the lesson 6 is to learn to analyze the competitiveness of products in order to improve their quality.

Supervised learning outcomes:

Learning task	Outcome
1. Identification of spontaneous repute of the products on the market	Literature review
2. Listing the attributes of products	Characteristics review and a questionnaire compiling
3. Significance assessment, that is the assessment of attributes for particular brands	Comparison of characteristics
4. Constructing “the polygon of competitiveness”	The polygon of competitiveness (scheme)
5. Determining the customer satisfaction level	Consumers inquiry and the results of inquiry
6. Working out the guideline to improve the competitiveness of products.	Working out the guideline

At the beginning of the practice students are reminded of some theoretical issues. They should **answer the questions**:

1. What is the competitiveness of a product?
2. What does it depend on?
3. What can you say about its economic, organizational and consumption parameters?

Competitiveness of the product is the level of its economic, technical and working parameters, which allows withstanding competition from other similar brands. In addition, competitiveness is a comparative characteristic of the product with integrated assessment of industrial, commercial, institutional and economic performance relative to the identified market requirements, or properties of other products.

Competitiveness of the product shows its appeal to the real consumer, i.e. preference level of the product on a particular market within a certain period of time.

Competitiveness is determined by three groups of parameters: the consumption, economic, and organizational (commercial).

Consumption parameters characterize the following properties: parameters of intended purpose, characteristics (including the consumer attitude), ergonomic, aesthetic and regulations, a public image of the product, its repute, brand name, etc. Parameters of intended purpose are connected with the range of product use and required fictions. Ergonomic parameters characterize the conformity of products with the abilities of a human body when performing work operations or consuming, that is, they show the level of comfort and convenience. Aesthetic parameters characterize information expressiveness, rationality of the form, perfection of production performance and marketable style stability. Regulations parameters reflect the product properties regulated by mandatory norms, standards and legislation.

Economic parameters characterize the consumer spending to purchase and use the item throughout the period of its use (consumption). The economic parameters are: the price of an item, transportation costs, installation, operation, repair, maintenance, taxes, insurance premium, etc.

Organizational parameters include: discounts, terms of sale, quality of service, guarantees, etc.

The list of relevant parameters for competitiveness and their importance for different customers may vary even within the same market, so it is necessary to assign the components in each case. The components significance and the consumer attitude to them may vary even for the same product in different periods of time, so development of components for competitiveness is one of the key points for its assessment.

To assess the competitiveness of products, it is therefore essential to estimate how much better/worse it meets the consumer requirements if compared to competing products, and during the examination of factors - how they improve or hinder competitiveness of products since a consumer appreciates the benefits of using the product rather than the product itself.

It is reasonable to solve the identified problem of competitiveness and management effects on the basis of the marketing research which involves the study of the customer's attitude to the product of the company under investigation and its competitors as well as the strengths and weaknesses of the internal environment of the company; opportunities efficiency and avoidance of external environment threats.

Assessment of product competitiveness must be carried out periodically, not only in problem situations. This is due to the fact that taking preventive measures based on potential deterioration in the competitiveness of products is more efficient than an attempt to increase its real low competitiveness.

Now the students should analyze the competitiveness of products.

Possible kinds of products (the teacher can choose and offer to students): cars, cosmetics, bakery products, mobile phones – or something else which the students use in their life.

To perform the task it is essential:

1. to identify spontaneous reputations of the product on our market;

2. to develop the list of attributes;
3. to assess the significance of attributes for particular brands;
4. to construct “the polygon of competitiveness”;
5. to determine the customer satisfaction level;
6. to work out the guideline to improve the competitiveness of products.

The data collection **method** is an inquiry. The **tool** for data collection is a questionnaire. The inquiry may include open-end, close-end and semi-closed questions:

- an open-end question may be as follows: which shampoo brands do you know? Possible answers are not suggested.
- close-end question limits respondents with a list of answer choices from which they must choose to answer the question.
- semi-closed questions combine suggested possible answers and an option to enter your own choice.

Example. Analysis of the shampoo Pantene Provi competitiveness.

To begin with, the students compile a questionnaire. They divide into groups, specify the kinds of the chosen product and write a list of its attributes.

1) Which shampoo brand comes to your mind first?

(possible answers: Pantene Provi, Shauma, Timotei, Head and Shoulders and others).

2) Which of the listed attributes are essential for you to choose a shampoo:

- foaming
- fragrance
- viscosity
- package design
- brand repute
- variety of products

- ease of use
- package volume
- a good name for shampoo
- colour of shampoo
- new products
- presence of vitamins
- presence of conditioners
- rinsability
- presence of medicinal herbs
- hypoallergenicity
- affordability
- sale place
- other answers _____

Now the students apply the questionnaire to assess the evidence of attributes of particular brands. They can ask each other and then process the data at the lesson (*another variant: the inquiry and its analysis can be continued as a home task – depending on the situation*).

“Dear respondent, the students of Tomsk Polytechnic University conduct a research on the shampoo Pantene Provi competitiveness within Tomsk market...”

1. Grade the characteristics which are essential for you to choose a particular shampoo on a 8-point scale (8 points being the most important and 1 point being the least important). Numbers are not repeated.

Criteria	Priority ranking
Fragrance	
Foaming	
Presence of conditioners	
Presence of vitamins	
Viscosity	

Package volume	
Presence of medicinal herbs	
Package design	

2. Please, grade on a 8-point scale (8 points being the most important and 1 point being the least important) the level of your satisfaction with each of the brands in accordance with the proposed characteristics.

Criteria\ Shampoo brands	Pantene Provi	Timotei	Schamtu	Head& Sholders
Fragrance				
Foaming				
Presence of conditioners				
Presence of vitamins				
Viscosity				
Package volume				
Presence of medicinal herbs				
Package design				

Collected data processing

Table 1 provides generalized results of the inquiry and shows the attitude of consumers to the well-known brands of shampoo.

Table 1

Consumers' attitude to some shampoo brands

Brand attributes	Fragrance	Foaming	Conditioners	Vitamins	Viscosity	Package volume	Medical herbs	Package design	Average point
Pantene Provi	6.6	6.2	6.2	6.9	7.2	5.7	4.9	5.4	6.14
Head&Shoulders	6,3	6,9	5,8	6,2	6,8	5,8	4,8	5,3	5,99
Timotei	6,8	5,9	5,6	6,2	6,0	5,3	4,8	5,5	5,76
Schamtu	6,5	5,6	5,4	5,9	6,0	5,6	4,8	4,6	5,55

As it is seen from Table 1, Timotei package design meets the requirements of most of the consumers (5.5), Pantene Provi package design gets 5.4 points, Head&Shoulders gets 5.3 points and Schamtu gets the least 4.6 points.

Head&Shoulders package volume suits most of the consumers (5.8), Pantene Provi gets 5.7 points on a 8-point scale, Schamtu gets 5.6 point and Timotei gets 5.3, respectively.

However, most of the consumers like Timotei fragrance (6.8), Pantene Provi gets 6.6 points, Schamtu gets 6.5 points, and Head&Shoulders gets only 6.3 points.

Concerning presence of medicinal herbs Pantene Provi keeps the leading position (4.9), Timotei, Schamtu and Head&Shoulders have the same points (4.8).

Concerning presence of conditioners, Pantene Provi is the leader (6.2), Head&Shoulders gets 5.8 points, Timotei gets 5.6 points, Schamtu gets 5.4.

Presence of vitamins in Pantene Provi suits most of the consumers (6.9), Head&Shoulders and Timotei have the same points (6.2), Schamtu gets 5.9.

Thus, the most essential attributes to choose a shampoo are: fragrance (0.14), foaming (0.13), presence of vitamins (0.13), viscosity (0.13), presence of conditioners (0.12), package volume (0.12). The least important attributes are: package design (0.11), presence of medicinal herbs (0.1). Fig. 1 clearly presents the results.

Such attributes as viscosity (0.52), foaming (0.48), vitamins (0.37), package design (0.35), and presence of conditioners (0.30) differentiate brands to the largest degree. Package volume (0.19) and fragrance (0.18) differentiate brands to the least degree.

Pantene Provi keeps the leading position in total (6.07), Head&Shoulders gets 5.92, Timotei gets 5.7, Schamtu gets 5.5 points.

Pantene Provi is the leader in the consumers' attitude to this particular brand of shampoo. The weakest characteristics of this shampoo are its fragrance and foaming, but these characteristics are the most essential and should not be ignored.

However, the presence of vitamins, medical herbs and conditioners as well as viscosity of Pantene Provi meet the customer requirements and should be used to effectively promote the shampoo. The polygon of competitiveness is presented in Fig. 1.

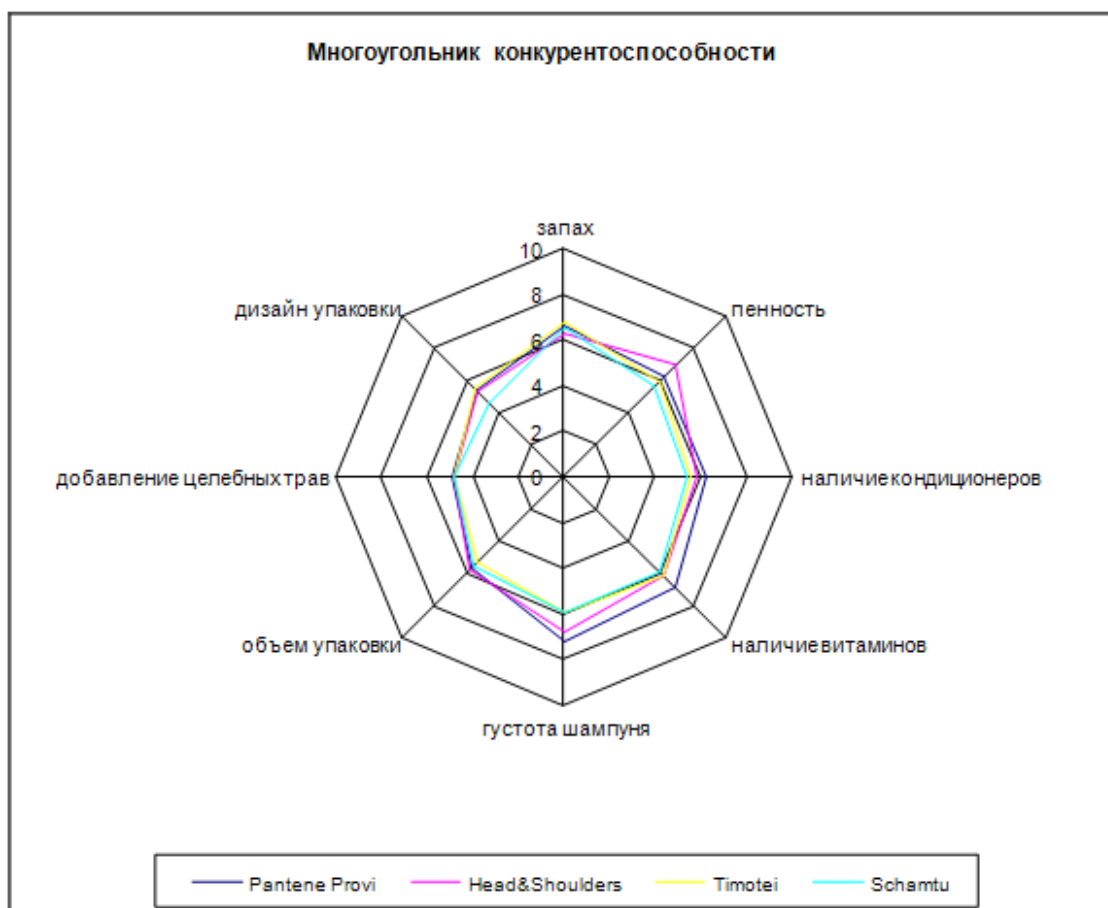


Fig. 1. The polygon of competitiveness

After this analysis at the lesson the students are given the home task: to make the “Guideline to improve competitiveness of the chosen product”. At the next lesson they should make a report on the work performed including the information describing the shampoo manufacturer: its mission, products, achievements, product quality, awards. It is necessary to use the additional information about the manufacturer (from the Internet or literature).

Their work can be assessed by the following **estimation criteria:**

1	2	3	4	5
Literature review (bibliography cited)	Less than 5 points	5-6	7-8	Greater than 8
Characteristics review	Less than 7 points	7-8	8-9	Greater than 9
The polygon of	Black-and-	No symbols	Scale is not	Highly coloured,

competitiveness	white colour		suitable	suitable scale, symbols
Consumers inquiry (a number of respondents)	Less than 10	11-15	16-20	Greater than 20
Inquiry results	Description in text mode	Diagram	Diagram, table	Diagram, table, comparison of results
Working out the guidelines	No guidelines	No guidelines	Comparison of characteristics is given, no guidelines	Comparison of characteristics is clearly stated, 3 recommendations and more

Score:

20-16 points: correctly stated material with conclusions and reasonable suggestions.

15-13 points: competent work with insignificant faults in the content or design.

12-10 points: inconsistently stated material with unfounded conclusions.

Lesson 7

Management Functional Assessment Model (MFAM)

The aim of the practical task proposed at the lesson 8 is to learn to apply the MFAM in the quality management at the enterprise. At the beginning of the training the students revise a few theoretical issues on MFAM. They answer the questions:

- What is MFAM?
- What advantages and possibilities does it give to quality managers?

Management Functional Assessment Model (MFAM) lets the head of the organization analyze not only the business process but also his own managerial activity. It helps to reveal strong and weak points, determine the high-priority spheres which need improvements and trace the dynamics of changes. The Management Functional Assessment Model (MFAM) is a very efficient tool for constant improvement of management system. The description of this model can be found at the site www.deming.ru («Management technologies»).

Practical task: the students are divided into groups of 2-3. Each group has one administrator who will lead the group work and present the final results.

Situation: a mature organization operates efficiently, effectively and achieves sustainable success. It mostly depends on its Top management who

- understand and meet the needs of the interested parties;
- are monitoring changes in the organization's environment;
- reveal the possible spheres which need improvement;
- define the strategy and policy;
- set the aims;
- manage the processes and resources;
- show their trust in their employees, which leads to increased motivation, dedication and involvement;
- establish a mutually beneficial relationship with suppliers and other partners.

Now the Top management which is interested in the use of self-esteem as an important instrument for the maturity level analysis, decided to introduce the Management Functional Assessment Model (MFAM) into the management system.

In accordance with the order of the head of the organization a working group for analysis, testing and implementation of MFAM has been created.

Task for all the groups:

1) make a comparative analysis of the MFAM criteria (Table 1) and the requirements of GOST R ISO 9001-2008. Present a small speech on this topic.

2) use the MFAM model to define the maturity level (Table 2, 3) of an organization you have been in (for example, during the manufacturing practice).

3) work out the ways to improve the management system of this organization (Table 4).

4) Present the results before the other groups. They may ask questions as opponents.

Time for preparation: 45 min. Time for one presentation (with discussion): 10 min.

Table 1

GOST R ISO 9001-2008 and MFAM conformity assessment form

MFAM criteria	GOST R ISO 9001-2008
1. Planning	
1.1. Setting of goals and strategic objectives	
1.2. Collection and analysis of the information about customers and market	
1.3. Detailed elaboration of business process	
1.4. Collection and analysis of the information about competitors and benchmark companies	
1.5. Resource planning	
2. Organization	
2.1. Building of the organizational structure	

2.2. Distribution of authority and establishment of responsibility areas	
2.3. Conditions for the Learning Organization establishment	
2.4. Basic process performance	
2.5. Efficiency of creating new values for clients	
3. Motivation	
3.1. Leadership and corporate culture	
3.2. Conditions for training and professional development of the staff	
3.3. Level of employees' needs	
3.4. Involvement of the employees into the process of improvement	
3.5. Satisfaction of employees with the results of their work	
4. Control	
4.1. System of quality control at each stage of the business process	
4.2. Criteria for evaluation of the results	
4.3. Measurement of the customers' satisfaction degree	
4.4. Rational use of resources	
4.5. Compliance of the obtained results with the set objectives	
5. Coordination	
5.1. Connection and coordination of the first four functions	

5.2. Establishment of the interconnections in the organization	
5.3. Conflict resolution system	
5.4. Current analysis of deviations: revision and adjustment of plans	
5.5. Informational management	

Table 2

«Rapid assessment of the enterprise activities by the MFAM model»

Each question has five possible answers. Choose the variant which characterizes more exactly the current state of this sphere:

- 0** – there is no activity at all;
- 1** – the activity is impermanent and occasional;
- 2** – the activity is partially carried out, depending on the situation;
- 3** – the activity is constant and systematic;
- 4** – activities are carried out as efficiently as possible.

MFAM criteria	Score
1. Planning	
1. Is the purpose of the organization clearly defined? Are there any strategic and operational objectives?	
2. Is the collection and analysis of customer data performed?	
3. Is there any exact distribution of the responsibilities at the enterprise?	
4. Do they analyze the information about competitors and the experience of other companies?	
5. Are the enterprise resources distributed efficiently? (concerning material, human, financial, information resources)	
2. Organization	
6. Is the organizational structure of the company quite clear?	
7. Are there any documents and standards regulating the duties and	

scope of responsibilities for separate departments and each employee?	
8. Are there any conditions for improvement and development of the enterprise?	
9. Is the production (or service making) process efficiently organized?	
10. Are the products (services) attractive for customers?	
3. Motivation	
11. Does the Head have high leadership qualities?	
12. Are there any created conditions for training and development of the employees?	
13. Are the personal needs of the employees satisfied?	
14. Do the employees take part in the enterprise development activities?	
15. Are the employees satisfied with the results of their work?	
4. Control	
16. Does the enterprise have the system of the production process quality assessment?	
17. Does the enterprise have the system of the obtained results assessment?	
18. Are the opinions and suggestions of clients taken into account in the work of the enterprise?	
19. Is the efficiency of resource use at the enterprise assessed?	
20. Do the obtained results confirm to the aims of the enterprise?	
5. Coordination	
21. Is the enterprise management system efficient?	
22. Are the interrelations between the departments established?	
23. Is there a conflict prediction and resolution activity at the enterprise?	
24. Do they lead the correction and adjustment of plans and tasks?	
25. Do they use new informational technologies and telecommunications?	
Total management assessment	

Table 3**Assessment of the maturity level of the enterprise**

There are five possible levels of the management maturity at the enterprise. Its development depends on the current state of management.

level	score	characteristic of management conditions
I	(0-20)	The management is unsystematic, goals are not defined or too vague. For the further development the business principles should be radically revised.
II	(21-40)	The management system has a development potential but these possibilities are implemented poorly. The top management should be active, clearly define the goals and work out the quality based management development strategy.
III	(41-60)	The management system in the company has been formed. Now it is necessary to pay attention to the business process optimization and quality improvement at each stage. Improving the management system you should take into account the importance of customers and employees needs.
IV	(61-80)	The majority of spheres are characterized by a constant improvement of the management quality. It is necessary to support the dynamics of improvements and begin the changes in the remaining areas of concern, using the benchmarking and other improvement strategies.
V	(81-100)	The maximum results in all the management spheres are achieved. The management system is optimal.

Table 4

Analysis of the organization communication profile

To represent the results of MFAM application a pentagram can be used (Fig. 1). The organization communication profile can be built basing on the five assessment criteria of the functional model (Fig. 2). This approach allows to clearly see the weak points which require the priority improvements of management.

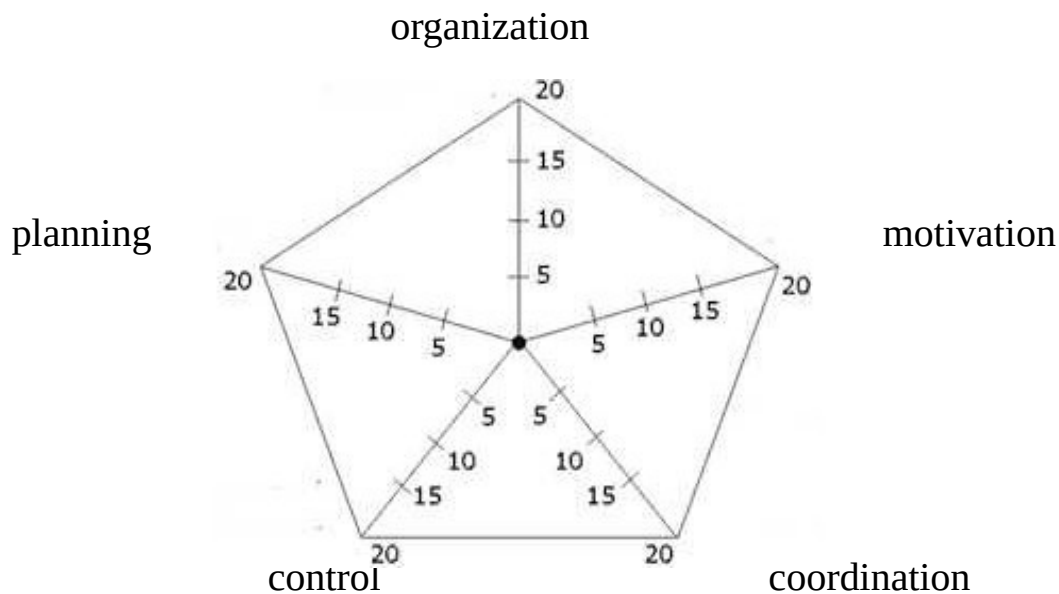


Fig.1 - Pentagram for visualization of MFAM application results

The organization communication profile represented in the Fig. 2 shows that the enterprise has problems with motivation and control. These spheres of management need further improvement and development.

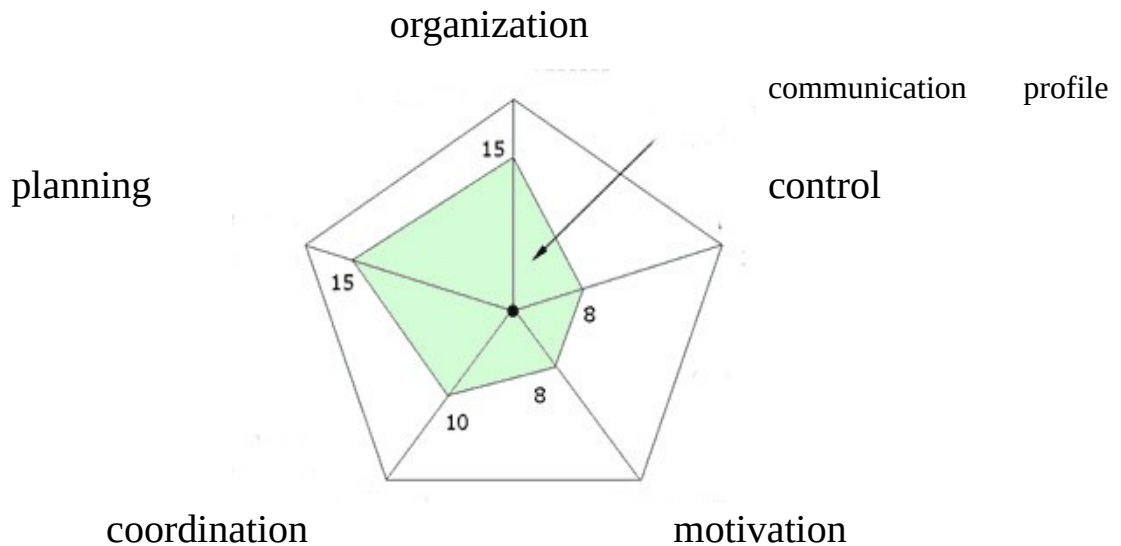


Fig. 2. The organization communication profile

It is necessary to take into account that any improvement in one sphere leads to the improvements in the others, because the criteria are closely interconnected.

Each time when you implement any changes, a new communication profile can be built and compared with the previous one – in order to determine the dynamics of the competitive management system building. Thus, the methodology of constant improvement of Deming (the cycle PDCA – Plan, Do, Check, Act) is practically realized within this functional model.

The points of MFAM results application

The MFAM can efficiently solve the most important management problems, improving the compatibility and business indicators of an organization. The conclusions which the organization makes after the MFAM analysis can be regarded as key points of activity, the improvement of which provides a stable development of the organization and helps to get certain advantages.

Key points of activity	Advantages
Improvement of processes	Clear understanding how to create values for customers
Achievement of the goals	Implementation of strategic objectives based on the available opportunities and realizing the potential of the organization's strong points
Benchmark comparison of the key results of the activities	Ability to measure the dynamics of improvement and level of the stated objectives achievement
Creating a system of operational planning based on the policy and strategy of the organization	The clarity and unity of goals within the organization contribute to the effective realization of the constant improvement process
Combining all the improvement initiatives into a single process	The interconnection of all the activities within a systematic approach to the management decisions
Development of team activities	The development and involvement of workers based on the common values, trust and corporate culture – as it is required by modern approaches to the management of organization

Lesson 8

Organizational actions in response to customers satisfaction and improvement of production efficiency

The aim of this practical task is to learn to analyse the information about customers in order to define the level of their satisfaction and to find out the company's strategy in response.

To begin with, students revise and discuss a few theoretical issues. They **answer the questions:**

1. What is the essence of Noriaki Kano theory?
2. What questionnaire did he offer?
3. What are the three types of product features in his model?

In 1984 the Japanese scientist Noriaki Kano worked out the concept of Attractive Quality Creation. It is a customer satisfaction model (now known as the Kano model) whose simple ranking scheme distinguishes between essential and differentiating attributes related to concepts of customer quality.

In this model, first, different descriptions of attractive quality are examined in order to determine whether there is a common understanding of the concept. Second, the ability to manage attractive quality creation in accordance to a proactive ideal is approached by an examination of the current ability to predict the occurrence of attractive quality.

Kano believed that not all attributes of product or service performance are equal in the eyes of the customer, and that some attributes create higher levels of customer loyalty than others. He proposed the questionnaire, which aims to identify the characteristics (features) of services or goods which provoke the consumer's delight. The questionnaire lets divide all the features into three types. They are "obligatory", "one-dimensional" and "attractive" features. The example is shown in the table below:

How do you feel about the fact if a particular feature is added to the product?	How do you feel about the fact if there is no such feature in the product?
New feature	Current feature
<ul style="list-style-type: none"> • I like it; • I expect it; • It is equal for me; • I don't like it but I am ready to endure it; 	<ul style="list-style-type: none"> • I like it; • I expect it; • It is equal for me; • I don't like it but I am ready to endure

<ul style="list-style-type: none"> • It is unacceptable for me; • Other 	<ul style="list-style-type: none"> • it; • It is unacceptable for me; • Other
How much more are you willing to pay for a product with a new feature? 0%, 5%, 10%, 20%, 25%	

Each question here has two parts: what is your attitude to the fact, whether a certain feature is added to a product or not. Sometimes an additional question is added: how much more is the customer willing to pay for a product with a new feature? Unfortunately the questionnaire doesn't allow to know what feature exactly should be added to a product. We have to guess it ourselves. But the questionnaire lets know if we achieve the breakthrough with the new feature or not. And this is exactly what we need.

The question is divided into these two parts because the «breakthrough feature» identification is based on the interconnection of the answers of these two types of questions (about a product with or without a new feature). For example, if the customer says about the current characteristic that “it is equal for him” and about the new feature – that “he likes it”, it shows a breakthrough. But if he says that “he expects” a new feature and “doesn't like” the current one, it shows that elementary "patchwork" is necessary. We can't speak about any breakthrough if the basic needs of customers are not satisfied.

A new feature should improve the customer's satisfaction, so we divide all the features of goods (services) into three types: "obligatory", "one-dimensional" and "attractive".

Obligatory features are those normal characteristics which meet the basic requirements of customers. Without them the production will never be bought. But if they are present, the customer will never be grateful for it – because he considers them as a of course. The example is a rearview mirror for cars: nobody is interested to buy a car without it.

One-dimensional features: the better they are realized in the product, the greater is customer's satisfaction. If they are present to a greater extent, the customer will be more satisfied. The shelf life or service life of products is an example of it: the more, the better.

Attractive features. Nobody requires the presence of these characteristics in the products – because nobody expects it. In the case of their absence the customers' attitude will be neutral, and they will not express dissatisfaction. But if the attractive features are present, the customer will be happy. For example, nobody outrage about the rearview mirrors which you can regulate automatically, not leaving your car seat. This feature proved to be unexpected and the customers were pleasantly surprised.

Attractive features are not not durable. In the course of time they become obligatory, when customers get used to them.

Having analyzed the questionnaire and divided all the features into three types you can start building a **competitive strategy**. The obligatory features let us improve the satisfaction of the dissatisfied consumers and reduce losses from sales caused by the low quality of products. The one-dimensional features let us not only to increase the sales but also to raise the price. And the attractive features are our skip to new markets! This is what the questionnaire was created for.

These three characteristics of goods should respectively satisfy three types of needs: **expected, desired and admired**.

To determine the accordance / exceeding of customers' expectations they should be compared with the satisfaction of their desires. The level of consumer

expectations is the level of feasibility of his ideas, whereas the level of desires is an ideal benchmark for a customer.

Expected quality of product – it is a set of characteristics that may encourage to buy or not. It depends on the generally accepted standards held by the majority of business companies. For example, the presence of clean towels in the hotel rooms is a feature expected by the majority of customers. Satisfaction of these needs means just that the manufacturer stays in business. If they are not satisfied, the business will lose clients. But if the quantity of towels will be increased it doesn't mean that the customers will be more satisfied.

Thus, some features are a necessary condition for satisfaction – their absence causes discontent, but the increase of their quantity doesn't improve satisfaction.

Desired quality of product – if you improve the product, the satisfaction increases. For example, the less is the waiting time at the hotel reception, the more is the client's desired needs satisfaction.

Admired quality of product is a new unexpected level of service. In such cases the customers can be pleasantly surprised, delighted and even stunned – for example, if they receive a bottle of champagne standing in line to register at the hotel. But you should be aware that this delightful quality will soon transform into a necessary one and will be accepted as normal.

You should always begin the product quality study from the expected one.

Execution order:

- 1) Students are divided into groups of 3-5.

2) The teacher offers them a certain product (or service) as an object for analysis – different for each group.

3) Students should choose 7-10 current features of this object and 3-5 new ones.

4) The groups exchange their objects and fill in the questionnaire of Kano. So they act as “customers” for each other and assess the production.

5) The questionnaires (filled) are given back to the “manufacturers”. The “manufacturers” analyze it and make a conclusion about the importance of each feature of their product and about the customers' satisfaction with its quality in general.

6) The results are presented before the groups.

7) The groups issue their “official” reports about their investigation.

Lesson 9

Quality management and control tools

This practical task is aimed at the development of skills to use different methods and tools of quality management and control.

To begin with, students revise and discuss a few theoretical issues.

They give their ideas and examples on such topics as:

1) Seven quality control tools

- Pareto chart (used to reveal the problems which have the greatest impact);
- Cause-and-effect diagram (used to determine and structure the impact of different factors)
- Checklist (used to collect, record and organize data on the detected flaws);
- Graphs (used for effective representation of the obtained data);

- Bar chart (for better representation of the structure and change of the analysed data);
- Scatter diagram (to reveal the correlations between the interconnected data);
- Control chart (to reveal the correlations between the interconnected data).

2) Seven quality management tools

- affinity diagram;
- cause and effect diagram;
- tree diagram (decision tree);
- matrix diagram;
- process diagram;
- arrow diagram;
- the matrix of priorities.

3) Why are these seven tools considered new?

The quality control tools were designed for quantitative analysis of quality data. They use simple but scientifically recognized methods able to solve 95 % problems of analysis and quality management in different spheres. They mainly use mathematical statistics techniques. They are accessible to all the participants of production and can be used at all the stages of product life cycle.

However, when creating a new product, not all the facts are numerical in nature. There are facts amenable to a verbal description only. Consideration of these factors is approximately 5% of all the problems in the field of quality. It mostly refers to the field of processes, systems or teams management. In meeting its challenges, along with statistical methods, it is necessary to use the results of the operational analysis, optimization theory, psychology.

So, JUSE (Union of Japanese Scientists and Engineers) worked out a new useful and powerful toolkit basing on these sciences. New tools, named “Seven quality management tools”, allow to facilitate the task of quality management by means of these factors analysis. In the field of quality management application of the “Seven new tools” is more efficient:

- at the stage of new production development and project preparation,
- to work out actions aimed at the elimination of flaws and reduction of claims
- to improve safety and reliability;
- to ensure the issue of pollution free products;
- to ensure the objectivity of surveillance;
- to improve standardization, etc.

Students should also revise **the method of brain storming** which will be used when performing the task. This method allows to generate as many ideas as possible. Then the Delphi method can be used for collection and processing of the data. It helps to choose the best variant among all the ideas: the participants should assess each variant in a certain subsequence. After the brain storming the participants can choose the data and make diagrams on the new seven management tools.

Execution order

1. The students are divided into groups of 4-5.
2. Each group gets the initial data from the teacher (a situation, a certain product or service for study).
3. Each group performs its task using necessary software and presents the results in electronic format
4. Students answer the control questions.

Tasks for each group:

1. Build the affinity diagram for the factors which contribute to the improvement of consumer properties of the specified product.
2. Build the cause and effect diagram to reveal the most important (throttling) factors which cause the flaws in the specified product.
3. The obtained set of factors (from the task 1) should be represented as three-level tree diagram. The third level should specify the quantitative indicators for each factor.
4. Work out the necessary actions to improve the indicators of the specified product factors. Display their relationship as L-shaped matrix diagram. Specify the weight of factors and the highest priority action. Build the Pareto chart on the importance of events.
5. Build the network plan graph of the priority action implementation to improve the indicators of the most important factor.

Tips for building diagrams:

Affinity diagram is a tool which helps to reveal the basic disturbances in the process by means of combining the related verbal information. The founder of this method is the Japanese scientist Jiro Kawakita. This business tool is used to organize ideas and data. It is one of the Seven Management and Planning Tools. People have been grouping data into groups based on natural relationships for thousands of years; however, the term “affinity diagram” was devised by Jiro Kawakita in the 1960s and is sometimes referred to as the **KJ Method**.

The tool is commonly used within project management and allows large numbers of ideas stemming from brainstorming to be sorted into groups, based on their natural relationships, for review and analysis. It is also frequently used in contextual inquiry as a way to organize notes and insights from field

interviews. It can also be used for organizing other freeform comments, such as open-ended survey responses, support call logs, or other qualitative data.

The affinity diagram organizes ideas with following steps:

1. Record each idea on cards or notes.
2. Look for ideas that seem to be related.
3. Sort cards into groups until all cards have been used.

Once the cards have been sorted into groups the team may sort large clusters into subgroups for easier management and analysis. Once completed, the affinity diagram may be used to create a cause and effect diagram.

The affinity diagram is built on the basis of “brain storming” or analysis of a problem. The diagram is usually built in such sequence:

1. Students make a list of ideas, write them on the self-adhesive sheets and attach them to a large sheet of paper or board available for review to all the team members.
2. Systematize the ideas (sheets) having a common direction – in groups. This work is carried out without discussion. Preforming of group names is possible.
3. If there is some similarity between some groups, they can be combined into one large group. Some of the ideas can be reformulated, combined or differentiated at this stage.



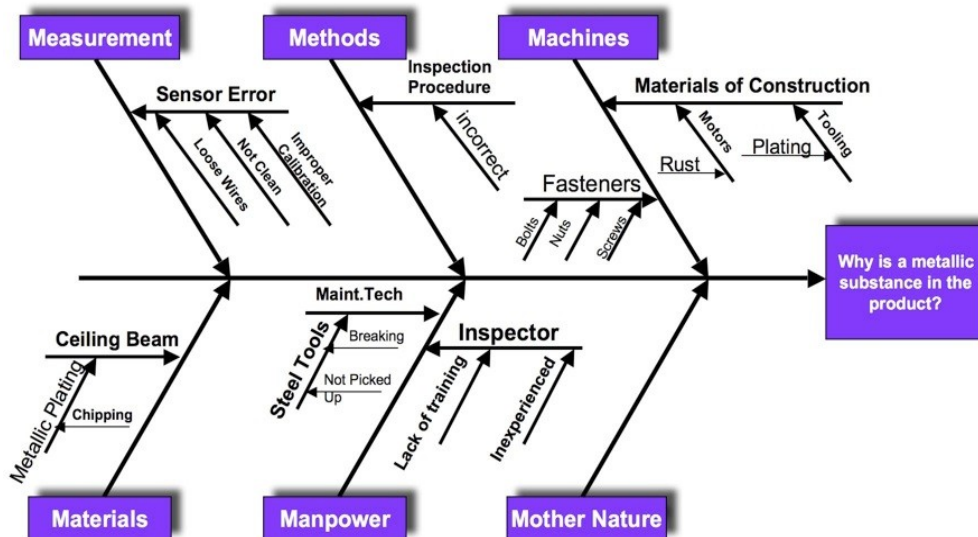
Example of the affinity diagram

Cause and effect diagram – Ishikawa diagrams (also called **fishbone diagrams, herringbone diagrams, cause-and-effect diagrams, or Fishikawa**) are causal diagrams created by Kaoru Ishikawa (1968) that show the causes of a specific event. Common uses of the Ishikawa diagram are product design and quality defect prevention, to identify potential factors causing an overall effect. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify these sources of variation. The categories typically include:

- People: Anyone involved with the process
- Methods: How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations and laws
- Machines: Any equipment, computers, tools, etc. required to accomplish the job
- Materials: Raw materials, parts, pens, paper, etc. used to produce the final product
- Measurements: Data generated from the process that are used to evaluate

its quality

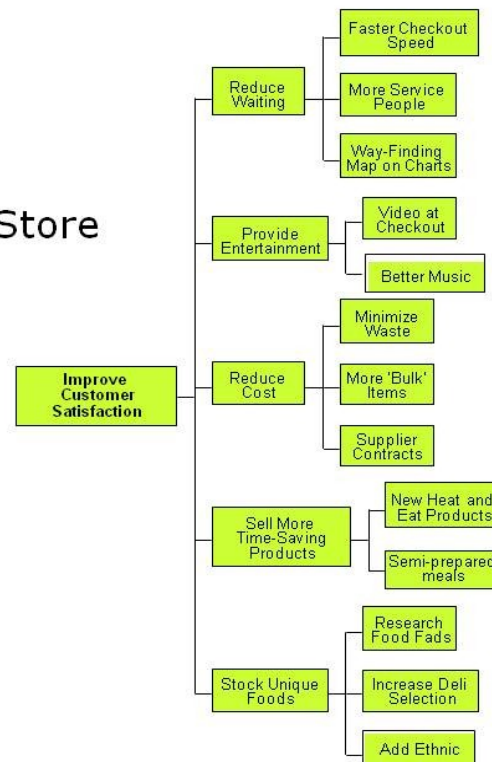
- Environment: The conditions, such as location, time, temperature, and culture in which the process operates



Ex:

Tree diagram is a tool providing a systematic way to resolve a current problem or to satisfy the customer's needs represented on different levels. Unlike the affinity and cause-and-effect diagrams this tool is more focused. The tree diagram is built as a multistage tree structure, the elements of which are different ways to solve the problem.

Improving Customer Satisfaction in a Grocery Store



Example of the tree diagram

Matrix diagram is a graphical tool that shows the connection or correlation between ideas or issues in the form of a table (matrix). A relationship is indicated at each intersection of rows and columns as present or absent. This tool reveals the importance of different links. It is used to organize large amounts of data so that the links between different elements are graphically illustrated. In its final form, the matrix diagram expresses the correspondence of different facts and phenomena to the causes of their emergence and means of eliminating their consequences. It also shows the degree of these facts dependency on their causes and measures to eliminate them. Such matrix diagrams are called connection matrixes.

	Item A	Item B	Item C	Item D	Item E
Item 1					
Item 2					
Item 3					
Item 4					
Item 5					

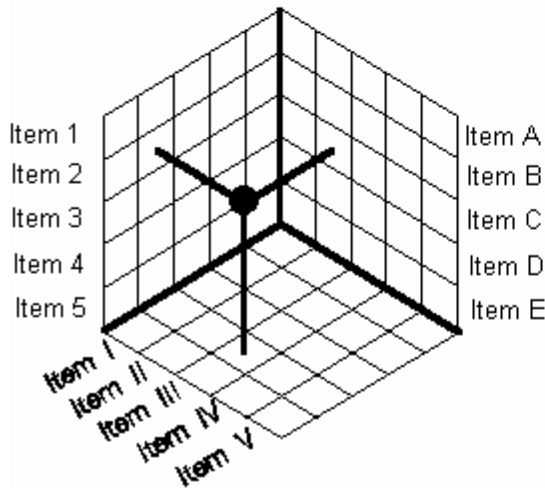
L-matrix

Compares one list against one other

			Item I			
			Item II			
			Item III			
Item a				Item A		
Item b				Item B		
Item c				Item C		
			Item 1			
			Item 2			
			Item 3			

X-matrix

Compares four lists, each against two others, in pairs



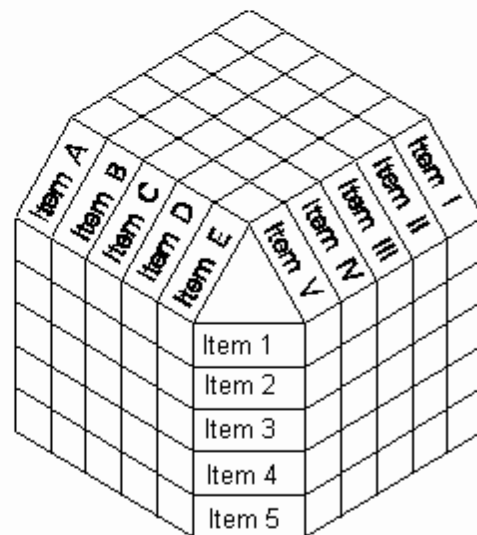
C-matrix

Compares three lists against one another, simultaneously

Item I					
Item II					
Item III					
Item IV					
Item V					
	Item A	Item B	Item C	Item D	Item E
Item 1					
Item 2					
Item 3					
Item 4					
Item 5					

T-matrix

Compares one list against two others in pairs



Y-matrix

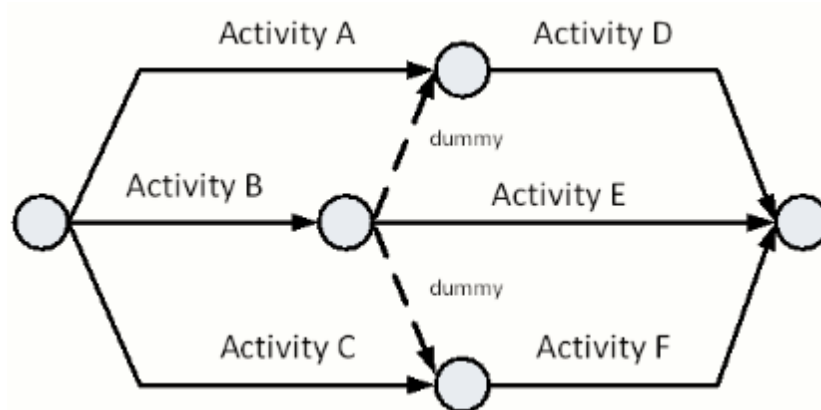
Compares three lists, each against one another, in pairs

Example of the matrix diagram

Arrow diagram is a tool allowing planning the optimal terms of all the works performance for the quickest and successful achievement of the stated goal. The implementation of this tool is possible only when the problems are

revealed and the necessary actions, terms and stages are defined – so to say, after the first four diagrams have been built.

The arrow diagram shows the progress of the works: the order and timing of their various stages from day to day. This tool is used to ensure that the planned time is optimal to achieve the final goal. It can be used not only for planning but also for the subsequent monitoring of the planned work implementation. It is especially popular for development of various projects and production planning.

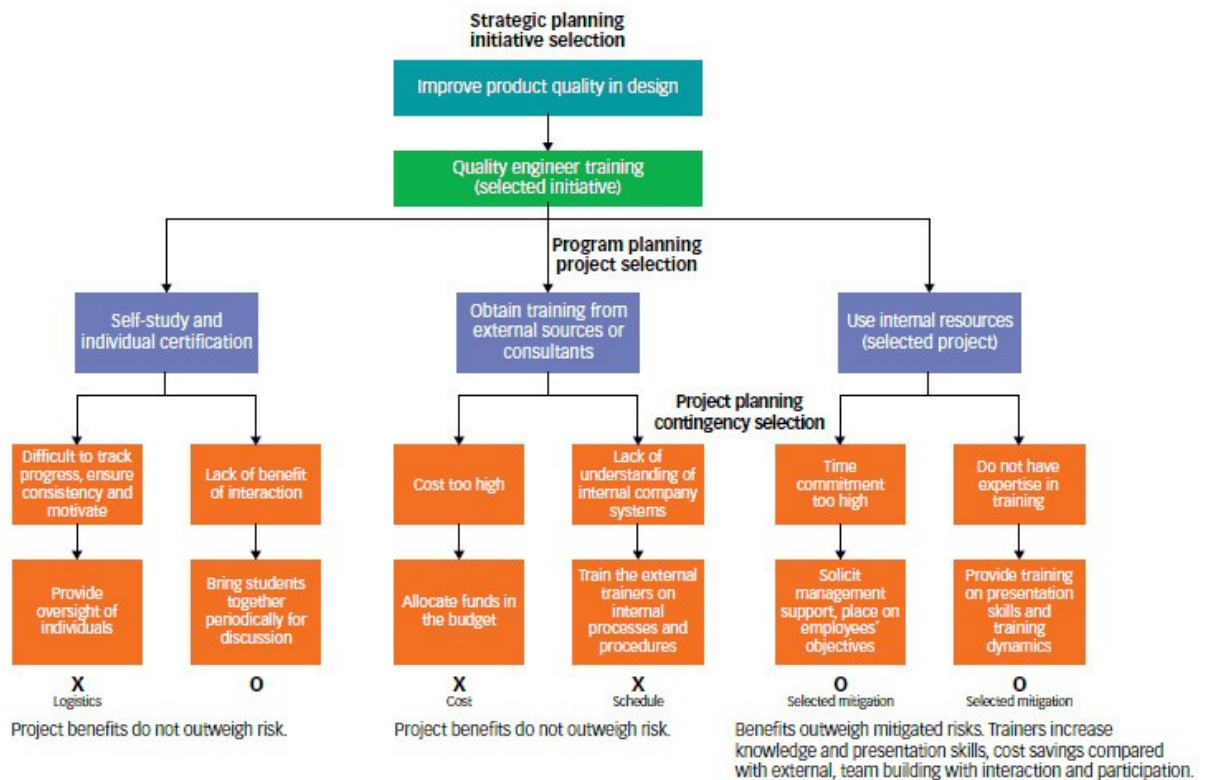


Example of the arrow diagram

Sometimes a "dummy task" is added, to represent a dependency between tasks, which does not represent any actual activity. The dummy task is added to indicate precedence that can't be expressed using only the actual activities. Such a dummy task often has a completion time of 0.

Process Decision Program Chart (PDPC) is a tool for assessment of terms and appropriateness of the program implementation work (according to the arrow diagram). It is built for the purpose of its adjustment in progress. PDPC is a diagram reflecting the sequence of process, actions and decisions necessary to obtain the desired result.

Process decision program chart example



Lesson 10

Methods of quality control. Types of control

Objective: to consider the issues related to control, maintaining cooperation with suppliers, and assessing the effectiveness of work.

Theoretical questions for revision

What is the purpose of control? What types of control do you know?

The purpose of the control is to ensure that the customer receives the

product of the required quality. There are three variants of control:

- 1) 100% control (expensive, time-consuming, not always feasible);
- 2) sample control based on the mathematical theory of probability (the most appropriate method for the customer, particularly if an independent manufacturer takes responsibility for the products to meet the requirements);
- 3) random sampling with no mathematical proof (not a good solution as it comes with high risk of mistakes and inability to perform calculations).

It should be noted that the costs for testing materials or components are to be minimized.

What types of defects do you know?

The types of defects are as follows:

- 1) **Critical defect** is the defect that can cause danger or threat to safety of people using, maintaining or relying on the product, or complete incapacitation.
- 2) **Big defect** is the defect which leads either to failure or substantial reduction of production efficiency;
- 3) **Small defect** is the defect that does not impact functioning of the product.

A completely defective product is the product with one or more critical defects.

A highly defective product is the product with one or more big (but not critical) defects.

A slightly defective product is the product with one or more small defects.

What the forms of control should be implemented before the product is accepted?

There are a number of basic types of control carried out prior to product

acceptance:

1) periodic monitoring the effectiveness of the quality assurance system of the manufacturer and analyzing daily performance;

2) requirement to supply the products with the control process protocols;

3) requirement to the supplier to carry out 100% inspection and testing;

4) acceptance sampling of the lot;

5) formal system of quality assurance defined by the consumer and used by the supplier (e.g. ISO 9000 (2000));

6) verification, inspection or testing of products by the consumer at the supplier or subcontractor;

7) inspection or testing and certification which implies involvement of the third party at some stage prior to acceptance of the products by the consumer.

100% input control is not always acceptable. Sample based on Limiting Quality or Lot Tolerance Percent Defective programs is used for serial, large-scale and mass production when the quality of individual lots is to be inspected.

What is one-phase sample by attributes?

In this type of control one sample is inspected for conformity to technical documentation. In case the number of defective units (units with one or more defects not permitted by technical documentation) in sample does not exceed the acceptance number, the lot is accepted. If the number of defective units per sample exceeds the acceptance number, the lot is rejected and, as a rule, returned to the manufacturer without the right for subsequent inspection. This type of control is referred to as non-rectifying sampling inspection.

To use quality units from rejected lots defect inspection can be performed. In this case, the rejected units are subjected to ongoing control of the lot. As a result, all quality units are accepted and defective ones are replaced.

The lot tolerance percent defective ranges from 0.5 to 10 %, and the consumer's

risk (probability of acceptance of a lot with the lot tolerance percent defective) varies from 5 to 10 %.

The universal formula proposed for calculating control plans with the acceptance number of zero by Academician A.N. Kolmogorov is

$$n=N\left(1-\left(\frac{\beta}{100}\right)^{\frac{100}{qN}}\right)$$

where β - the average percent of accepted lots;

q - the fraction defective , %;

n - the number of units per sample;

N - the number of units per lot.

The expected percentage of accepted lots in this sample number is determined as a function of the fraction defective per lot and is referred to as the operating characteristic of the control plan:

$$\beta(q)=100\left(1-\frac{n}{N}\right)^{\frac{qN}{100}}$$

The operational characteristics of the control plan can be illustrated in the form of a diagram (Fig. 1), which the manufacturer can use to determine the quality level of the most of lots to be accepted by the consumer and to take appropriate measures to ensure the production of the desired average input quality level by the formula:

$$q=\frac{100\lg\beta-2}{N\lg\left(1-\frac{n}{N}\right)}$$

To choose a control plan standards with tables of control plans are worked out.

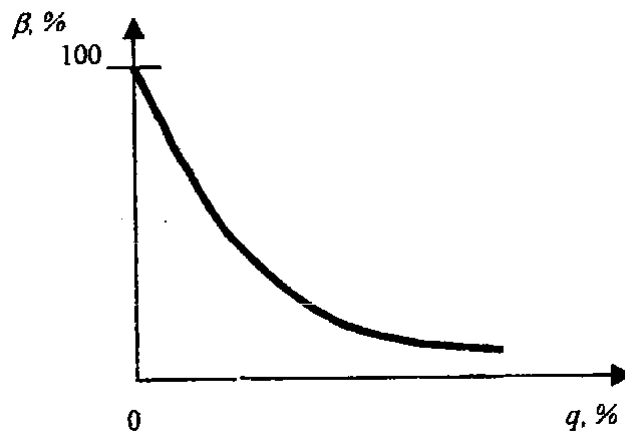


Fig. 1. Operational characteristics of the control plan

To determine the sample number for a given volume of the lot and the limit of the average output quality level with the acceptance number $c=0$ A. Kolmogorov suggested the formula:

$$n = N \left(1 - e^{-\frac{100}{cq^n}} \right)$$

where e is the base of natural logarithms;

q is the limit of the average output quality, %.

Practical task № 1

1) Draw a diagram (Fig. 1) of the operational characteristic of the control plan using the data in Table 2.1

2) Determine the average the fraction defective in the lots (q % of the units under inspection to ensure acceptance β % of the lots under the control plan (Table 2.1)

3) Determine the control plan that ensures that the average fraction defective in the accepted lots does not exceed q and the volume of each lot is equal to N (Table 2.2.).

Table 2.1

No	N, um	n, um	C	$\beta \%$
1	100	21	0	90

2	120	25	0	92
3	140	29	0	90
4	150	32	0	92
5	160	34	0	90
6	180	38	0	92
7	200	42	0	90
8	220	46	0	92
9	240	50	0	90
10	260	55	0	92

Table 2.2

Variant No	Average fraction defective, unit	Lot number, N, unit	Acceptance number, c
1	1%	100	0
2	2%	110	0
3	3%	110	0
4	4%	120	0
5	5%	130	0
6	1%	140	0
7	2%	150	0
8	3%	160	0
9	4%	170	0
10	5%	180	0

What is two-phase sample by attributes?

This type of control is used to reduce the amount of inspection, and it is performed as follows:

- 1) the first sample of n units is taken from the lot under control;
- 2) all the units of the first sample are tested, and if the number of defective units does not exceed the acceptance number c , the first lot is accepted;
- 3) if the number of defective units in the first sample exceeds the second acceptance number ($c_2 > c_1$), the lot is rejected. In case of rejection, the lot, in the same way as in the one-phase control, can be returned to the manufacturer

or subjected to ongoing inspection to accept only quality units;

4) if the number of defective units in the first sample is greater than the first acceptance number, but less than the second acceptance number, the second sample of n_2 is taken from the lot;

5) all the units of the second sample are tested. If the total number of defective units in the first and second samples is less than the second acceptance number, the lot is accepted;

6) if the total number of defective items in both samples is greater than the second acceptance number, the lot is rejected.

Practical task № 2

The lot of N units is inspected without further rectifying inspection, and $n_1, n_2, c_1, c_2, x_1, x_2$ are known (Table 2.3). Answer the questions:

1) Is the lot accepted if the defective units are not found in the first sample?

2) Is the lot accepted if x_1 defective units are found in the first sample?

3) One defective unit is found in the first sample. The second sample n_2 is performed with the untested units. In the second sample x_2 defective units are found. Is the lot accepted?

Table 2.3

No	N, unit	n_1	n_2	c_1	c_2	x_1, unit	x_2, unit
1	1000	20	20	0	2	1	3
2	1200	25	25	0	2	1	1
3	1400	30	30	0	3	1	5
4	1500	35	35	0	2	1	1
5	1600	35	35	0	3	1	2
6	1800	40	40	0	3	1	8
7	2000	45	45	0	4	1	4

8	2200	50	50	0	3	1	2
9	2400	55	55	0	4	1	3
10	2600	55	55	0	2	1	1

What do you know about the assessment of suppliers?

After approving a supplier his products must be inspected for conformity to various established criteria. This inspection depends on the complexity of the product, its operating parameters, significance etc.

Inspection begins with the series of samples offered, which are then subjected to physical, functional, durability and operational suitability test.

After positive assessment of samples the supplier is permitted to prepare the production for manufacturing these products.

After completion of this work the supplier manufactures several small lots of products, testing the manufactured unit, changing the tooling and manufacturing process until the desired product quality is achieved. In this case, the customer must be aware of the mode of equipment operation and promptly informed about deviations from the established requirements.

The results of equipment testing and the units manufactured with the equipment under testing should be sent to the customer. This enables to solve the problem of inspection adequacy.

To assess the work of the supplier information from several departments must be collected and analyzed:

- Supply Department: delivery dates, comments about delays, required quantity, return of materials, etc.;
- Quality Assurance Department: the results of the input control, abort analysis, etc.;
- Production Department: internal and other production losses and failure;
- Maintenance and Sales Department: incapacitation during operation,

return under the guarantee, etc.

It should be noted that responsibility for the analysis of the supplier work rests with the Sales Department or the Quality Assurance Department.

Consider the indexing method (from Quality Control Handbook by Zhuran and Grain), which implies several sources of information and sets the penalty points given in Table 3.1.

Table 3.1

Table with points

Factors	Points
Rejection of lot	20 points
Failure is found later	10 points
Limiting acceptance	5 points
Dealer complaint	10 points
Guarantee request	10 points

Table 3.2 shows the example of assessment of the supplier and combined assessment of quality index, price and services adopted by US National Association of Purchasing Managers.

Table 3.2

What is done with the lot	Lot number (from 50)	% of lots	Weight	Weight % x
Is used	2	$2/50=4$	1	4

Sorted/remanufactured	1	$1/50=2$	5	10
Rejected/returned	1	$1/50=2$	2	4
Supplier rating: $100-18 = 82\%$			TOTAL:18	

Table 3.3

Factor	Measurement units	Weight, %
Quality	Percent of decisions	40
Price	Low price/ net price	35
Service	Percent of fulfilled promises	25

The customer and the supplier are required to keep exchanging information on the product quality, i.e. to provide feedback loop. In case the supplier is not finally approved and needs to confirm ability to achieve the acceptable level (B), Table 3.4 is to be used. Decrease of the supplier level to satisfactory (C) means that they work worse than they are able to, however they are given a chance to take measures until the next rating is issued (e.g. within four months). In reassessments, if suppliers cannot achieve level B, they are excluded from the list.

Table 3.4

Level	Grade	Status	Action
A	95–100	Preferably	Cannot be the only source

B	80–95	Acceptable	Cannot be the only source
C	70–80	Satisfactory	Requires improvement up to B
D	Less than 70	Unacceptable	Exclude from the list

Practical task № 3

Typically, the earlier diagnosed the cause of the fault, the cheaper its elimination. Apply this principle to cases in Tables 3.1 and 3.2, comment on the procedure for determining weight number for both of the cases.

Make a report on the work performed.

Appendix 1

Proverbs and sayings about quality

(supplementary material for discussions, dialogues,
individual compositions, situations, project work)

«Quality is not an act, it is a habit» (Aristotle, Ancient Greek philosopher).

«Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives» (William A. Foster).

«Quality means doing it right when no one is looking» (Henry Ford).

«If you want a quality, act as if you already had it» (William James, American psychologist and philosopher).

«Quality questions create a quality life. Successful people ask better questions, and as a result, they get better answers» (Anthony Robbins, American advisor to leaders).

«Quality is never an accident; it is always the result of intelligent effort» (John Ruskin, English writer).

«The quality of an organization can never exceed the quality of the minds that make it up».

«Quality has to be caused, not controlled» (Philip Crosby).

«By three methods we may learn wisdom: First, by reflection, which is noblest. Second, by imitation, which is easiest. And third - by experience, which is the bitterest» (Confucius, the Chinese philosopher).

«Quality in a product or service is not what the supplier puts in it. It is what the customer gets out and is willing to pay for. A product is not quality because it is hard to make and costs a lot of money, as manufacturers typically believe. This is incompetence. Customers pay only for what is of use to them and gives them value. Nothing else constitutes quality» (Peter F. Drucker, American writer and teacher).

Glossary

Aggregation – the technique of construction and operation of products based on the functional and geometrical interchangeability of their units and assemblies.

Accreditation – the official recognition of the fact that the experimental laboratory is entitled to lead specific experiments.

Accrediting authority – the official body which manages the accrediting system and carries out the accreditation of the organizations being objects of it.

Accreditation certificate – the document given by the accrediting authority and recording the fact of the official recognition that the organization is competent in a certain field of activity (or that it is independent and competent).

Accreditation criteria – the requirements used by the accrediting authority, necessary for an organization to be accredited.

Accreditation expert – the person performing all or separate functions for accreditation and certification of organizations, whose competence is admitted by accreditation authorities.

Accreditation scope – an activity or a range of activities which an organization is accredited to perform.

Accreditation system – a system which has its own management and procedure tools for accreditation of objects.

Acknowledged technical regulation – a technical provision reflecting the advanced scientific and technological achievements, according to the recognition of the majority of competent professionals.

Added value - the difference between a particular product's final selling price and the direct and indirect input used in making that particular product.

Amendments to Standards – the modification, addition or exclusion of certain parts from a regulatory document. The results of the amendment are published

separately as a list of changes.

Amount of the physical quantity – a definite quantity of physical amount inherent to a specific material object (or process). The actual amount is a reality independent of measurements.

Applicant – an enterprise, organization or person who made the application for accreditation or certification.

Application of a regulatory document – use of the regulatory document in production, trade and other spheres referring to the goods, processes and services.

Audit 1) planned and documented activity performed by qualified personnel to determine by investigation, examination, or evaluation of objective evidence, the adequacy and compliance with established procedures, or applicable documents, and the effectiveness of implementation.

2) a check performed by an inspector which should correspond to the control card contents.

Benchmarking – process of comparing one's business processes and performance metrics to industry bests or best practices from other industries.

Certification – a procedure in the course of which the third party gives an official written guarantee that the product, process or service conforms to the specified requirements. It refers to the confirmation of certain characteristics of an object, person, or organization. This confirmation is often, but not always, provided by some form of external review, education, assessment, or audit.

Certification center – legal entity authorized to perform functions of a certification body and a testing laboratory at the same time.

Certificate of conformity – document indicating that the properly identified production, process or service corresponds to a certain standard or other regulatory document.

Certification of the laboratory – check of the experimental laboratory in order

to determine its correspondence to the established criteria of laboratory accreditation.

Certification of organization – check of the organization in order to determine its correspondence to the criteria of accreditation.

Certificate of origin (often abbreviated to C/O or COO) – document used in international trade. It is a printed form, completed by the exporter or its agent and certified by an issuing body, attesting that the goods in a particular export shipment have been wholly produced, manufactured or processed in a particular country.

Certification of staff

1) establishment of personnel quality characteristics compliance to the requirements of the domestic or international standards.

2) a traditional method of the staff assessment when the certifying commission periodically assesses the efficiency of the official duties performance by the employees via certain previously determined standard criteria.

Check – confirmation of the specified requirements performance by the expertise presenting an objective proof.

Commodity nomenclature – the classification of commodities of foreign economic activity used in the countries of the Agreement, based on the Harmonized System of Commodity Description and Coding and the combined tariff and statistical nomenclature of EC.

Competitiveness of the product – the level of its economic, technical and working parameters, which allows withstanding competition from other similar brands. In addition, competitiveness is a comparative characteristic of the product with integrated assessment of industrial, commercial, institutional and economic performance relative to the identified market requirements, or properties of other products.

Complex quality management system – establishes, provides and keeps a

necessary level of quality when the production is developed, made and used. This level is supported by a systematic quality control and intended impact on the conditions and factors which influence the quality of production.

Compatibility – the suitability of products, processes or services for a common (but not causing adverse interaction) usage in order to perform statutory requirements under given conditions.

Conformity – the performance of statutory requirements, real or potential tasks.

Conformity assessment – any procedure of checking up the conformity to the technological requirements and standards. The conformity should usually be confirmed by certification. The procedure of assessment includes sampling, testing, monitoring, registration, control, accreditation and acceptance.

Conformity mark – the document which proves that this product or service corresponds to a certain standard.

Conformity to purpose – the ability of a product or service to perform certain functions under given conditions.

Consensus – an agreement characterized by the absence of objections to the substantive issues on the acceptance of a regulatory document (standard) within the majority of parties concerned in it. The consensus does not mean total consentience.

Control – activity which includes measurements, verification, testing or assessment of one or several characteristics of an object and the comparison of the results with the statutory requirements.

Correction to the standard – elimination of misprints and linguistic errors from the published text. The results of the correction are presented in a separate printed list or in a new edition of the standard.

Country of goods origin – the country where the goods have been produced or subjected to processing or recycling.

Criteria of sufficient processing – one of the principles to define the country of goods origin. If two or more countries were involved into the production of certain goods, these goods are considered to originate from that country where they were subject to the last processing, sufficient to impart to the goods their characteristic properties. To assess the criterion of sufficient processing it is possible to apply the cumulative principle under which the origin of goods as a result of their sequential processing in several countries (participants of the agreement) is the country-manufacturer of the final product.

Criterion of effectiveness – a complex of conditions (rules) which determine whether a process is suitable or optimal to achieve the statutory aims.

Declarant – manufacturer (seller) who has accepted the Declaration of conformity and registered it in the established procedure.

Declaration of conformity – the document in which the manufacturer (seller, performer) confirms that the production made or sold by him corresponds to the statutory requirements.

Degree of inconsistency – the degree of non-compliance to the requirements.

Deming Cycle – sequence of actions PDCA: plan (planning process), do (implementation), check (control) and act (manage the impact).

Destination requirements – the requirements for the production features characterizing its main functions designed to perform its intended purpose in the given conditions. It includes compatibility and interchangeability. Depending on the sort of production the appointment requirements can refer to the performance, accuracy and processing speed (for a machine), contents of the basic material, impurities, additives, caloric content (foodstuff). The compatibility can be functional, geometrical, biological, electromagnetic, program.

Draft of the standard – a suggested variant of a regulatory document, offered for an open discussion, voting or acceptance as a standard.

Effectiveness – degree of the planned activity implementation and planned results obtaining.

Environmental quality management system – part of the general management system including the organizational structure, planning activity, distribution of responsibility, practical work, procedures, processes and resources for the development, introduction and achievement of goals within the ecological policy implementation. **ISO 14000** is a family of standards related to **environmental management** that exists to help organizations (a) minimize how their operations (processes, etc.) negatively affect the environment (i.e., cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.

Environmental protection – protection of the environment from adverse influence of production, processes and services.

Equity theory of S. Adams – a theory that attempts to explain relational satisfaction in terms of perceptions of fair/unfair distributions of resources within interpersonal relationships. The belief is that people value fair treatment which causes them to be motivated to keep the fairness maintained within the relationships of their co-workers and the organization. The structure of equity in the workplace is based on the ratio of inputs to outcomes. Inputs are the contributions made by the employee for the organization.

Ergonomics requirements – the requirements to ensure the coherence of product technical characteristics with the features (dimensions, properties, peculiarities) of the human body and figure.

ERG motivation theory of K. Alderfer – content theory of motivation including three groups of needs: Existence (E) Relatedness (R) and Growth (G). It demonstrates how the individuals move up and down the levels of the model and seek satisfaction of needs. In the hierarchy system of needs (transfer from

the lowest needs to the highest ones) the influence can go in both directions - upwards and downwards. Different levels are all operative at the same time and a frustration dimension can be in operation forcing us to seek more satisfaction of goals and needs at a lower level when blocked at a higher level.

Expectancy theory of V. Vroom – proposes that an individual will decide to behave or act in a certain way because they are motivated to select a specific behavior over other behaviors due to what they expect the result of that selected behavior will be. In essence, the motivation of the behavior selection is determined by the desirability of the outcome. However, at the core of the theory is the cognitive process of how an individual processes the different motivational elements. This is done before making the ultimate choice. The outcome is not the sole determining factor in making the decision of how to behave. Expectancy theory is about the mental processes regarding choice, or choosing. It explains the processes that an individual undergoes to make choices.

Functional head – an official responsible for the set of similar functions referring to a certain management activity in the system of **Functional management**.

Functional management – is the most common type of organizational management. The organization is grouped by areas of specialty within different functional areas (e.g., finance, marketing, and engineering). Besides the heads of a firm's product and/or geographic units the company's top management team typically consists of several functional heads such as the chief financial officer, the chief operating officer, and the chief strategy officer. Communication generally occurs within a single department. If information or project work is needed from another department, a request is transmitted up to the department head, who communicates the request to the other department head. Otherwise, communication stays within the department. Team members complete project

work in addition to normal department work.

Global marketing – one of the international marketing concepts. It is a system of marketing applied by an organization to be performed at the above-national markets (or market segments). Global marketing is a firm's ability to market to almost all countries on the planet.

Goods – any movable property including all kinds of energy (heat, electricity) and vehicles (except for the vehicles used for international transportation of people and goods) transported through the customs.

Holder of the conformity certificate – the organization or individual entrepreneur in whose name the certificate is issued.

Homologation – official approval, acceptance. In the terminology of ECE UNO it refers to the acceptance of equipment for road vehicles.

Identification – the procedure which establishes the conformity of production to the requirements imposed to it (or to its certain type) in the regulatory or informational documents.

Indicators of efficiency and effectiveness – a numerical expression of efficiency and effectiveness for a certain process in accordance with the stated aim.

Inspection control of the accredited organization – a check performed by the accrediting authorities in order to find out whether the activity of the accredited organization is still complying with the statutory requirements.

Inspection control of the certified products – the control conformity assessment made in order to establish that the products are still complying with the requirements having been confirmed at the certification.

Interchangeability – the ability of one product, process or service to be a substitute for another product, process or service in order to correspond to the same requirements (rules or standards). The interchangeability can be geometrical (connected to the shape and dimensions of products) and functional

(the ability of products to perform the same function).

International Standardization Organization – the organization with membership opened for the corresponding national authorities of any country.

Introduction of classifier – a range of works aimed at the timely amendment of all the documents connected to it, the notification of these amendments to the users. This process is controlled by the Russian State Standard.

Labeling requirements – the rules concerning the place of marking (products, labels, packaging, containers), way of marking (engraving, stamping) and its content. In case of need it is required to use warning labels regarding the conditions of usage, transportation, storage, fire hazard and explosiveness of production, terms of periodic inspection (status control).

Labor motivation – purposeful process of formation of interested attitude toward the work itself and its results.

Level of scientific and technical progress – the result of scientific and technical achievements and practical experience in relation to products, processes or services in a certain sphere.

Management – coordinated activities to direct and control an organization.

Marketing mix – a complex of managed components of marketing activities of an organization, or marketing policy. Marketing mix includes product policy, promotion, price, place and personal policy. It is also called “The concept of 5P”.

Marketing study – a systematic determination of data necessary to analyze and solve the tasks set before an organization; collection of the information, its processing, research and presentation of results.

Measuring equipment – set of tools and methods of measurement.

Measurement principle – use of a certain physical value or phenomenon to get the result of the measurement.

Methods of HR management – specific techniques and means of influence on

the process of formation and development of the labor collective and separate employees. The methods are economic, administrative and socio-psychological.

Method of measuring – a complex of measurement principles and means corresponding to a chosen principle.

Method of testing – established technical rules for testing.

Motivation –

1) a complex of internal and external motive forces which encourage a person to activity, define the behavior and activity forms, provide the orientation that focuses on the personal and organization's aims achievement.

2) Motivating, method of psychological influence based on the use of current or newly created motives.

Motivation of personnel (in quality management) – the motivation of employees to be active in ensuring the required quality of production.

Motivational structure of employee – a complex of motives regarded as a basis of performance of specific tasks by the employee by means of formation of a certain motivation.

Motive –

1) motivation, the desire to meet the specific needs and requirements.

2) an incentive reason, a reason for action.

Multinational marketing – one of the international marketing concepts. Marketing mix is differentiated and adapted for each of target market segments characterized by obvious distinctive features (national, cultural or traditional).

National Classification of technical, economic and social information – official document representing a systematic compilation of names and codes of the classification groups and (or) objects of classification in the field of technical-economical and social information.

Need Theory of McClelland – a motivational model that attempts to explain how the needs for **achievement**, **power**, and **affiliation** affect the actions of

people from a managerial context. McClelland stated that we all have these three types of motivation regardless of age, sex, race, or culture. The type of motivation that each individual is driven by is changed by life experiences and the opinions of their culture.

New edition of standard – new printed edition of a standard document including the rules, principles and characteristics established during the standardization – which concern different activities or their results available to a wide circle of interested users.

Nonconformity – failure to meet requirements.

Notification – an official notice on an international issue. Here – on the issue of the international standardization.

Object – something that can be individually reviewed and described.

Object of standardization – production, work, process and services subject to standardization.

Operational marketing – a set of certain marketing complex, aims and tools referring to the market where the company is acting.

Period of the standard validity – the period of time from the introduction date of a regulatory document until its revocation. The decision on the introduction and revocation is taken by the authority which has accepted this document.

Personnel policy (HR policy) – the system of work with the staff including different activities in order to create a responsible and highly productive labor collective, able to adequately respond to changes in the external and internal environment.

Porter-Lawler model – a procedural theory of motivation, combining elements of the expectancy theory and equity theory. It includes five values: effort, expectation, effectiveness, reward, pleasure. The essence of the theory is the idea that the individual's motivation to complete a task is affected by the reward they expect to receive for completing the task.

Process – a set of interrelated resources and activities which transforms the income elements into the outcome ones.

Processability requirements – the requirements characterizing the fitness of production for processing, operation, maintenance at minimal costs and at specified values of quality parameters.

Product defect – any characteristic of a product which hinders its usability for the purpose for which it was designed and manufactured. It is noncompliance of the product to the requirements established by the regulatory and technical documentation.

Product positioning – determination of the product place at the market under competition with the analogous offers taking into account the studied preferences of the customers and the policy of competitors.

Product protection – product safety under the impact of climatic or other adverse factors during its use, transit or storage.

Production – the result of an activity or process.

Qualification test – a method of assessing the work of a laboratory by performing the same parallel tests in another analogous laboratory (inter-laboratory tests).

Qualimetry – the science of measurement methods and quantitative assessment of the quality of products and services.

Quality – set of characteristics of an object related to its ability to meet the specified and implied needs.

Quality assessment – a systematical check whether an object is able to fulfill statutory requirements.

Quality assurance – all the planned and systematically performed activities in the quality system, or those which are necessary to create enough confidence that the object will fulfill the quality requirements.

Quality costs – the total cost of quality-related efforts, necessary to ensure and

guarantee a satisfactory quality.

Quality improvement – the activities undertaken at the whole enterprise in order to improve the efficiency and effectiveness of work.

Quality loop – a model of interdependent activities influencing the quality of production (services) at all the stages of its life – from the identification of needs and design to the utilization.

Quality management – methods and kinds of operational activity used to perform the quality requirements.

Quality planning – the activity which sets the aims and requirements for quality.

Quality policy – the basic aims and directions of an enterprise in the field of quality officially expressed by the top management.

Quality program – the document regulating specific measures in the field of quality, resources and activity sequence.

Quality system – a complex of organizational structure, methods, processes and resources necessary to perform the general quality management.

Recycling – process to change waste materials into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, reduce air pollution and water pollution by reducing the need for "conventional" waste disposal, and lower greenhouse gas emissions as compared to plastic production. Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" waste hierarchy.

Reliability – property of products to keep values of established functioning parameters within specified limits.

Reliability requirements – the requirements for the implementation of the production function with a given efficiency within a certain time interval and for preservation of these functions in the process of transportation, storage,

reparation. The quantitative parameters of reliability are reliability, durability, maintainability, shelf life.

Regional Organization for Standardization – the organization which is opened for the correspondent national authority of only one geographical, political or economical region of each country.

Renovation – economical process of obsolete (physically and morally) equipment and machinery substitution by new means at the expense of the sinking fund.

Reprint of the standard – a new printed edition of a regulatory document without any amendments.

Requirements for acceptance – rules establishing the obligatory conditions for the acceptance of production depending on its quality and quantity, testing and quality (quantity) control programs.

Requirements for packaging – establishment of the allowed quantity of product units in one package, requirements for packaging materials and packing method, depending on the conditions of transportation and storage.

Requirements for transportation and storage – the conditions which should be observed during transportation and storage of production in order to ensure the safety and preservation of its quality and quantity. These requirements refer to the kinds of transport and vehicles, allowed external impact on the product (mechanic or climatic), place and conditions, specific rules and terms of storage.

Resident – any individual or legal entity, enterprise or organization which has no legal status and is subject to taxation under the laws of this State, on the basis of its residence, permanent location, control location, registration or some other analogous characteristic. This notion doesn't include entities subject to taxation in the State only in respect of income derived from operations not connected to the production and sale of goods.

Resource saving requirements – the requirements for the economical use of raw materials, fuel, energy, labor resources in the manufacturing process and under a regulated regime of the intended use of products. The quantitative indicators of these requirements are: specific consumption of raw materials and energy and also the coefficient of performance and labor content with respect to the unit of consumer properties.

Responsible marketing – concept of marketing connected with two key ideas: concern for the general welfare of customers (instead of their short-term needs satisfaction) and orientation of the company for long-term well-being of society as a whole.

Revision of the standard – introduction of all the necessary changes into the content and form of a regulatory document. The results of the revision are represented in the new printed edition of the standard.

Safety – the conditions under which the damage or risk of a harm to the personnel is limited to the acceptable level.

Segmentation – process of indication of consumers' groups at the market which show similar requirements to the offered goods.

Service as object of standardization – includes services for the population as well as the production services for enterprises and organizations.

Simplification – a process of simple quantity reduction of types or other species of goods to such quantity which is sufficient to satisfy the needs of clients.

Social loyalty of the company – the degree of compliance with the ILO and UNO Conventions requirements regarding the use of child and forced labor, safety and health work, respect for freedom of association, right for collective agreements, etc.

Specifications (technical specifications) – the document establishing requirements for an object (product, process of service etc.).

Spoilage – a defective unit of production, i.e. the production which has at least one defect.

Stability of staff – the ability of the production team to keep and develop its social and productive capacity in conditions of personnel dynamics (reduction, modification, development, turnover, promotion etc.).

Standardization – the establishment and implementation of the rules in order to regulate the activity in a certain sphere for the benefit and with the participation of all the interested parties, to achieve total optimal economy under the functional conditions and safety requirements.

Standardization plan – the working program of the standardizing authority which lists all the current standardization works.

State measurement standards – measurement standards recognized by the decision of the authorized state body as the original ones within this State.

State Register of Certification – the official list of registered certification systems.

State Standardization System of the Russian Federation – complex of organizational and technical arrangements performed under the rule of the Federal Standardization Executive Authority and aimed at the development and application of the regulatory documents in the field of standardization in order to protect the consumers and state.

Supplier – the enterprise which supplies the production to the customer.

Testing technique – a technical procedure determining one or several specific features of material or product.

Traceability – the possibility to check the presence of the quality system ensuring components. They should be not only practically realized but also documented. The production traceability is the possibility to trace the use, place and conformity of the production units to the definite norms by means of identification.

Undifferentiated marketing – strategy of marketing aimed at all the marketing with one and the same offer - as opposed to working out separate offers for each segment (chosen as target).

Unification – the quantitative optimization of production (products, processes, services) types or dimensions, necessary to satisfy the basic needs. Unification includes the reduction of sameness. *In Russia the term “unification” is understood as bringing all the technical characteristics, documentation, terms and designations to uniformity.*

Uniformity of measurements – the measurement status at which their results are expressed in legal units, and the measurement errors do not exceed the established limits with a given probability.

Uniform products certification system – a certification system referring to a certain group of products subject to the same specific standards, rules and procedures.

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