

# Ugotavljanje in vrednotenje potreb kupcev v postopku razvoja izdelka

## Finding and Evaluating Customers' Needs in the Product-Development Process

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*Podjetja današnjih dni se soočajo z novimi izzivi. Imamo opravka z globalizacijo poslovanja in lokalizacijo delovanja, standardizacijo in individualizacijo izdelkov, zahtevnim kupcem in močno konkurenco. V prispevku so prikazane faze razvoja funkcij kakovosti (RFK - QFD) postopka sprejemanja izdelka in podano mesto pridobivanja, sestavljanja in vrednotenja potreb kupcev izdelka. Podrobno so opisani viri pridobivanja informacij o potrebah kupcev, predstavljene so metode pridobivanja, sestavljanja in vrednotenja podatkov o potrebah kupcev izdelka ter prikazan postopek razvoja izdelka. Podani so rezultati preizkusa predlagane metodologije upoštevanja glasu kupcev v postopku razvoja izdelka Vario Flow podjetja, ki se ukvarja s proizvodnjo in prodajo medicinske opreme za domači in tuji trg.*

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**(Ključne besede: razvoj izdelka, razvoj funkcij kakovosti (RFK), potrebe kupcev, odločitveni postopki, hiša kakovosti)**

*Today's companies are facing new challenges: global business and local operation, the standardization and individualization of products, and demanding customers and fierce competition. This paper presents the phases of quality functions deployment (QFD) during a new-product development process along with the method for obtaining, structuring and evaluating customer needs. A full description of the information resources for obtaining the data on customer needs is given, and the methods for obtaining, structuring and evaluating the data on customer needs are presented. The QFD process of new-product development is described. We present the results of testing the proposed methodology, taking into account the voice of the customer, in the process of developing a new Vario Flow product in a company that produces and sells medical equipment on domestic and foreign markets.*

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**(Keywords: product development, quality function deployment (QFD), customer needs, decision making, house of quality)**

### 0 UVOD

Za današnjega kupca izdelkov lahko trdimo, da je "kralj", saj je pripravljen kupiti le izdelke, ki zadovoljujejo njegove potrebe in zahteve. Podjetje želi doseči krajši čas razvoja izdelka, manjše stroške, vrhunsko kakovost izdelka ter končno zadovoljstvo kupcev izdelka. Da bi podjetje doseglo postavljene cilje, mora že med razvojem izdelka upoštevati potrebe in zahteve kupcev izdelka. Znano je, da se izdelek razvija v postopku, ki se prične z abstraktnim razmišljanjem in konča s končnim izdelkom. Izkušnje kažejo, da je treba v tem miselnem in stvarnem postopku razvoja izdelka upoštevati glas kupcev (potrebe in zahteve), če

### 0 INTRODUCTION

Today, we can maintain that the customer is "king" as he or she will only buy products that satisfy his or her needs and wants. Every company wants to achieve shorter product-development times, lower costs, higher quality of the product, and, finally, the satisfaction of its customers. In order to achieve the set goals, the company has to take into account the customers' wants and needs during the new-product development process. It is well known that the new-product development process starts with an abstract idea and ends with the physical realization of the product. Experience has shown that in this mental and physical product-development process the voice

želimo, da bo izdelek lahko tekmoval na globalnem tržišču.

Razvoj funkcij kakovosti ([1] do [3]) je edini, na kupca usmerjeni postopek razvoja izdelka, pri čemer je “glas kupca” izhodiščna točka vseh dejavnosti. RFK vpraša: “Kaj potrebuje in zahteva kupec” in spremeni njegova pričakovanja v značilke izdelka [4]. Razvoj funkcij kakovosti strmi za tem, da se izdelek tako definira, razvije, konstruira, izdelava, dobavi in vgradi, da se ne izpolni le želja kupca, ampak da so želje celo več ko izpolnjene. Metoda razvoja funkcij kakovosti rabi za preoblikovanje potreb in zahtev kupcev v zmožnosti podjetja ter za vključitev vseh oddelkov oziroma služb podjetja za izpolnitev naročila.

Metoda RFK je igra vprašanj in odgovorov z dvema osnovnima vprašanjema:

- KAJ pričakujejo kupci izdelka,
- KAKO podjetje izpolni potrebe kupcev.

Metoda RFK spremlja postopek razvoja izdelka od faze razmišljanja pa do faze uporabe izdelka, pri tem pa je “hiša razvoja funkcij kakovosti izdelka” (sl. 1) namenjena dokumentiranju miselnih in načrtnih rezultatov.

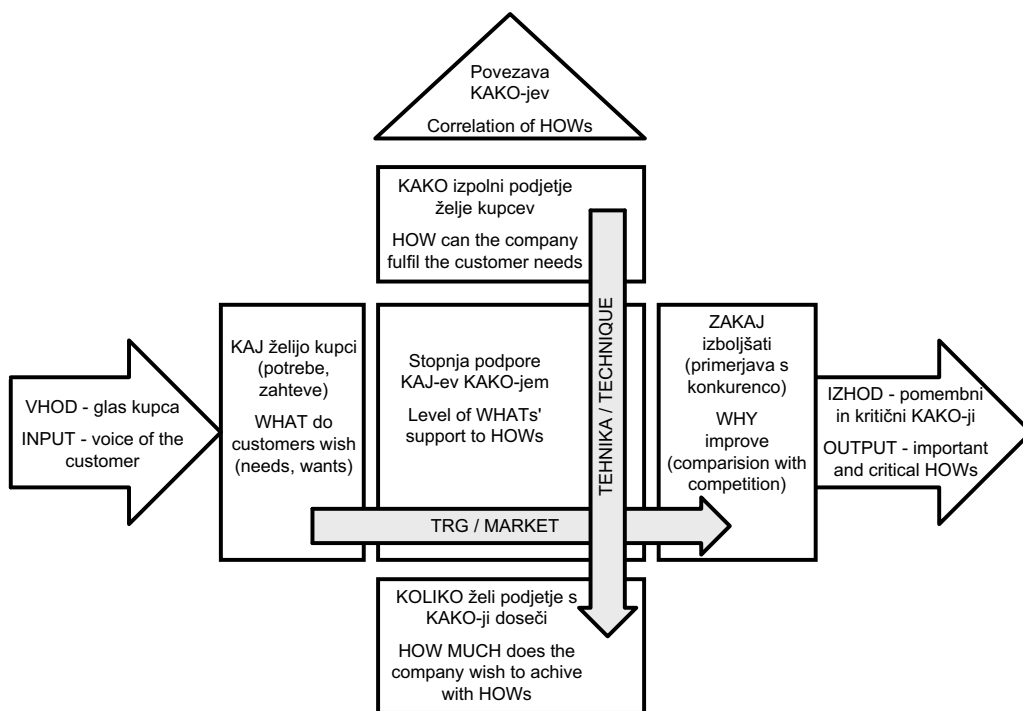
of the customer (his or her needs and wants) has to be taken into account in order to ensure that a globally competitive product will be produced.

Quality functions deployment (QFD) ([1] to [3]) is the only customer-oriented product-development method where the “voice of the customer” is the starting point of all activities. QFD starts with the question: “What does the customer need and want?” and transforms the customers’ expectations into the product’s features [4]. The goal of the QFD method is to define, develop, design, manufacture, supply and install the product in such a way that the customers’ wishes are over-fulfilled rather than simply “just” fulfilled. The QFD method allows the transformation of the customers’ needs and wants into the company’s potentials and the engagement of all its departments to serve the customers.

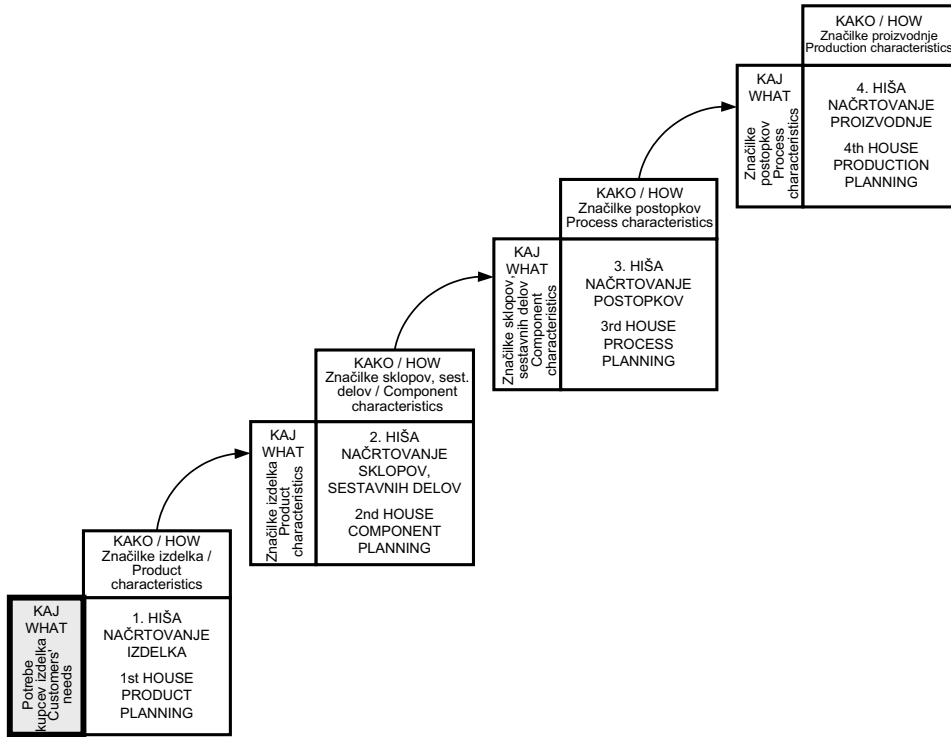
The QFD method is a game of questions and answers with two basic questions:

- WHAT do customers expect from the product?
- HOW can the producer fulfill the customer needs?

The QFD method is used throughout the product-development process: from the first abstract concept to the use of the product. The “product’s quality-functions-deployment house” (Figure 1) is used to record the mental and planned results.



Sl. 1. Hiša razvoja funkcij kakovosti izdelka  
 Fig. 1. Product's quality-functions-deployment house



Sl. 2. Postopek sprejemanja izdelka na osnovi RFK  
 Fig. 2. QFD process of new-product development

Postopek razvoja izdelka na osnovi RFK poteka kaskadno in se opiše s štirimi hišami razvoja funkcij kakovosti (sl. 2) in to [4]:

- hišo razvoja funkcij kakovosti izdelka,
- hišo razvoja funkcij kakovosti sklopov oziroma sestavnih delov izdelka,
- hišo razvoja funkcij kakovosti postopka in
- hišo razvoja funkcij kakovosti proizvodnje.

Kakor prikazuje slika 2 se postopek razvoja izdelka na osnovi RFK prične s pridobivanjem, sestavljanjem in vrednotenjem potreb kupcev izdelka – rezultat je vektor ugotovljenih potreb kupcev izdelka, ki pomeni vhodni podatek hiše načrtovanja izdelka.

Da bi lahko pri sprejemanju izdelka upoštevali glas oz. potrebe kupcev, je le-te treba pridobiti in raziskati z namenom, da bi razumeli ter vedeli, kako bodo upoštewane.

Slika 3 prikazuje osnutek pridobivanja, sestavljanja in vrednotenja potreb kupcev izdelka.

V nadaljevanju bodo prikazani postopek in metode pridobivanja, sestavljanja in vrednotenja podatkov o potrebah kupcev, kar je temelj za uspešno izvedbo postopka razvoja izdelka oziroma za uspeh izdelka na trgu.

The QFD process of new-product development is carried out in cascades and can be described with four QFD houses (Fig. 2) [4]:

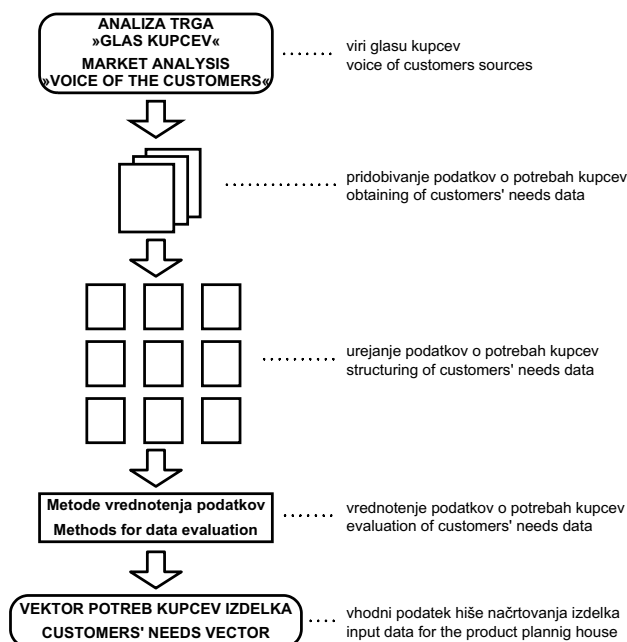
- the product's quality-functions-deployment house
- the product's component quality-functions-deployment house
- the process quality-functions-deployment house
- the manufacturing quality-functions-deployment house.

As presented in Figure 2, the QFD process of new-product development starts by obtaining, structuring and evaluating the customer needs, which represent the input data for the product planning house.

In order to take into account the customer needs during new-product development, they must be identified and analyzed beforehand, so that they can be properly understood and fulfilled.

Figure 3 presents the concept of obtaining, structuring and evaluating the data on customer needs.

In the text that follows, the procedure and methods for obtaining, structuring and evaluating customer needs are presented. These are the basis for the successful execution of the product-development process or for the success of the product on the market.



Sl. 3. Osnutek zbiranja, urejanja in vrednotenja potreb kupcev izdelka  
 Fig. 3. The concept of obtaining, structuring and evaluating customer needs

## 1 VIRI GLASU KUPCEV

Glas kupcev je pojem, s katerim se opišejo izrečene in neizrečene potrebe ter zahteve kupcev in je kot tak potreben za zagon postopka razvoja izdelka ([5] in [6]). Potreba kupca pomeni izjavo kupca o koristi, ki bi mu jo lahko prinesel izdelek ali storitev ([1] in [7]). Kupci želijo svoje potrebe in želje zadovoljiti z izbiro izdelkov ali storitev, ki to najboljše izpolnjujejo.

Kupci pa pogosto izražajo svoje potrebe z izjavami, ki govorijo o tem, kako bi lahko te potrebe zadovoljili, te izjave pa se imenujejo kupčeve zahteve [8], ki se prepoznajo kot nekaj zahtevanega, nekaj, o čemer se ne da pogajati.

Poznani so trije glavni viri pridobivanja informacij o glasu kupca, in to so ([3] in [9]):

- zunanji kupci,
- notranji kupci in
- podatki o izdelkih in postopkih.

### 1.1 Zunanji kupci

Zunanji kupci so kupci, ki so zunaj podjetja in govorijo drugačen jezik kakor proizvajalec izdelka. Po pregledu literature ([1], [3], [6] in [7]) lahko ugotovimo, da se zunanji kupci delijo v več kategorij in podkategorij, glede na to, od koga

## 1 SOURCES OF THE CUSTOMERS' VOICE

The voice of the customers is a concept that describes the uttered and unuttered customers' wants and needs; as such it must exist in order to start the new-product development process ([5] and [6]). A customer need is a description, in the customer's own words, of the benefit to be fulfilled by the product or service ([1] and [7]). Customers would like to satisfy their needs and wishes by selecting products or services that best fulfill them.

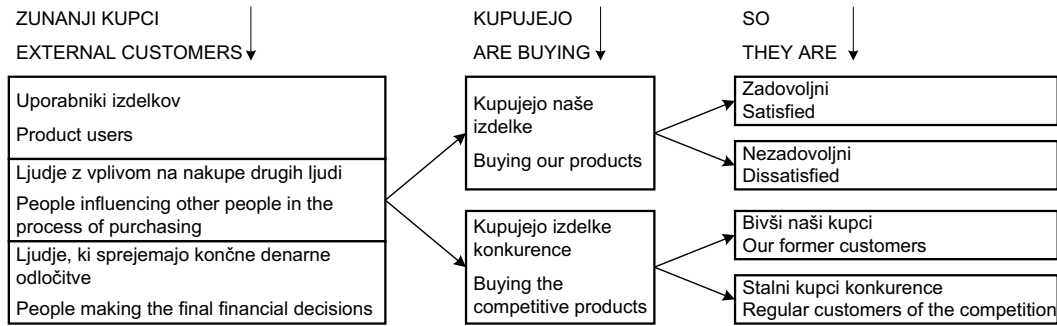
Customers often express their needs using statements that describe how these needs could be fulfilled and these statements are called "customer requirements" [8], which are considered as something required, something that is non-negotiable.

There are three major sources for obtaining information on the voice of the customer ([3] and [9]):

- external customers,
- internal customers,
- information on products and processes.

### 1.1 External customers

External customers are the customers outside the company. They speak a different language than the company that manufactures the product. A survey of the reference works ([1], [3], [6] and [7]) reveals that external customers fall into several categories and



Sl. 4. Pregled zunanjih kupcev  
 Fig. 4. The overview of external customers

kupujejo izdelke in kakšno vlogo imajo v oskrbovalni verigi. Slika 4 prikazuje delitev zunanjih kupcev.

### 1.2 Notranji kupci

Notranji kupci ([1], [3], [6] in [7]) so kupci, ki so v podjetju, njihov jezik se gotovo razlikuje od jezika zunanjih kupcev. Notranji kupci imajo svoje poglede na določene probleme v postopku razvoja izdelka, zato je treba ločevati njihov glas od glasu zunanjih kupcev. Glas notranjih kupcev lahko pomembno prispeva k izboljšanju postopka razvoja izdelka, saj je v njihovem interesu, da izboljšajo sam postopek razvoja izdelka, katerega del so, ter tako prispevajo k zadovoljevanju potreb zunanjih kupcev. Slika 5 prinaša pregled notranjih kupcev.

### 1.3 Podatki o izdelkih in postopkih

Podatki o izdelkih in postopkih pomembno pomagajo pri ugotavljanju potreb kupcev, tako zunanjih kakor tudi notranjih.

Slika 6 prikazuje pregled podatkov o izdelkih in postopkih.

## 2 METODE PRIDOBIVANJA IN POSTOPEK UREJANJA PODATKOV O POTREBAH KUPCEV

Analizirane in ocenjene so bile različne metode pridobivanja in postopki sestavljanja podatkov o potrebah kupcev ([7] do [12]), rezultat tega dela je predlog za prakso najprimernejših metod pridobivanja in sestavljanja podatkov o potrebah kupcev.

sub-categories, depending on who they buy the products from and their role in the supply chain. Figure 4 presents the categories of external customers.

### 1.2 Internal customers

Internal customers ([1], [3], [6] and [7]) are customers who are from the company, and most certainly use a different language than the external customers. Internal customers have a unique perspective on specific problems in the product-and-process development, and that is why their voice must be distinguished from the voice of external customers. The voice of the internal customers can contribute significantly to the product-and-process development, as it is very important for them to improve the product development they are part of. In this way they contribute to satisfying the needs of external customers. Figure 5 gives an overview of internal customers.

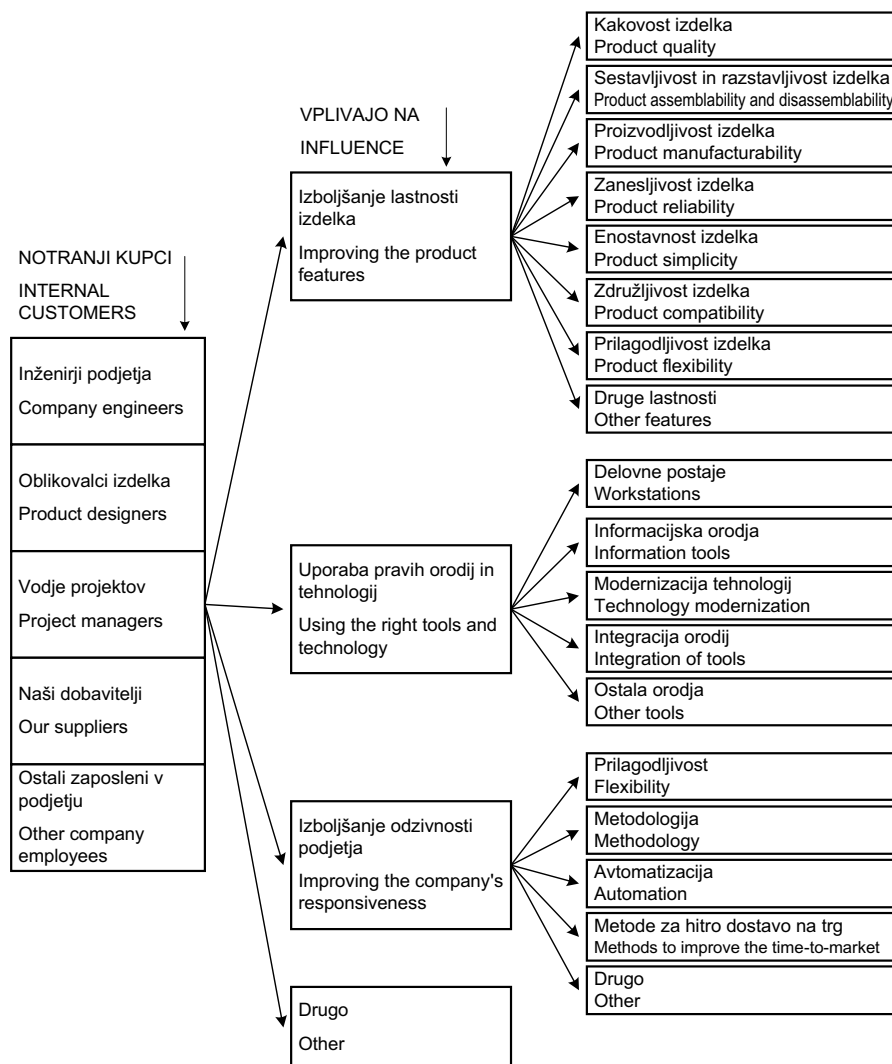
### 1.3 Information on products and processes

Information on products and processes is very helpful for discovering the needs of the customers, both the internal and external ones.

Figure 6 shows an overview of the information on products and processes.

## 2 METHODS FOR OBTAINING THE CUSTOMER NEEDS AND THE PROCEDURE FOR STRUCTURING THESE DATA

Several methods for obtaining customer needs and the procedures for structuring these data were analyzed and reviewed ([7] to [12]). The result is a suggestion for using the most suitable methods for obtaining and structuring the data on customer needs.



Sl. 5. Pregled notranjih kupcev  
 Fig. 5. The overview of internal customers

## 2.1 Metode pridobivanja podatkov o potrebah kupcev

Za pridobivanje podatkov o potrebah kupcev imajo prednost naslednje metode:

- metoda žariščne skupine,
- metoda izvedbe intervjuja,
- metoda pripomb in pritožb kupcev in
- metoda soočanja idej.

### 2.1.1 Metoda žariščne skupine

Metoda žariščne skupine je metoda, pri kateri izbrana skupina kupcev razpravlja o vprašanih, ki jih poda moderator. Razprava nastane tako, da vsak član skupine poda svoje poglede na določen

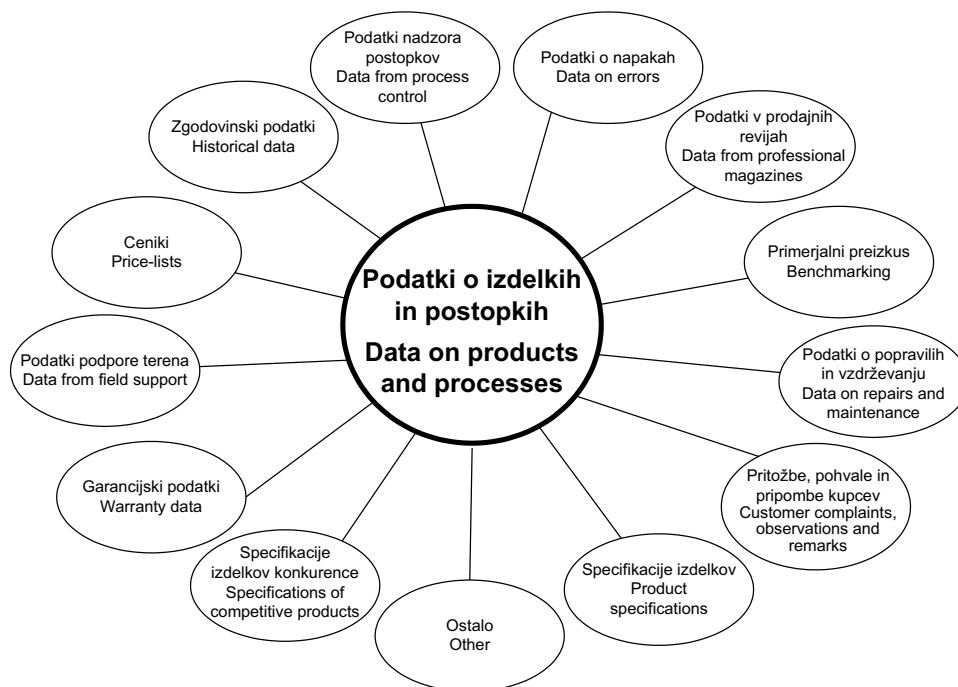
## 2.1 Methods for obtaining the data on customer needs

When obtaining the data on customer needs preference is given to the following methods:

- the focus-group method,
- interviews,
- the customer-remarks-and-complaints method,
- brainstorming.

### 2.1.1 Focus-group method

The focus-group method uses a selected group of customers who discuss questions posed by a moderator. The discussion is initiated so that each group member first expresses his/her opinion on a particular



Sl. 6. Podatki o izdelkih in postopkih  
 Fig. 6. Information on products and processes

problem, sliši mnenja drugih in nanje tudi odgovarja. S takim načinom razprave metoda žariščne skupine priskrbi kakovostne poglede majhnega števila ljudi. Moderator lahko razišče razloge, ki povzročajo nezadovoljstvo in lahko razpravlja o mogočih rešitvah določenih problemov. Običajno je v žariščni skupini od 6 do 12 ljudi, razprava pa traja dve do tri ure. Slika 7 prikazuje potek pridobivanja podatkov o potrebah kupcev po metodi žariščne skupine.

Da bi lahko s pomočjo žariščne skupine zagotovili ustvarjalno razpravo o določeni temi, je treba v skupino povabiti člane tima s podobnimi interesi in znanji. Izkušnje so pokazale, da je pri tem treba paziti, da člani tima niso v kakršnikoli ukazovalni hierarhiji.

Običajno se pri raziskovalnih projektih oblikuje več žariščnih skupin (zunanji in notranji kupci, razdeljeni po različnih delih), da se pridobijo različni pogledi na problem.

Razprava v žariščni skupini je sestavljena iz treh faz:

1. faza: uvodna predstavitev,
2. faza: razprava,
3. faza: sklep razprave.

Delo žariščne skupine vodi in usmerja moderator, ki prične z uvodno predstavitvijo, se

problem, then other participants comment on it and then further discussion of their opinions follows. In this way the discussion of the focus group provides a qualitative view of a small number of people. The moderator can search for reasons causing dissatisfaction and can discuss possible solutions for particular problems. Normally, there are 6 to 12 people in a discussion group, each discussion lasts for two to three hours. Figure 7 presents the course of obtaining the data on customer needs using the focus-group method.

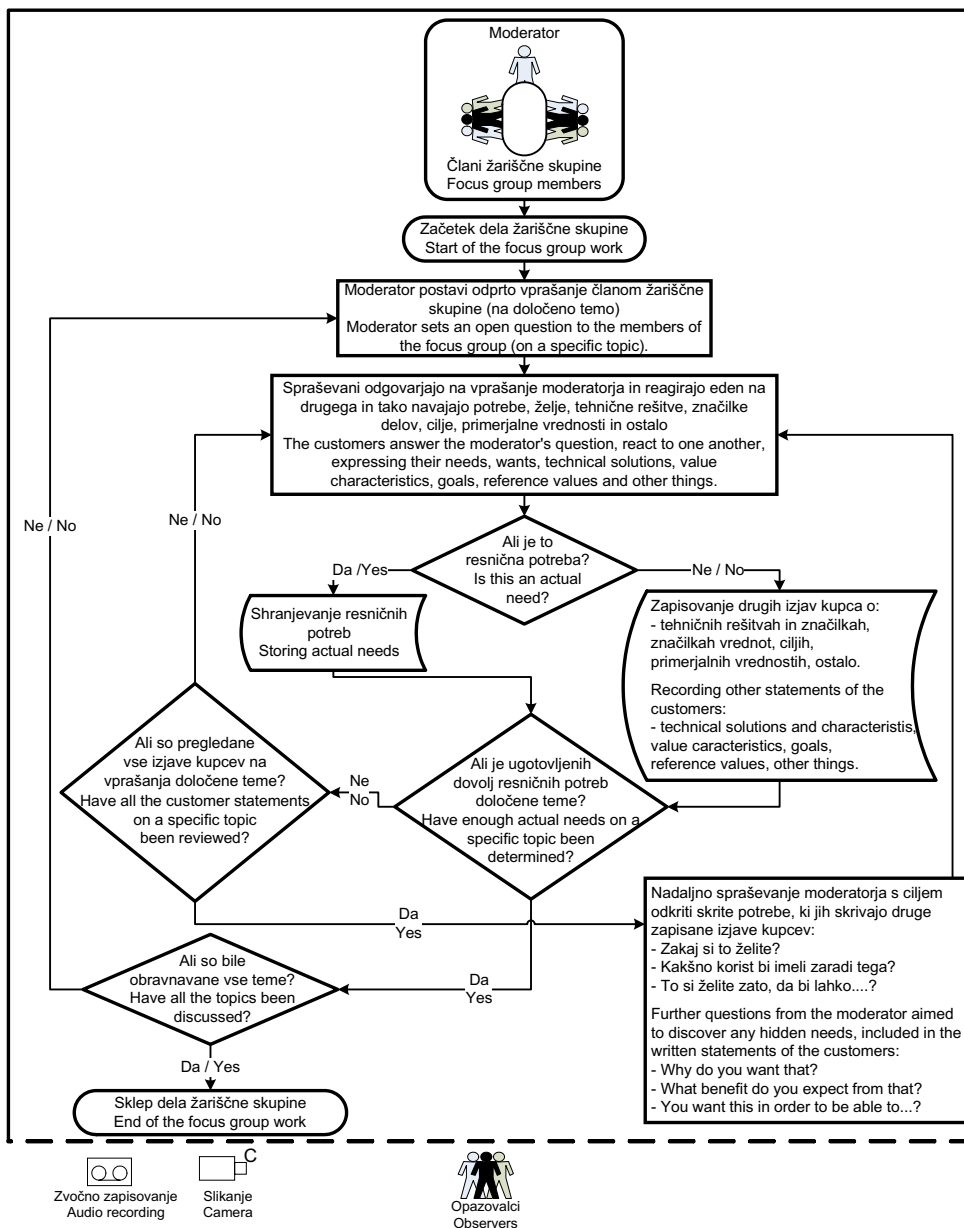
To be able to provide a productive discussion on a particular subject, discussion members with similar interests and knowledge must be selected. Experience shows that care must be taken that the members are neither in a superior nor in a subordinate relationship with each other.

Normally, there are several focus groups formed in the research project (external and internal customers are grouped by different segments) with the goal of gathering different opinions on a problem.

The focus-group discussion is carried out in three phases:

- phase 1: introduction,
- phase 2: discussion,
- phase 3: conclusion.

The focus-group work is directed by a moderator. He or she starts with an introduction by



Sl. 7. Pridobivanje podatkov o potrebah kupcev z metodo žariščne skupine  
Fig. 7. Obtaining the data on customer needs using the focus-group method

predstavi in razloži namen žariščne skupine in vzrok za vabilo članom. Sledi seznanitev članov z osnovnimi pravili, nato pojasnitev namena zapisovanja in snemanja razgovorov ter zagotovitev zasebnosti sodelujočih.

Ko se člani tima predstavijo, moderator začne voditi razpravo tako, da uporablja osnutek vprašanj, namenjenih raziskavi različnih pogledov na obravnavano temo. Moderatorjevo osnovno delo je, da obdrži skupino osredotočeno. Po obravnavi

presenting the focus group, its purpose and the reason why the members have been invited. Then the members are acquainted with the basic rules and explained the purpose of recording the discussion, and the discretion of the participating members is ensured.

Then the members participating in the discussion are introduced and the moderator starts the discussion by asking the initial questions in order to gather different views relating to the topic of the discussion. The moderator's basic task is to keep the discussion group



določenega vprašanja lahko moderator raziskuje naprej, da bi dobil več informacij in postavlja izzivalna vprašanja, da izvabi več razprave.

Običajno se zahteva, da je moderator izvedenec na področju, ki ga skupina obravnava, in da pozna cilje študije. Njegov cilj je pomagati skupini, da ustvarjalno razpravlja o temi. Kakovost podatkov v žariščnih skupinah je močno odvisna od tega, kako učinkovito moderator postavlja vprašanja in kako dobro vzdržuje razpravo, osredotočeno na predmetu raziskave. Moderator mora delovati kot pospeševalec, nadzirati mora sodelovanje med njim in člani skupine, kakor tudi med samimi člani skupine. Nekaj članov žariščne skupine je običajno bolj zgovornih, preostali pa so bolj zadržani, zato mora moderator najti način, da utiša preveč zgovorne, da lahko tihi spregovorijo. Ko so vprašanja izčrpana, moderator konča delo skupine.

Razprava žariščnih skupin se običajno izvede v posebni sobi, po možnosti je ta soba urejena tako, da ima na eni strani posebno steno, skozi katero se vidi v sobo, iz nje pa ne. Za to steno so slikovne in zvočne snemalne naprave ter ljudje, ki opazujejo intervju, vendar nanj nimajo vpliva.

### 2.1.2 Intervju

Intervju je metoda za pridobivanje kakovostnih informacij, pri katerih obstaja dialog med spraševalcem in vprašanim. Omogoča pridobivanje podrobnih informacij o potrebah kupcev in razpoznavo kakršnihkoli inovativnih rešitev. Kakovost intervjuja se meri s številom zapisanih potreb.

Odvisno od področja in obsega projekta je treba izbrati kupce, ki bodo intervjuvani, določiti, kje bodo intervjuji potekali, kdo jih bo vodil in kakšne vrste vprašanja bodo postavljena.

#### **Intervju v konferenčni sobi**

Najbolj običajna oblika intervjuja za pridobivanje potreb kupcev je intervju v konferenčni sobi (slika 8). Pri intervjuju v konferenčni sobi se je treba zanesti na zmožnost odgovarjajočega, da priključ v spomin stvari, ki so mu bile ali mu niso bile všeč pri izdelku in da poskuša navesti tiste stvari, ki jih je pogošal.

Spraševalec mora imeti nekakšen vodnik intervjuja, ki deluje kot opomnik, katere teme spraševati med intervjujem.

focused. After a question has been generally discussed, the moderator can search further to get more information by using additional teaser questions.

Normally, it is necessary that the moderator is an expert in the field discussed by the group and is acquainted with the subject of the study. It is his or her goal to help the group create a productive discussion on the specified topic. The quality of the data in the focus group mostly depends on how efficiently the moderator is asking questions and focusing the entire group on the topic. The moderator must work as a promoter, controlling the interaction between himself/herself and the members as well as between the members themselves. Some members of the focus group are usually more eloquent, while others are more reserved, so the moderator has to find a way to silence the too eloquent people in order to make the quiet ones start speaking as well. When all the issues have been discussed, the moderator concludes the work of the focus group.

The focus group discussion is normally carried out in a special room. The room can have a special one-way see-through wall, behind which there can be video- and audio-recording equipment, as well as additional observers.

### 2.1.2 Interview

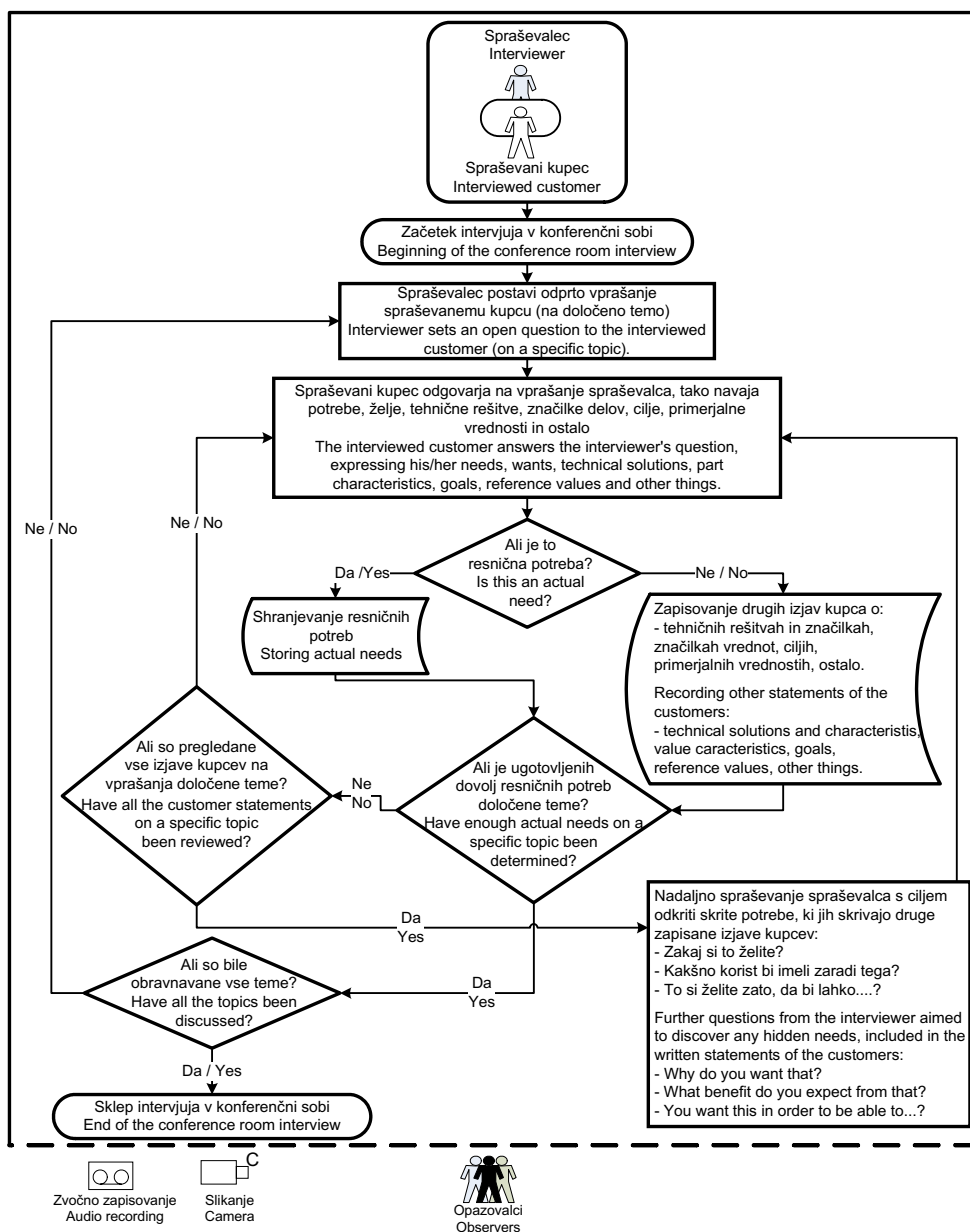
The interview is a method of gathering qualitative information through a dialog between the interviewer and the interviewee. It enables them to gather detailed information on customer needs and identify innovative solutions. The quality of the interview is measured by the number of recorded needs.

Depending on the area and the size of the project, the following must be selected: the customers to be interviewed, the locations where the interviews are to be carried out, the interviewers, and the type of questions asked.

#### **Conference-room interview**

The most common form of interview for obtaining customer needs is a conference-room interview (Figure 8). During a conference-room interview it is necessary to rely upon the ability of the interviewee to recall the things he or she liked or disliked about the product, and that he or she will try to mention the things he or she missed.

The interviewer has to have some sort of interview guide that serves as a checklist for the subjects to be asked about during the interview.



Sl. 8. Intervju v konferenčni sobi  
Fig. 8. Conference-room interview

Intervjuji v konferenčnih sobah omogočajo dobro vodenje intervjujev in zato učinkovito izrabo časa.

The conference-room interviews make possible good time-planning and the efficient use of time.

### Povezano poizvedovanje

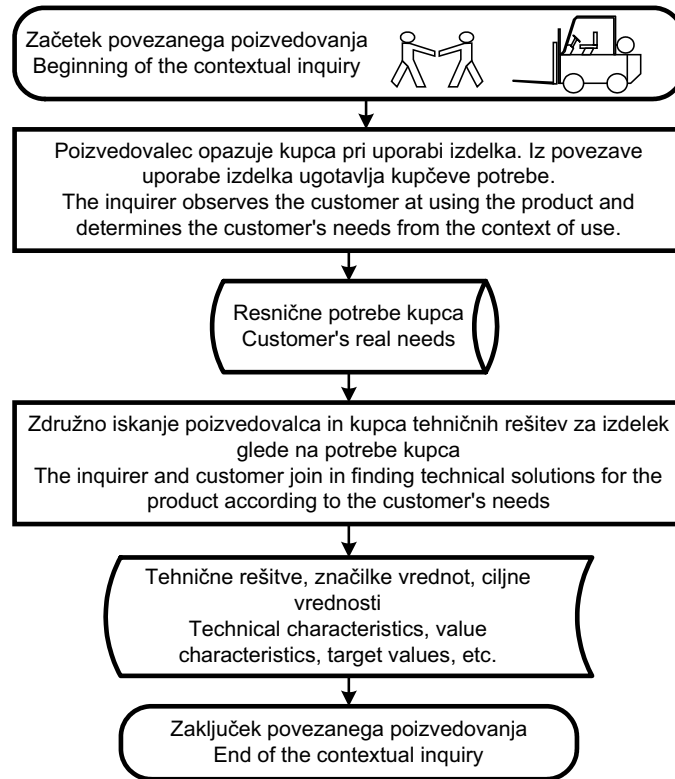
Povezano poizvedovanje se izvaja na mestu uporabe izdelka (sl. 9). Omogoča spraševanje med opazovanjem dejanske uporabe izdelka.

### Contextual inquiry

A contextual inquiry is carried out at the location where the product is being used (Fig. 9). It allows the interview to be conducted during observation of the actual use of the product.

Povezano poizvedovanje se uporabi predvsem za boljše razumevanje okolja (vremenski

A contextual inquiry is used mostly for better understanding of the environment (weather, culture,



Sl. 9. Povezano poizvedovanje  
Fig. 9. Contextual inquiry

vplivi, kultura okolja, vrednote), v katerem kupec uporablja izdelek. Povezano poizvedovanje pomeni partnerstvo kupca in spraševalca pri iskanju rešitev za ugotovljene potrebe kupca.

### 2.1.3 Pridobivanje potreb iz pritožb kupcev

Potrebe kupcev, ki se pridobijo iz baze podatkov o pritožbah kupcev so kakovostne informacije, ki se zaradi narave pridobivanja ne morejo posploševati na večjo populacijo. Pogosto se zgodi, da so ljudje, ki se pritožujejo, taki, da se pritožujejo iz navade, ali taki, ki so imeli posebej slabo izkušnjo, predvsem pa tisti, ki imajo čas, da se pritožujejo. Pritožbe kupcev pokažejo informacijo o vzrokih za nezadovoljstvo. Potrebe iz pritožb kupcev se uporabijo kot dopolnilo k potrebam kupcev, ki se pridobijo z intervjuji oz. žariščnimi skupinami.

Postopek ustvarjanja potreb kupcev iz pritožb kupcev obsega naslednje korake:

1. korak: Naključna izbira dogovorjenega števila pritožb iz baze podatkov.
2. korak: Pritožbe je treba prevesti v pozitivne izraze in osnutke, ki pomenijo skrite potrebe kupcev,

values) where the customer uses the product. A contextual inquiry is a partnership between the customer and the inquirer during their search for a solution to the identified customer needs.

### 2.1.3 Obtaining the needs from customer complaints

Customer requirements, obtained from the customer-complaint database are qualitative data that cannot be generalized to a wider population because of the way they were obtained. It often happens that certain people complain out of a habit, or those who have had an especially bad experience, and particularly those who have time to complain. Customer complaints reveal the causes of dissatisfaction. The needs obtained from customer complaints can be used in addition to the customer needs obtained by interviews and focus groups.

The procedure for obtaining the customer needs from customer complaints consists of the following steps:

- Step 1: Random retrieval of a certain number of complaints from the database,
- Step 2: Translation of the complaints into positive expressions and concepts, which represent the hidden

izražene s pritožbo.

3. korak: Prečistiti izraze potreb kupcev z odstranitvijo ponovitev.

4. korak: Označiti vsak izraz, dobljen iz pritožb kupcev.

5. korak: Spojiti izraze pritožb kupcev z izrazi, pridobljenimi z drugimi metodami.

#### 2.1.4. Metoda soočanja idej pridobivanja podatkov o potrebah notranjih kupcev

Metoda soočanja idej je najbolj znana in najpogosteje uporabljena metoda ustvarjalnega pridobivanja podatkov o potrebah kupcev. Pri uporabi te metode je treba upoštevati štiri osnovna pravila:

1. pravilo: Vsaka kritika ali vrednotenje zamisli je strogo prepovedana, saj zavira ustvarjalno mišljenje.
2. pravilo: Zamisli drugih članov skupine so lahko prevzete in nadalje razvite.
3. pravilo: Člani skupine naj čim bolj prožijo svojo fantazijo pri reševanju problema.
4. pravilo: V kratkem času naj bo predlaganih čim več zamisli rešitve problema.

### 2.2 Postopek sestavljanja podatkov o potrebah kupcev

Sestavljanje podatkov o potrebah kupcev naj se izvede v naslednjem zaporedju korakov:

needs of the customers, expressed by the complaint, Step 3: Removal of duplicates,

Step 4: Marking of each expression obtained from customer complaints,

Step 5: Combining customer complaints with the expressions obtained by other methods.

#### 2.1.4 The brainstorming method for obtaining data on internal customer needs

The brainstorming method is the most popular and the most widely used creative method for obtaining data on customer needs. When using this method, four basic rules should be taken into account: Rule 1: Any criticism or evaluation of ideas is strictly forbidden because it obstructs creative thinking.

Rule 2: The ideas of other team members can be used and developed further.

Rule 3: Team members should activate their imagination as much as possible during problem solving.

Rule 4: As many ideas as possible should be proposed in the shortest possible time.

### 2.2 Methods for structuring the data on customer needs

Structuring of the data on customer needs is carried out in the following sequence:

| Tabela podatkov o izdelkih in postopkih / Table of products and processes data |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|--|--|--|--|-----------------|---------------|---------------|---------------|---------------|---|---|---|---|--|
| ID<br>Št./<br>ID<br>No.  | E/I  | Demografija<br>kupcev/<br>Customer<br>demographics | Izjava kupca/<br>Customer<br>statement | Uporaba / Usage |               |               |               |               |   | Analizirana<br>izjava/<br>Analyzed<br>statement | Potreba/<br>Značilka<br>Need/<br>Characteristic               | Vrsta potrebe/<br>značilke<br>Type of need/<br>characteristic |  |
|  |  |  |  | Kdo/<br>Who     | Kaj/<br>What  | Kdaj/<br>When | Kje/<br>Where | Zakaj/<br>Why | Kako/<br>How                                    |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
| Tabela glasu notranjih kupcev / Table for the voice of the internal customers  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
| ID<br>Št./<br>ID<br>No.  | Demografija<br>kupcev/<br>Customer<br>demographics | Izjava kupca/<br>Customer<br>statement             | Uporaba / Usage                        |                 |               |               |               |               | Analizirana<br>izjava/<br>Analyzed<br>statement | Potreba/<br>Značilka<br>Need/<br>Characteristic | Vrsta potrebe/<br>značilke<br>Type of need/<br>characteristic |   |  |
|  |  |  | Kdo/<br>Who                            | Kaj/<br>What    | Kdaj/<br>When | Kje/<br>Where | Zakaj/<br>Why | Kako/<br>How  |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
| Tabela glasu zunanjih kupcev / Table for the voice of the external customers   |  |  |  |                 |               |               |               |               |   |   |   |   |  |
| ID<br>Št./<br>ID<br>No.  | Demografija<br>kupcev/<br>Customer<br>demographics | Izjava kupca/<br>Customer<br>statement             | Uporaba / Usage                        |                 |               |               |               |               | Analizirana<br>izjava/<br>Analyzed<br>statement | Potreba/<br>Značilka<br>Need/<br>Characteristic | Vrsta potrebe/<br>značilke<br>Type of need/<br>characteristic |   |  |
|  |  |  | Kdo/<br>Who                            | Kaj/<br>What    | Kdaj/<br>When | Kje/<br>Where | Zakaj/<br>Why | Kako/<br>How  |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |
|  |  |  |  |                 |               |               |               |               |   |   |   |   |  |

Sl. 10. Izhodiščne preglednice glasu kupcev  
Fig. 10. Initial tables for the voice of the customers

1. korak: Oblikovanje izhodiščnih preglednic glasu kupcev,
2. korak: Oblikovanje sorodnostnega diagrama,
3. korak: Oblikovanje drevesnega diagrama.

**1. korak: Oblikovanje izhodiščnih preglednic glasu kupcev**

Z metodami za zbiranje podatkov se pridobijo najrazličnejše izjave kupcev, ki govorijo o njihovih problemih, priložnostih, zamislih, rešitvah, željah in potrebah.

Ločevanje resničnih potreb kupcev je prvi pogoj za sestavljanje potreb in ovrednotenje relativne pomembnosti potreb, ki naj se upoštevajo pri načrtovanju izdelka. Pri tem si tisti, ki analizirajo kakovostne podatke pomagajo z izhodiščnimi preglednicami glasu kupcev, v katere se vpišejo dobesedne izjave kupcev. Slika 10 prikazuje vsebino izhodiščnih preglednic glasu kupcev.

Stolpec z “razpoznavno številko” razpozna vir izjave kupca, npr. številka intervjuja, številka strani, številka vrstice ali datum intervjuja. Njegov namen je, da preskrbi povezavo nazaj do vira izjave za primer, ko želimo izvedeti nadaljnje informacije o izjavi.

Stolpec, ki obravnava “demografijo kupcev”, vsebuje informacije, to so starost, prihodki, poklic ali lokacija osebe, ki je preskrbela podatke.

Razdelek “uporaba” vsebuje informacije, ki opisujejo povezavo uporabe izdelka.

V stolpcu “analizirana izjava” se označi, ali gre za resnične potrebe kupcev, in/ali pa za možne tehnične rešitve in cilje.

**2. korak: Oblikovanje sorodnostnega diagrama**

V izhodiščnih preglednicah glasu kupcev zbrane potrebe se nadalje razvrstijo z uporabo sorodnostnega diagrama, to je orodja za hierarhično organizacijo kakovostnih informacij. Slika 11

- Step 1: Design of initial tables for the voices of the customers
- Step 2: Design of the affinity diagram,
- Step 3: Design of the tree diagram.

**Step 1: Design of initial tables for the voices of the customers**

Using data-acquisition methods various statements of the customers are obtained, related to their problems, opportunities, ideas, solutions, wishes and needs.

The separation of real customer needs from other expressions is a precondition for structuring the needs and evaluating the relative relevance of needs that are taken into account when planning the product. Those who analyze the quantitative data use the initial tables of the voice of the customers, which are filled out with literal customer statements. Figure 10 presents the contents of the initial voice-of-the-customer tables.

The “ID” column identifies the source of the customer statement, e.g., interview number, page number, number of the line or the date of the interview. It is used for back-referencing the statements in case further information is required about the source.

The “Customer demographics” column contains the age, income, occupation and location of the customer.

The “Use” section describes the context of use of the product in detail.

The “Analyzed statement” marks whether the statement is a real customer need and/or a possible technical solution or goal.

**Step 2: Design of the affinity diagram**

The needs, collected in the initial tables of the voice of the customers are further classified using the affinity diagram – this is a tool for the hierarchical organization of qualitative information.



Sl. 11. Načelo gradnje sorodnostnega diagrama za vrednoto “kakovost izdelka”  
 Fig. 11. Principle of building the affinity diagram for the value of the quality

prikazuje načelo oblikovanja sorodnostnega diagrama načrtovanja izdelka. Hierarhija se začne sestavljati od spodaj navzgor.

V vrednoti "kakovost izdelka" so vse potrebe, ki so jih izrazili zunanji kupci, to so predvsem potrebe, ki se nanašajo na varnost, delovanje in videz izdelka.

### 3. korak: Oblikovanje drevesnega diagrama

Drevesni diagram tako kakor sorodnostni diagram sestavlja potrebe hierarhično. V nasprotju s sorodnostnim diagramom je drevesni diagram grajen od zgoraj navzdol oz. z leve v desno. V drevesnem diagramu so prikazane osnovne, drugotne in ostale potrebe kupcev. Terciarnе potrebe predstavljajo vhod v "hišo kakovosti" načrtovanega izdelka. Slika 12 prikazuje načelo gradnje drevesnega diagrama za vrednoto "kakovost izdelka".

#### 3 VREDNOTENJE PODATKOV O POTREBAH KUPCEV

Na podlagi podatkov o potrebah kupcev, sestavljenih v sorodnostnem oz. drevesnem diagramu, je treba izvesti še vrednotenje potreb, torej določiti pomembnost posameznih potreb kupcev.

Analiza in ocena razpoložljivih metod vrednotenja podatkov o potrebah kupcev ([5] in [13]) je pokazala, da je za vrednotenje podatkov najprimernejše "orodje" anketa, in to telefonska ali poštna.

Figure 11 presents the principle of affinity-diagram development for planning the product. The hierarchy is being built bottom-up.

"Quality of the product" contains all of the needs expressed by external customers, especially the needs related to the safety, functionality and aesthetics of the product.

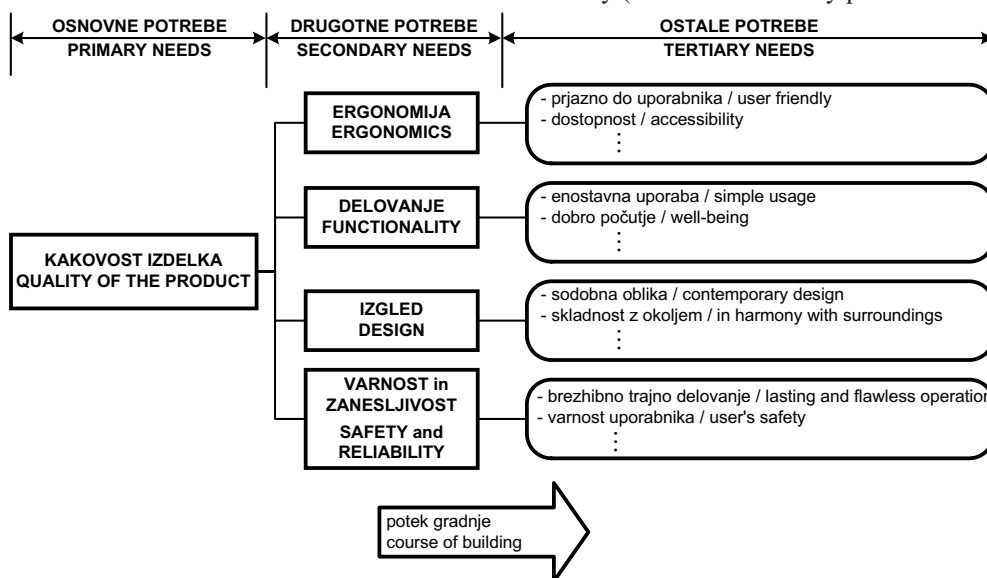
### Step 3: Design of the tree diagram

In the tree diagram the needs are also structured in a hierarchical way. In contrast to the affinity diagram, the tree diagram is built from the top to the bottom (or from the left to the right). In the tree diagram the primary, secondary and tertiary customer needs are shown. Tertiary needs represent the entrance into the house of quality of the planned product. Figure 12 presents the principle of building the tree diagram for the value of the quality.

#### 3 EVALUATION OF THE DATA ON CUSTOMER NEEDS

On the basis of the data on customer needs, stored in the affinity and tree diagrams, it is necessary to evaluate the needs, and therefore to define the relevance of each customer need.

The analysis and appraisal of the available methods for evaluating the data on customer needs ([5] and [13]) has revealed that in order to evaluate the data on customer needs the most suitable tool is a survey (conducted either by phone or mail).



Sl. 12. Načelo gradnje drevesnega diagrama za vrednoto "kakovost izdelka"  
 Fig. 12. Principle of building the tree diagram for the value of the quality

V anketi je treba vzorec izbrati naključno, tako da ima vsaka oseba v populaciji merljivo verjetnost izbire, s tem se rezultati ankete zanesljivo preslikajo iz vzorca na večjo populacijo. Anketa se lahko izvede v državi, regiji ali občini.

Telefonske ankete so drage, običajni vir za vzorčenje pa so telefonski imeniki.

Poštne ankete terjajo manjše stroške, so pa zelo učinkovite takrat, ko so naslovljene na uporabnike določene skupine izdelkov in preskrbijo merljive podatke, ki se lahko posplošijo na celotno populacijo. Naslovno pismo poštne ankete mora razložiti vzroke za anketo in izraziti zagotovila o zaupnosti.

Da zagotovimo veliko odgovorov, priporočamo pri poštni anketi priporočila upoštevanje naslednjih pravil:

1. pravilo: Večkratni stiki, ki obsegajo:
  - o pošiljanje predhodnega poštnega naznanila o anketi,
  - o pošiljanje ankete vsem odgovarjajočim ob istem času s spremnim besedilom,
  - o pošiljanje opomnika z informacijo, da lahko spraševani zahtevajo nadomestni vprašalnik,
  - o pošiljanje zadnjega nadomestnega vprašalnika s priporočeno pošto,
  - o pošiljanje potrdila ali priznanja za sodelovanje v anketi,
2. pravilo: Uporabiti natiskani papir in predstavniška pisma z logotipom in stično osebo,
3. pravilo: Vključitev ovojnice z znamko in naslovom za vrnitev ankete,
4. pravilo: Vključitev simboličnega darila s prvotnim ali naslednjim vprašalnikom kot spodbudo in znak spoštovanja.

Pri izvedbi ankete kupce zaprosimo, da posamezno potrebo ustrezno ovrednotijo. Za vrednotenje potreb kupcev je na voljo več metod ([14] in [15]), katerih značilnosti, prednosti in pomanjkljivosti so prikazane v preglednici 1.

Po opisani metodi pridobljene, sestavljene in vrednotene potrebe kupcev izdelka pomenijo vhodni podatek 1. hiše postopka razvoja izdelka z načinom RFK. Slika 13 prikazuje posplošeni model ugotavljanja in vrednotenja potreb kupcev.

#### 4 PRIMER

Podjetje, ki izdeluje zdravstveno opremo, želi izboljšati konkurenčno zmožnost na domačem trgu in razširiti svojo ponudbo tudi na svetovni trg.

The sample for the survey should be selected randomly, so that each person in the population has a measurable probability of being selected and thus the survey results can be reliably extended to a larger population. The survey can be conducted in the state, region or municipality.

Phone surveys are expensive and the usual source for sampling is phone directories.

Mail surveys cost less; they are very effective when they are targeted to the users of a particular group of products and they provide measurable data that can be generalized to the whole population. The letter accompanying the mail survey should explain the reasons for the survey and give an assurance of confidentiality.

To ensure a high response rate, the following rules should be followed when conducting mail surveys:

- Rule no. 1: Multiple contacts should be used, including:
- sending an announcement of the survey by mail,
  - sending the survey with a cover letter to all interviewees at the same time,
  - sending a reminder with contact details, enabling the interviewees to request a substitute survey,
  - sending the last substitute survey with registered mail,
  - sending a letter or certificate as a symbol of appreciation for the cooperation.

Rule no. 2: Use printed paper and memos with letterheads and contact person details.

Rule no. 3: Use stamped envelopes with printed return addresses.

Rule no. 4: Enclose a symbolic gift with the first or subsequent surveys to recognize the efforts of the interviewees and to thank them,

When conducting a survey, the customers are requested to evaluate each individual need. There are several methods available to evaluate the customer needs ([14] and [15]). Their characteristics, advantages and drawbacks are presented in Table 1.

With the described methods obtained, structured and evaluated customer needs represent the input data for the 1<sup>st</sup> QFD house of new-product development. Figure 13 shows a general model for obtaining and evaluating customer needs.

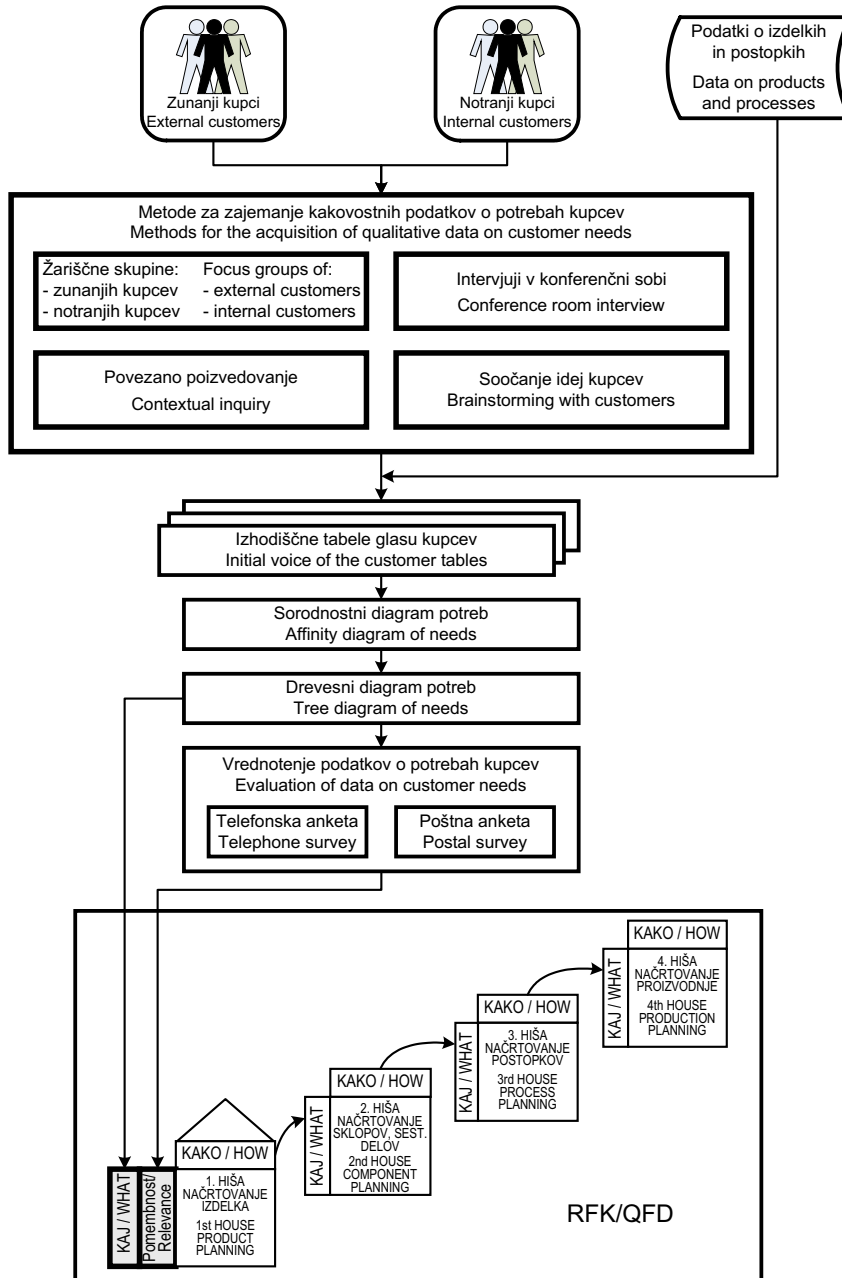
#### 4 CASE STUDY

A company that produces medical equipment wishes to improve its competitiveness on the domestic market and to offer its products to the global market.

Preglednica 1. Metode vrednotenja podatkov o potrebah kupcev  
 Table 1. Methods for evaluating the data on customer needs

| METODA VREDNOTENJA / EVALUATION METHOD  | OPIS METODE / DESCRIPTION OF THE METHOD  | PREDNOSTI METODE / ADVANTAGES OF THE METHOD  | SLABOSTI METODE / DISADVANTAGES OF THE METHOD   |
|---|--|--|---|
| Neposredna ocenitev potreb kupcev / Direct evaluation of customer needs   | Kupce se prosi, da ovrednotijo pomembnost vsake potrebe z lestvico, ki jo navaja anкета. Najbolj pomembne potrebe naj bi bile ocenjene z visokimi števili, medtem, ko naj bi bile potrebe z manjšo pomembnostjo ocenjene z nizkimi števili. / The customers are asked to evaluate the relevance of every need on a scale, given by the survey. The most important needs should be marked with high scores while the less important needs should get lower scores.  | Metoda je za kupce lahko razumljiva. / The method is easily comprehensible to the customers.   | Kupci težijo k temu, da ocenijo vse potrebe kot zelo pomembne. To naredijo precizem zato, ker jim ni potrebno primerjati potreb med seboj. / The customers tend to mark all needs as very important because they do not have to compare the needs with each other   |
| Razvrstitve potreb kupcev po pomembnosti / Sorting customer needs by relevance  | Kupce se naprosi, da razvrstijo potrebe iz seznama od najbolj pomembne do najmanj pomembne. / The customers are requested to sort the needs on the list from the most important need to the least important one.   | Metoda je za kupce lahko razumljiva. Kupci morajo narediti ljudi nekaj primerjalnih odločitev. / The method is easily comprehensible to the customers. They must also make some comparative decisions.   | Metoda je težka za izvedbo, kadar je potrebno razvrstiti več kot deset potreb. / This method is difficult to carry out when more than ten needs have to be evaluated.   |
| Kombinirana metoda razvrstitve pomembnosti in dodeljevanja točk potrebam kupcev / Combined method of sorting by relevance and assigning points to the needs | Pri tej metodi kupci potrebe najprej razvrstijo po padajočem vrstnem redu pomembnosti, nato tem potrebam dodajo števila s 100 številčne lestvice. Najvišje število dajo najpomembnejši potrebi in najmanjše število najmanj pomembni potrebi. / In this method the customers first sort the needs by relevance in descending order. Then they assign numbers from a 100 point scale to the needs, giving the highest number to the most important need and the smallest number to the least important need.  | Metoda je lahko razumljiva. Kupci naredijo primerjalne odločitve že pri določanju vrstnega reda potreb, zato lažje dodajo različne vrednosti potrebam s 100 številčne lestvice. / The method is easily comprehensible to the customers. The customers already make comparative decisions when selecting the order of needs and can easily assign values from the 100 point scale to different needs. | Metoda je težka za izvedbo, kadar je potrebno razvrstiti več kot deset potreb. / This method is difficult to carry out when more than ten needs have to be evaluated.   |
| Dodeljevanje 100 točk med vse potrebe kupcev / Assigning 100 points among all customer needs  | Pri tej metodi je potrebno razdeliti 100 točk med potrebe kupcev iz seznama. / In this method, 100 points are distributed to the customer needs on the list  | Kupci morajo pri razdeljevanju točk sprejemati primerjalne odločitve in relativno primerjati potrebe med seboj. / The customers must make comparative decisions when assigning points and compare the needs relatively.  | Ker se od odgovarjajočih zahteva velika pozornost, odgovarjajoči porabijo veliko časa za razdeljevanje točk med potrebe, posebej, če je teh potreb 10 ali več. / As the attention required from the interviewees is very high, a lot of time is necessary to assign the points to the needs, especially if there are more than ten needs. |
| Priorizacijski model 1-2-3 / Prioritization model 1-2-3   | Priorizacijski model 1-2-3 je metoda, kjer kupci najprej določijo za njih najpomembnejšo potrebo, kasneje določijo druga mesta potrebam, za katere menijo, da so po pomembnosti za najpomembnejšo potrebo. Ostalim potrebam pripisajo tretja mesta. / Analytical kasneje pripisajo najpomembnejši potrebi za posameznejšo kupca 5 točk, potrebam, uvrščenim na drugo mesto, 3 točke in tretje uvrščenim potrebam 1 točko. / Vse točke za vsako potrebo so osnova za določanje relativne pomembnosti potreb. / The prioritization model 1-2-3 is a method where customers first determine the needs they find most important. Then they select the second most important needs. The remaining needs are considered as the third most important. / The analysts assign 5 points to the most important need of the customer, 3 points to the second most important needs and 1 point to the third most important needs. The sum of points for each need is the basis for determining the relative relevance of the needs. | Metoda je lahka za razumevanje in hitra za izpolnjevanje. / The method is easy to comprehend and quick to fill in.   | Kadar je potrebno obravnavati večje število potreb je metoda zamudna. / The method is slow when a large number of needs have to be dealt with.  |
| Metoda primerjave parov potreb kupcev / Couple comparison method  | Pri metodi primerjave parov se primerjata po dve potrebi, glede na direktno primerjavo se da prednost eni od obeh potreb. Potreba, ki je imela največkrat prednost glede na ostale potrebe, je po rangi najvišje, to pomeni, da je najpomembnejša. Potrebe se uredijo v obliki matrice, ugotovitve primerjave parov pa se vnašajo v odgovarjajoča polja matrice. / In the couple comparison method, two needs are directly compared in order to determine the more important one. The need which was selected in favor of others most of the times, is ranked the highest, i.e., the most important need. The needs are sorted in matrix form and the results of comparisons are entered in the appropriate fields of the matrix.  | Možnost pridobitve relativnih pomembnosti potreb. / The possibility to acquire relative relevance of needs.  | Možnost nedoslednih sodb. Kadar je potrebno obravnavati večje število potreb je metoda zamudna. / The possibility of inconsistent judgments. Time-consuming when a lot of needs have to be evaluated.   |
| Analični hierarhični pristop / Analytical hierarchic approach   | Analični hierarhični pristop uporablja primerjavo parov potreb samo med sorodnimi potrebami v drevesu in tako ustvarja lestvico razmerij pomembnosti. Najprej se ugotovijo pomembnosti potreb na višjih nivojih, nato pa pomembnosti potreb po posameznih skupinah na nižjih nivojih. Pare primerjamo z ocenami od 1 do 9. / The analytical hierarchic approach uses the couple comparison of needs only among related needs in the tree, creating a scale of relevance relations. Firstly, the relevance of needs on higher levels is determined, followed by the relevance of needs by individual groups on lower levels. The couples are compared by using marks from 1 to 9.   | Možnost pridobitve relativnih pomembnosti potreb. / Najbolj natančna metoda. / The possibility to acquire relative relevance of needs. The most accurate method.   | Kadar je potrebno obravnavati večje število potreb je metoda zamudna. / The method is slow when a large number of needs must be dealt with.   |





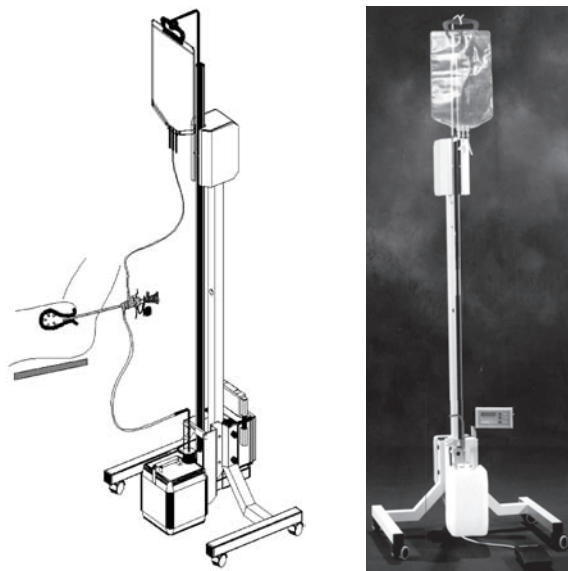
Sl. 13. *Posplošeni model ugotavljanja in vrednotenja potreb kupcev*  
 Fig. 13. *A general model for obtaining and evaluating customer needs*

Vodstvo podjetja se je odločilo, da za izdelek Vario Flow (sl. 14), ki se uporablja v zdravstvu kot pripomoček pri posegih, ugotovi potrebe kupcev in kasneje z uporabo metodologije RFK te potrebe v kar največji meri upošteva pri sprejemanju nove različice izdelka ([16] in [17]).

V nadaljevanju je prikazan postopek pridobivanja, sestavljanja in vrednotenja potreb

The company management has decided that it will establish the customer needs for the Vario Flow product (Fig. 14 – it is used in medicine as an aid in surgery), and later on, using the QFD methodology, consider these needs in the development of a new version of the product ([16] and [17]).

In the text that follows, the procedure for obtaining, structuring and evaluating the needs of



Sl. 14. *Vario Flow*  
Fig. 14. *Vario Flow*

kupcev izdelka Vario Flow ter oblikovanja vhodnega vektorja KAJ hiše razvoja funkcij kakovosti izdelka.

Za izvedbo naloge je vodstvo podjetja izbralo projektni način in imenovalo projektni tim v sestavi:

- Moderator: Inženir načrtovanja kakovosti, ker dobro pozna metodologijo RFK in izdelek Vario Flow,
- Člani tima:
  - o razvojni inženir, ker pozna konstrukcijske zahteve izdelka,
  - o zdravnik, ker uporablja izdelek pri posegih,
  - o oblikovalec, ker je odgovoren za obliko izdelka,
  - o član vodstva, ker je odgovoren za povezovanje projektne skupine z vodstvom podjetja in pozna kupce,
  - o inženir načrtovalec proizvodnih postopkov, ker pozna tehnološke postopke izdelave izdelka,
  - o proizvodni inženir, ker pozna možnosti in omejitve izdelave v podjetju.

#### 4.1 Viri glasu kupcev za izdelek Vario Flow

Projektna skupina je ugotovila, da so za izdelek Vario Flow na voljo naslednji viri glasu kupcev:

Vario Flow customers and the establishment of the input WHAT vector for the house of QFD of the product is presented.

In order to accomplish the task, the company management selected the project approach and appointed a project team consisting of:

- Moderator: quality-planning engineer – because he knows well the QFD methodology and the Vario Flow product,
- Team members:
  - o development engineer – because he knows the design requirements of the product,
  - o physician – because he uses the product in surgical procedures,
  - o designer – because he is responsible for the design of the product,
  - o managing board member – because he is responsible for connecting the project team with the company management and he knows the customers,
  - o production process planning engineer – because he knows the production processes,
  - o production engineer – because he knows the possibilities and limitations of manufacturing in the company.

#### 4.1 Sources of the customers' voice for the Vario Flow product

The project team established that the following sources for the customers' voice for the Vario Flow product are available:

- Zunanji kupci (zdravniki, ki opravljajo endoskopske posege; inštrumentarke, ki sodelujejo pri posegih, ter zastopniki vodstva podjetja).
- Notranji kupci (inženirji, odgovorni za razvoj izdelka, postopkov, kakovosti; dobavitelji sestavnih delov in materialov; vzdrževalci, ki skrbijo za nemoteno delovanje izdelka).
- Podatki o izdelkih in postopkih (podatki o opravljenih vzdrževalnih posegih, pripombah in pritožbah kupcev).

#### 4.2 Pridobivanje podatkov o potrebah kupcev izdelka Vario Flow

Za pridobitev podatkov o potrebah kupcev je projektna skupina izbrala metodo intervjujev, in to v obliki:

- intervjujev v konferenčni sobi in
- povezanega poizvedovanja.

Za prvo obliko intervjujev se je projektna skupina odločila zaradi lažjega časovnega usklajevanja udeležencev intervjuja. Intervjuja se je udeležilo 10 oseb različnih profilov: zdravniki, inštrumentarke, inženirji, vzdrževalci, predstavniki vodstev podjetij. Udeleženci so vnaprej dobili okvirna vprašanja, da so se lahko ustrezno pripravili.

S pomočjo intervjuja je bilo zbranih 35 potreb kupcev, in sicer:

- posebne zahteve za laparoskopijo, artroskopijo...
- stabilnost sistema
- nadzor kakovosti
- majhni proizvodni stroški
- majhni garancijski stroški
- majhni stroški posegov
- zahteva za prave dobavitelje in kooperante
- oblika za dobro mobilnost sistema
- primernost videza za zdravstveno okolje
- neodvisnost od vira energije
- varnost za bolnika
- varnost naprave
- zanesljivo delovanje
- vzdržljivost naprave
- varnost delovanja
- varnost izdelka in odgovornost za posledice
- izboljšanje napak človeškega dejavnika
- varnost za uporabnika in odgovornost za posledice
- hiter prenos
- varen prenos
- preprosto vzdrževanje
- preprosta in hitra montaža/demontaža

- External customers (physicians who perform endoscopies, scrub nurses who participate in surgery and representatives of the company management).
- Internal customers (engineers responsible for the development of the product, the processes, the quality; the suppliers of components and materials; the maintenance crew that is responsible for normal operation of the product).
- Product and process data (data on performed maintenance works, customer remarks and complaints).

#### 4.2 Obtaining the data on customer needs for the Vario Flow product

In order to obtain the data on customer needs the project team selected the following forms of interviews:

- conference-room interviews
- contextual inquiry.

The project team selected the first form of interview because of the easier time management of the interviewees. The interviewees were 10 people of various profiles: physicians, scrub nurses, engineers, maintenance personnel and company management representatives. The participants were given general questions in advance so that they could prepare properly.

35 customer needs were identified by the interview:

- Special requirements for laparoscopy, arthroscopy, etc.
- Stability of the system
- Quality control
- Low production costs
- Low warranty costs
- Low operating costs
- Requirement for suitable suppliers and cooperators
- Good system mobility design
- Aesthetical suitability for medical environment
- Independence of energy source
- Patient's safety
- Device's safety
- Reliable operation
- Durability of the device
- Safety of operation
- Safety of the product and responsibility for consequences
- Improvement of human-factor errors
- Safety for the user and responsibility for the consequences
- Fast transport
- Safe transport
- Simple maintenance
- Simple and quick assembly/disassembly

- lahka izvedljivost
- pravočasnost (JIT)
- prilagodljivost delovnega okolja
- metodologija načrtovanja
- avtomatizacija
- vrednostni sistem
- izboljšanje organizacije/vodenja
- izobraževanje in izpopolnjevanje zaposlenih
- delovna postaja
- informacijsko vodenje
- zahteve skupin
- integracija
- orodje za odzivnost

Povezano poizvedovanje je bilo namenjeno spoznavanju postopka uporabe izdelka v kirurški dvorani.

V razgovoru z uporabniki je bilo oblikovanih še nadaljnjih 14 potreb kupcev, in sicer:

- dobra vidljivost v polju posegov
- nastavitev tlaka kirurgu in/ali inštrumentarki
- dobra vidnost informacije o stanju tlaka v sistemu
- dobra vidnost informacije o stanju pomanjkanja v sistemu
- hitra menjava tekočine
- večja ločljivost prikazovalnika
- omogoča dostop v notranjost telesa
- zvezna nastavitev tlaka
- segrevanje vode
- po menjavi vode upoštevanje prejšnjega stanja tlaka
- prednastavljanje vrednosti tlaka
- nadzor količine vode v sistemu
- opozorila stanja zbiralnika
- opozorila o kritičnih stanjih sistema

Skupno je bilo torej oblikovanih 49 zahtev kupcev.

### 4.3 Sestavljanje podatkov o potrebah kupcev izdelka Vario Flow

Projektna skupina je izvedla sestavljanje podatkov o potrebah kupcev v treh korakih:

#### 1. korak: Oblikovanje izhodiščnih preglednic glasu kupcev

Izhodiščne preglednice glasu kupcev izdelka Vario Flow (sl. 15) so bile oblikovane posebej za zunanje in notranje kupce ter glede na podatke o izdelkih in postopkih.

V preglednici zunanjih kupcev je navedenih 21 potreb, v preglednici notranjih kupcev 26 in v preglednici podatkov o izdelkih in postopkih dve

- Simple manufacturability
- JIT (just in time)
- Flexibility of the operating environment
- Planning methodology
- Automation
- Value system
- Improvement of organization/management
- Training of employees
- Workstation
- IT management
- Requirements of teams
- Integration
- Tool for response

The purpose of the contextual inquiry was to get acquainted with the use of the product in the operating theater.

Another 14 customer needs were identified during the discussions with users:

- Good visibility in the surgical field
- Operator and/or scrub nurse can set the pressure
- System pressure is clearly visible
- System deficit is clearly visible
- Quick exchange of fluid
- Higher display resolution
- Interior of the body should be accessible
- Continuous set of pressure
- Heating of water
- Following water change, the previous pressure is taken into account
- Pressure can be pre-set
- Control of amount of water in the system
- Battery status warnings
- Critical system state warnings

Altogether there were 49 customer requirements formed.

### 4.3 Structuring the data on customer needs for the Vario Flow product

The project team carried out the structuring of data on customer needs in three steps:

#### Step 1: Forming the initial tables of the voice of the customers

Initial tables of the voice of the customers of the Vario Flow product (Figure 15) were formed especially for external and internal customers and according to the data on products and processes.

The table of external customers contains 21 needs, the table of internal customers contains 26 needs, and the table on the product and process

**PREGLJEDNICA GLASU ZUNANJH KUPCEV / TABLE FOR THE VOICE OF THE EXTERNAL CUSTOMERS**

| UPORABA / USE   |  |   |  |   |  |                                       |   |                                  |                                |   |
|-----------------|--|---|--|---|--|---------------------------------------|---|----------------------------------|--------------------------------|---|
| Id. št./ ID No. | Demografija kupcev Customer demography                 | Izjava kupca Customer statement                                       | Kdo Who                                    | Kaj What                                      | Kdaj When                                  | Kje Where                             | Zakaj Why                               | Kako How                         | Potreba/ značilka Need/feature | Vrsta potrebe/ značilke Type of need/ feature |
| 1.              | Zdravniki Physicians                                   | Omožja dostop v notranjost telesa Interior of the body is accessible  | Kirurg Surgeon                             | Preprečitev poškodb Prevention of injuries    | Med celotnim posegom During entire surgery | Operacijska dvorana Operation theatre | Za nemoteno delo For uninterrupted work |                                  | Kakovost Quality               | Delovanje Functionality                       |
| 2.              | Zdravniki Physicians                                   | Dobra vidljivost v polju posega Good visibility in the surgical field | Kirurg Surgeon                             | Preprečitev zastojev Prevention of deadlocks  | Med celotnim posegom During entire surgery | Operacijska dvorana Operation theatre | Za nemoteno delo For uninterrupted work | Z endoskopom With endoscope      | Kakovost Quality               | Delovanje Functionality                       |
| 3.              | Zdravniki Physicians                                   | Zvezna nastavitve tlaka Continuous set of pressure                    | Kirurg Surgeon                             | Preprečitev poškodb Prevention of injuries    | Med celotnim posegom During entire surgery | Operacijska dvorana Operation theatre | Za nemoteno delo For uninterrupted work |                                  | Kakovost Quality               | Delovanje Functionality                       |
| 4.              | Zdravniki, instrumentarke inštrumentarke, scrub nurses | Nadzor količine vode v sistemu Control of water amount in the system  | Kirurg in inštrum. Surgeon and scrub nurse | Prava količina vode The right amount of water | Med celotnim posegom During entire surgery | Operacijska dvorana Operation theatre | Varnost bolnika Safety of the patient   | Kontrolna naprava Control device | Kakovost Quality               | Varnost Safety                                |
| ...             |  |   |  |   |  |                                       |   |                                  |                                |   |
| 21.             |  |   |  |   |  |                                       |   |                                  |                                |   |

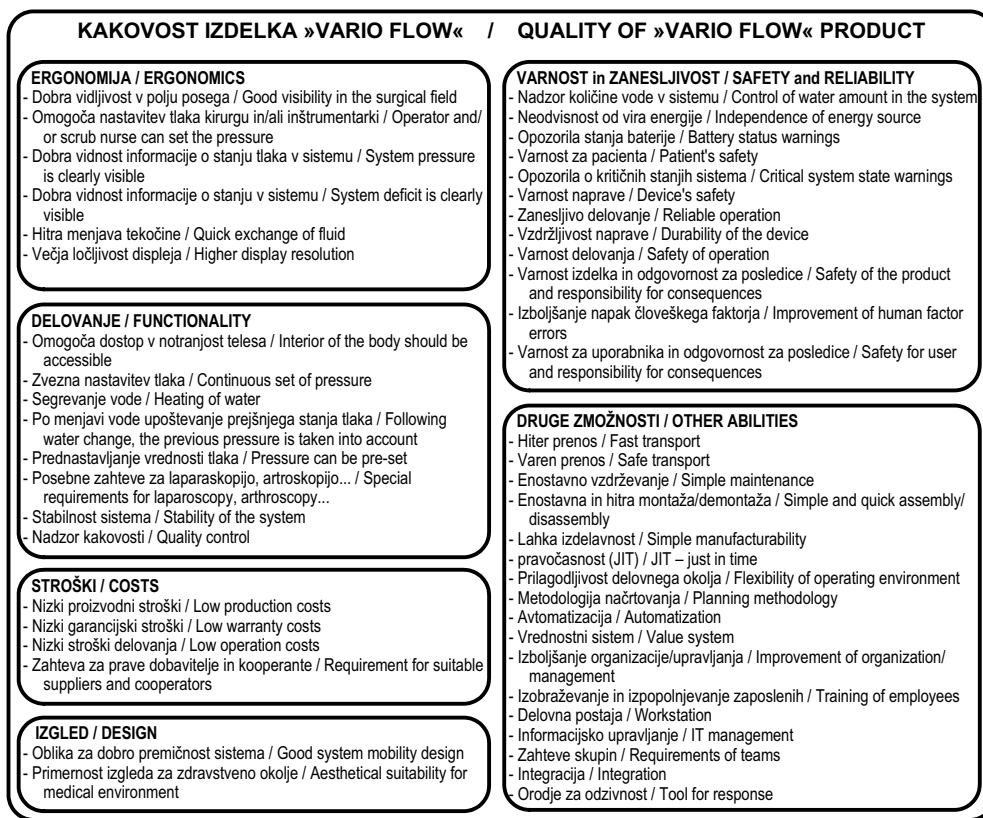
**PREGLJEDNICA GLASU NOTRANJH KUPCEV / TABLE FOR THE VOICE OF THE INTERNAL CUSTOMERS**

| UPORABA / USE   |   |  |         |  |                               |                                       |  |                                       |                                |   |
|-----------------|---|--|---------|--|-------------------------------|---------------------------------------|--|---------------------------------------|--------------------------------|---|
| Id. št./ ID No. | Demografija kupcev Customer demography  | Izjava kupca Customer statement          | Kdo Who | Kaj What                                     | Kdaj When                     | Kje Where                             | Zakaj Why                                  | Kako How                              | Potreba/ značilka Need/feature | Vrsta potrebe/ značilke Type of need/ feature |
| 22.             | Nadzorni inženirji Inspection engineers | Varnost za bolnika Safety of the patient |         | Preprečitev poškodb Prevention of injuries   | Med posegom During surgery    | Op. dvorana Operation theatre         |  | Varnost, sistem Safety system         | Kakovost Quality               | Varnost Safety                                |
| 23.             | Razvojni inženir Development engineer   | Zanesljivo delovanje Reliable operation  |         | Preprečitev zastojev Prevention of deadlocks | Med posegom During surgery    | Operacijska dvorana Operation theatre | Nemoteno delovanje Undisturbed operation   | Konstruktivna rešitev Design solution | Kakovost Quality               | Zanesljivost Reliability                      |
| 24.             | Razvojni inženir Development engineer   | Vzdržljivost naprave Device durability   |         |  | Vsa dva leti At least 2 years |                                       | Brezhibno delovanje Perfect operation      | Konstruktivna rešitev Design solution |                                | Zanesljivost Reliability                      |
| 25.             | Razvojni inženir Development engineer   | Varnost delovanja Safety of operation    |         | Preprečitev zastojev Prevention of deadlocks | Med posegom During surgery    | Operacijska dvorana Operation theatre | Da ne pride do poškodb To prevent injuries | Konstruktivna rešitev Design solution | Kakovost Quality               | Zanesljivost Reliability                      |
| ...             |   |  |         |  |                               |                                       |  |                                       |                                |   |
| 47.             |   |  |         |  |                               |                                       |  |                                       |                                |   |

**PODATKI O IZDELKIH IN PROCESIH / PRODUCT AND PROCESS DATA**

| UPORABA / USE   |  |  |                             |  |   |                           |   |              |                                |   |
|-----------------|--|--|-----------------------------|--|---|---------------------------|---|--------------|--------------------------------|---|
| Id. št./ ID No. | Demografija kupcev Customer demography | Izjava kupca Customer statement                | Kdo Who                     | Kaj What                                     | Kdaj When                                     | Kje Where                 | Zakaj Why   | Kako How     | Potreba/ značilka Need/feature | Vrsta potrebe/ značilke Type of need/ feature |
| 1.              | Vzdrževalna služba Maintenance service | Hlita menjava tekočine Quick exchange of fluid | Inštrumentarica Scrub nurse | Premajhna ločljivost insufficient resolution | Pred in med posegom Before and during surgery | Na izdelku On the product | Nemotena oskrba s tekočino Uninterrupted fluid supply | Ročno Manual | Kakovost Quality               | Delovanje Functionality                       |
| 2.              | Zdravniki Physicians                   | Premajhna prikazovalnik Too small a display    | Zdravnik Physician          | Premajhna ločljivost insufficient resolution | Med posegom During surgery                    | Na izdelku On the product | Da ne pride do napak To prevent errors                |              | Kakovost Quality               | Delovanje Functionality                       |

Sl. 15. Izhodiščne preglednice glasu kupcev izdelaka Vario Flow  
 Fig. 15. Initial tables of the voice of the customers for the Vario Flow product



Sl. 16. Sorodnostni diagram za vrednoto kakovost izdelka Vario Flow  
 Fig. 16. Affinity diagram for the value of the quality of the Vario Flow product

potrebi. Za vsako potrebo so v preglednicah navedeni podatki: prepoznavna številka potrebe, demografija kupca, izjava kupca, uporaba potrebe (kdo, kaj, kdaj, kje, zakaj, kako), analiza izjave ter vrsta potrebe oz. značilke.

**2. korak: Oblikovanje sorodnostnega diagrama izdelka Vario Flow**

Na podlagi podatkov, zbranih v izhodiščnih preglednicah kupcev, je projektna skupina lahko oblikovala sorodnostni diagram za vrednoto kakovost izdelka Vario Flow. Zahteve kupcev je razdelila na šest skupin in vsaki potrebi, zapisani v izhodiščni preglednici glasu kupcev, priredil pripadnost v eno skupino potreb. Sorodnostni diagram za vrednoto kakovost izdelka Vario Flow je prikazan na sliki 16.

**3. korak: Oblikovanje drevesnega diagrama izdelka Vario Flow**

V drevesnem diagramu za vrednoto kakovost je projektna skupina, podobno kot v sorodnostnem diagramu potrebe kupcev uredila hierarhično,

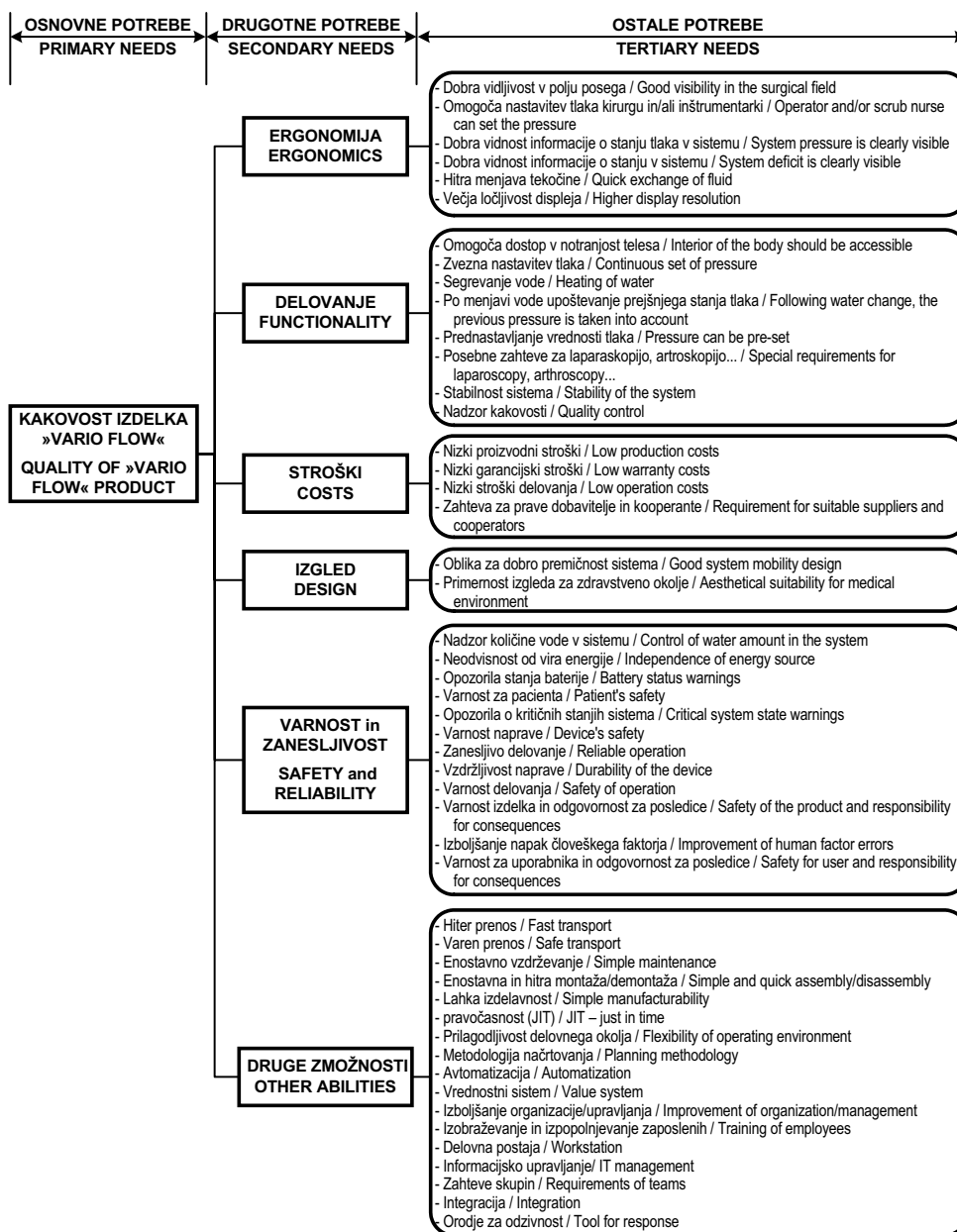
data contains 2 needs. For each need the table contains the following data: ID number of the need, customer demography, customer statement, use of the need (who, what, when, where, why, how), analyzed statement and the type of need or characteristics.

**Step 2: Forming the affinity diagram for the Vario Flow product**

On the basis of the data collected in the source tables of customers the project team formed the affinity diagram for the value of quality of the Vario Flow product. Customer needs were divided into six groups and each need, written in the source table for the voice of the customers, was assigned to one group of needs. The affinity diagram for the value of quality of the Vario Flow product is presented in Figure 16.

**Step 3: Forming the tree diagram for the Vario Flow product**

In the tree diagram for the value of quality the customer needs are arranged hierarchically (similar to the affinity diagram), divided into primary,



Sl. 17. Drevesni diagram za vrednoto kakovost izdelka Vario Flow  
 Fig. 17. Tree diagram for the value of quality of the Vario Flow product

razdeljene na osnovne, drugotne in ostale potrebe. Drevesni diagram za vrednoto “kakovost izdelka” Vario Flow je prikazan na sliki 17.

secondary and tertiary needs. The tree diagram for the value of quality of the Vario Flow product is shown in Figure 17.

#### 4.4 Vrednotenje podatkov o potrebah kupcev izdelka Vario Flow

#### 4.4 Evaluation of the data on customer needs for the Vario Flow product

Skupina se je odločila za izvedbo poštne ankete. Izdelan je bil anketni list, v katerem so bile

The team decided to use the postal survey. A survey form was composed where the primary, sec-

navedene osnovne, drugotne in ostale potrebe kupcev, in poslan v ocenitev 50-tim naključno izbranim možnim kupcem izdelka Vario Flow.

V predpisanem roku je prispelo 38 izpolnjenih anketnih listov, v katerih so kupci izdelka Vario Flow določili za njih najpomembnejšo potrebo, manj pomembne in končno zelo malo pomembne potrebe. Projektna skupina je kasneje z uporabo PREDNOSTNEGA MODELA 1-2-3 najpomembnejši potrebi posameznega kupca (prvo mesto) pripisala 5 točk, malo pomembnim potrebam, uvrščenim na drugo mesto, 3 točke in potrebam, uvrščenim na tretje mesto, 1 točko.

S seštevanjem točk pomembnosti potreb, navedenih v vseh 38 izpolnjenih anketnih listih, je projektna skupina končno prišla do rezultatov o absolutni in relativni pomembnosti posamezne potrebe, kar prikazuje preglednica 2.

V preglednici 2 pridobljene, sestavljene in vrednotene potrebe kupcev predstavljajo vhodni podatek 1. hiše (načrtovanje izdelka) – postopka sprejemanja izdelka. Slika 18 prikazuje model ugotavljanja in vrednotenja potreb kupcev izdelka Vario Flow.

## 5 SKLEPI

Podjetje ne more priti do konkurenčnega izdelka, če že v fazo sprejemanja izdelka ne vključi tistega osebk, ki bo izdelek uporabljal oziroma imel od njega korist, torej kupca izdelka.

Pravočasno vključevanje kupcev v postopek sprejemanja izdelka daje kupcu možnost, da z

ondary and tertiary customer needs were stated and it was sent for evaluation to 50 randomly selected potential customers of the Vario Flow product.

Up to the due date, 38 survey responses were received; in these, Vario Flow customers stated what in their opinion were the most important, less important and least important needs. After that the project team, using the “PRORITY MODEL 1-2-3”, assigned 5 points to the most important feature of a particular need, less important needs were assigned 3 points and the least important features were assigned 1 point.

By summing up the points obtained from all 38 surveys the project team finally obtained the results on the absolute and relative relevance of a particular need, as presented in Table 2.

The customer needs, obtained, structured and evaluated in Table 2, are the input data for the first – product planning house – the development process. Figure 18 shows a model for obtaining and evaluating the customer needs of the Vario Flow product.

## 5 CONCLUSIONS

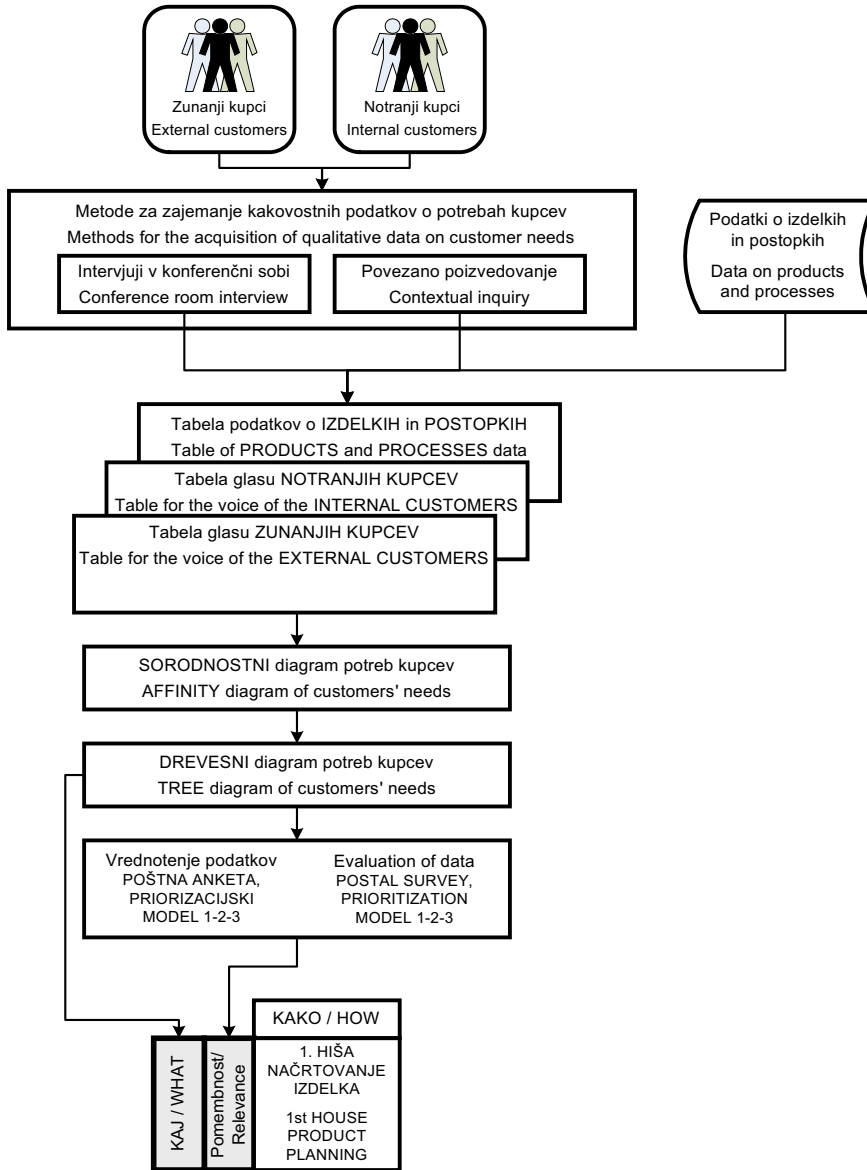
A company cannot produce a competitive product unless the client (end user) takes part in the development process.

If the clients take part in the new-product development process early enough, then the client (by expressing his or her needs) can influence the

Preglednica 2. *Absolutna in relativna pomembnost dela potreb kupcev izdelka Vario Flow*  
Table 2. *Absolute and relative relevance of customer needs for the Vario Flow product*

| ID ŠT.<br>ID NO | POTREBE KUPCEV / CUSTOMERS' NEEDS  | Absolutna pomembnost (število točk)<br>Absolute relevance (number of points) | Relativna pomembnost<br>Relative relevance [%] |
|-----------------|--|--|--|
| 1.              | Dobra vidljivost v polju posega /<br>Good visibility in the surgical field                                   | 149  | 2,8  |
| 2.              | Omogoča nastavitvev tlaka kirurgu in/ali inštrumentarki /<br>Surgeon and/or scrub nurse can set the pressure | 190  | 3,5  |
| 3.              | Dobra vidnost informacije o stanju tlaka v sistemu /<br>System pressure is clearly visible                   | 143  | 2,7  |
| 4.              | Dobra vidnost informacije o stanju v sistemu /<br>System deficit is clearly visible                          | 135  | 2,5  |
| 5.              | Hitra menjava tekočine / Quick exchange of fluid   | 151  | 2,8  |
| ⋮               | ⋮  | ⋮  | ⋮  |
| 48.             | Integracija / Integration  | 69   | 1,3  |
| 49.             | Orodje za odzivnost / Tool for response  | 63   | 1,2  |
| VSOTA / TOTAL   |  | 5370   | 100,0  |





Sl. 18. Model ugotavljanja in vrednotenja potreb kupcev izdelka Vario Flow  
 Fig. 18. Model for obtaining and evaluating the customer needs of the Vario Flow product

izražanjem svojih potreb vpliva na definiranje izdelka in celotni postopek sprejemanja izdelka.

Dosedanje raziskave upoštevanja potreb oziroma zahtev kupcev izdelka v postopku sprejemanja izdelka so se nanašale na oblikovanje modela ugotavljanja, sestavljanja in vrednotenja potreb oziroma zahtev kupcev izdelka glede na kakovost izdelka. V primeru izdelka Vario Flow je bilo prepoznanih 21 potreb zunanjih kupcev, 26 potreb notranjih kupcev in 2 potrebi o izdelku in

concept of the product and the whole product-development process.

Past researches that analyzed the customers' needs or demands in the new-product development process were related only to the development of the model for obtaining, structuring and evaluating the customers needs as to the quality of the product. In the case of the Vario Flow product, there were identified 21 needs of external customers, 26 needs of internal customers and 2 needs on product and pro-

postopkih, torej skupaj 49 potreb oziroma zahtev kupcev, ki pomenijo izhodiščni podatek za razvoj delovanja kakovosti izdelka na sonovi RFK ([3] in [16]). Pri ugotavljanju pomembnosti potreb izdelka Vario Flow z ABC analizo [18] se je izkazalo, da je nadpovprečno pomembnih 12 potreb, povprečno pomembnih 16 in manj pomembnih 21 potreb. V postopku razvoja izdelka, bo torej treba posebej paziti na izpolnitev nadpovprečno pomembnih zahtev in med njimi najbolj na izpolnitev zahteve o "možni nastavitvi tlaka".

Nadaljnje raziskave upoštevanja glasu kupcev bodo usmerjene na ugotavljanje potreb za izboljšanje ne samo kakovosti temveč tudi drugih lastnosti in vrednot izdelka, npr. preprostost, sestavljivost, možnost ponovne uporabe, odzivnost, stroški itn., ki jih izražajo predvsem notranji kupci in so izhodiščni podatek za sočasni razvoj funkcij kakovosti [12].

cesses. There are 49 needs or customer demands together, which represent the source data for the quality functions deployment (QFD) process [3, 16]. The obtaining of the importance of the needs of the Vario Flow product with ABC analysis [18] shows that there are 12 needs with high importance, 16 with average importance and 21 less important needs. Special attention should be given to fulfilling the high-importance needs in the process of product development, and from these needs, in particular for "Possible pressure setting".

Further research on the influence of the voice of the customers will be focused on establishing the needs for the improvement of not only the quality but other features as well, such as simplicity, ease of assembly, recyclability, responsibility, costs, etc., which are expressed mostly by internal customers and which represent the source data for concurrent functions deployment [12].

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