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OPTIMIZATION OF TELECOMMUNICATION COSTS AS A FACTOR OF SOCIAL DEVELOPMENT

OPTIMIZACIJA TELEKOMUNIKACIJSKIH TROŠKOVA KAO ČIMBENIK RAZVOJA DRUŠTVA

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Abstract
Modern technology and improvement in communications have significantly contributed to social development in the last 30 years. Although high quality telecommunications services are one of the most important factors of rapid economic development, their high costs prevent optimal growth of the economy/society. There is a lack of research that indicates the extent to which the growth is slowed down or has not reached its full potential due to high prices that are a burden to business ventures. The purpose of this paper is to discover possibilities of (a) optimizing telecommunications costs under given conditions, and (b) redirecting resources into developement of enterprises (education, lifelong learning, modernization of technology, etc.). Based on the existing relationships between social and telecommunications services' development, and the positive role of applying high technology in business, the authors conducted a survey to research growth possibilities arising from optimization of telecommunications costs. This survey was conducted in a fast-growing company, by the use of interviews and comparison methods. The results of the study include recommendations for the fast-growing companies as bearers of economic growth, and consequently, of social development.

Sažetak
Uvođenje suvremene visoke tehnologije te poboljšanje komunikacija značajno su doprinijeli razvoju društva u zadnjih 30 godina. Iako su kvalitetne telekomunikacijske usluge jedan od važnijih čimbenika brzog razvoja gospodarstva, njihove visoke cijene sprečavaju optimalni rast gospodarstva/društva. Nedostaju istraživanja koja ukazuju u kojoj mjeri je rast usporen, odnosno, nije postignut njegov puni potencijal, usljed previsokih cijena koje opterećuju poslovanje gospodarskih subjekata. Cilj ovoga rada je otkriti mogućnosti (a) optimiziranja telekomunikacijskih troškova u zadanim uvjetima, te (b) preusmjeravanja tako uštođenih sredstava u razvoj poduzeća (primjerice u obrazovanje, cjeloživotno učenje, modernizaciju tehnologije i sl.). Na temelju već utvrđene veze između razvoja društva i razvoja telekomunikacijskih usluga, te pozitivne uloge primjene visoke tehnologije u poslovanju, metodama intervjua i usporedbe provedeno je istraživanje mogućnosti optimizacije telekomunikacijskih troškova u svrhu pokretanja rasta na primjeru brzorastuće tvrtke. Istraživanje je rezultiralo formuliranjem preporuka za brzorastuća poduzeća kao nosilaca gospodarskog rasta, kao i razvoja društva.

1. Introduction

The term Information and Communication Technology (ICT) is often used as a synonym for Information Technology (IT), although it comprises both, communications and telecommunications (telephone lines and wireless signals), personal computers, appropriate software, systems for storing and audio-visual systems, which enable the users to create access, exchange and manage data. In other words ICT consists of IT, telecommunications, electronic media, all kinds of audio and video processing, distributing as well as network control and function monitoring. Introduction of modern technology and improvement in communications have significantly contributed to social development in the last 30 years. High-quality telecommunication services are one of the more important factors in the rapid economic

growth. However, their high prices hinder the optimum economic and social growth, and significantly contribute to widening the difference between the development of urban and rural parts of the country (Strategy for Rural Development of the Republic of Croatia 2008-2013) and contribute to decreasing population on the islands (National Programme for the Development of Islands of the republic of Croatia), as well as mountain regions.

1.1. Europa 2020 and Digital Agenda for Europe

Provided that Europe wants to succeed in its plans announced in the Strategy Europe 2020, the use of information and communication technologies will inevitably play an important role. Digital Agenda for Europe is one of the key documents, whose goal is to enhance social and economic potential of information and communications technology, especially the Internet as the most important medium for economic and social activities in business, work, play, communications and self- expression. By doing this, innovation shall be encouraged, economic growth initiated and every-day life improved both for the citizens and business ventures. The Europeans shall be provided with the prerequisites for higher quality of life, e. g. better health insurance, safer and more efficient traffic solutions, cleaner environment, possibilities for new media, simpler communication with public administration and better access to cultural events. ICT sector is directly responsible for 5% of European GDP, with the market value of 660 billion Euros per year. Its contribution to the total productivity growth is much higher (20% directly from the ICT sector and 30% from the ICT investments). Due to the high dynamics and innovation characteristic of the sector as well as its influence on the changes in other sectors, social impact of the ICT has become significant. The fact that there are more than 250 million Internet users in Europe who use it daily and that almost all Europeans own mobile phones, has had a life changing effect. The services and the way they are provided are changing rapidly, in the direction from the physical to the digital and are available globally on any device (smart phone, tablet, personal computer, digital radio, high-resolution TV, etc.). It is predicted that digital contents and applications shall almost fully be delivered online.

1.2. Telecommunication services and economic growth in Croatia

Since there is a lack of research in Croatia, which would indicate to what extent the economic growth is slowed down due to the insufficient standards or distribution of telecommunications services, it is difficult to assess to which extent economy is hindered in achieving its full potential. The first presumption is that the high prices which burden business ventures, high costs of telecommunications included, slow down the economic growth. Consequently, the second presumption is that this slowdown influences the development of society as a whole. The cooperation between telecommunications industry and other sectors including the public sector contributes to finding solutions acceptable for different sectors and segments of society, but also indicates the importance of knowledge needed for individual and social growth. Modern world of telecommunications offers possibilities for development by connecting private and professional life by offering equal opportunities for participating in the information society (both to socially and geographically deprived groups) and helps reduce negative effects of climatic changes and pollution.

1.3. Methodology

This paper attempts to present different possibilities for optimising telecommunications costs in the fast growing companies, under given conditions, with an aim to achieve rationalisation within a company and in such a way enable redirecting the saved resources into company development (e.g. education, lifelong learning, modernization of technology, etc.) Methodologically, based on the existing relationships between social and telecommunications services' development, and the positive role of applying high technology in business, the authors conducted a survey to research growth possibilities arising from optimization

of telecommunications costs. This survey was conducted in a fast-growing company, by the use of interviews and comparison methods. Furthermore, the settings of *business intelligence* have been used for the purpose of devising an overview, the results have been grouped and systematically presented in tables and the method of presenting results by doing a case study has been used.

2. The need for telecommunications services

Telephone was invented in the second half of the 19th century and it proved to be extremely useful at the very beginnings of its use. Mobile telephoning developed simultaneously with the fixed one at the beginning of the 1920s. High demand for mobile phones begun in 1983. At first, mobile phones were extremely large and could not fit a pocket. In the 1990s this changed, so mobile telephones became more available. In the 2000s the third generation of mobile phones was developed, and since then they have been used not only for making telephone calls or sending SMS (*Short Message Service)*, i.e. for mobile telephone primary functions, but also for connecting to the Internet.

There is a high number of factors which support the necessity of using telecommunications services. The starting ones are the statistical data, i.e. the number of users in Croatia and worldwide. For example, at the end of the first quarter of 2010 Croatian mobile operators had six million mobile telephone users, 36% of which were third generation cell phone users with Internet access. [1] Since there are 50% more mobile telephone users than there are inhabitants, it is obvious that the Croatian market has accepted mobile telephony extremely well. International data shows that at the end of 2010 there were 2.08 billion users of Internet (ten years ago there were 250 million). Almost a half of them access Internet via a mobile phone. There are approximately 5 billion users of mobile telephones worldwide. As technology has developed, the way in which individuals and companies function has changed. Banks, for example, have experienced a huge increase in internet and mobile banking. In the USA 27% of the population use mobile banking and 13% use Internet banking[1]. It is believed that one should visit a bank personally only if it is absolutely necessary. In less developed countries such as India, inhabitants have the possibility to make payments via SMS. Technology has, in all its segments, become a part of everyday life and the expected development of mobile telephony has positively contributed to the globalisation. A society in which the whole world is connected is a characteristic of modern information era and the technology, which enables that, is definitely going to continue developing. Companies can benefit from the development of telecommunications. Nowadays, it is necessary for an enterprise to have a completely functional telecommunication system. There are several reasons for this; firstly, because of the need to operate fast, whereby the speed increases as the technology develops and the global economy becomes even more competitive, so it becomes essential information can travel throughout the world in a moment.

This need is also evident in the way telecommunications are used when starting or expanding a company. Modern technologies stimulate creativity by making use of available technology for attracting and keeping customers as well as for maintaining efficient communication with all the members of a team. For example, it has never been simpler or more economical to arrange a meeting without having to meet in person, only by using voice transmission technology via Internet. The rapid development of hotspots has also influenced the wide use of telecommunications technologies, most commonly in public areas such as airports, hotels, libraries, restaurants, etc. In the areas where Wi-Fi routers (transmitters) are available users can connect to the Internet with their computers or mobile telephones and use it free of charge or for a small fee. It has been impossible to find any information on the number of hotspots worldwide, but it is most definitely increasing on a daily basis. Nowadays, it is impossible to do business without meeting basic technological standards. It is important to implement the standards in an efficient way, not only because one should follow the cutting edge trends. If particular technology is not appropriate for a business activity of a company, it should not be introduced unless it is capable of returning the

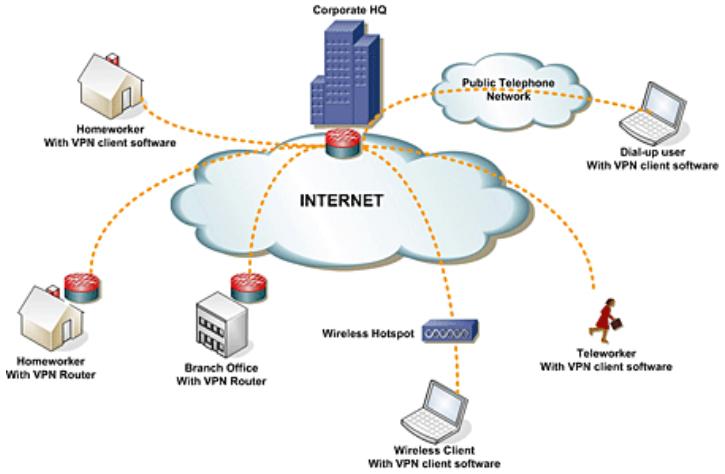
investment by making it faster, cheaper and better in any respect important for that activity.

3. Telecommunications cost in companies

In every company costs are a factor that needs to be addressed in order to keep it sustainable in the long run. Ventures have to cover all the inputs related to the business, so a company should optimise the costs in order to obtain return on investment in each aspect of its activities. It is, therefore, obvious that there are many benefits to be gained from cutting all the costs, including the telecommunications costs, so that the resources could be redirected from an activity which used to make losses to profitable, sustainable and developing activities. After cutting the costs, the company would have more financial resources at their disposal, so it could allocate it to the socially responsible activities (bonuses, incentives, donations, organising training courses, employing marginalised groups, etc.). If the company encounters difficulties, it could invest in improving the business (upgrading technology). The company could increase salaries, or recruit new staff. One of the most important benefits would be making room to lower the prices of its products or services, which could increase the number of customers or clients (cheaper products or services would be purchased by a higher number of customers or clients). Total expenses of a company are divided into fixed and variable costs. Fixed costs consist of a rent, contract payments, etc., they have to be paid even if there is no production and they do not change when production changes. Fixed costs in telecommunications include maintaining the telecommunication connection. Certain types of subscriptions can also present a fixed cost. All the additional costs are variable costs. Variable costs change with the change in production. For instance, an increase in car production will require more materials, therefore, variable costs will increase as well. In telecommunications, variable costs are calculated easily. Namely, after deducting the subscription and maintenance costs, every other cost is a variable one. When users increase the number of their calls, send more messages or use Internet more, they become a higher variable cost for their company. An important part of the costs theory is the rule of substitution, i.e. if the price of one production factor falls and all the other factors remain stable, ventures benefit from substituting the factor with the other factors until the marginal products per Kuna become equal in all the inputs. [1] In fact, companies strive to cut their costs and find a substitute. In telecommunications, different operators act as substitutes. In Croatian market, as well as in regional markets, there are companies whose main activity is optimisation of telecommunications expenses. These companies are different: some offer only advice or technology and some offer the whole system of consulting and the distribution of technology.

In Croatia these are Signum Telekomunikacije d.o.o., PSE Poslovne Komunikacije, Lator d.o.o., Minima d.o.o., Bel-tel, etc. All these companies have recognised the importance of telecommunications and there are different types of offers in the market. They often use NGN (Next Generation Network) as the method for cutting costs, substituting PSTN (the public network used today) with the VoIP (Voice over Internet Protocol). These companies believe they can cut costs by 15% or even 50% and obtain return on investment in three months. The most important service is VPN (Virtual Private Network) which uses the public infrastructure (Internet) in order to enable the employees to (most commonly) communicate free of charge. This service uses the same infrastructure, but different networks. Simplified, every company has its own VPN cable which is accessible only to the users of the corporate VPN. This guarantees maximum speed and security. Almost all the companies use this service for their internal communication.

Figure 1: How VPN functions



Source: Internet Techies, http://www.clickonf5.org/wp content/uploads/2009/12/InternetAccessVPN_thumb.png

Finally, it is important to mention the regulation regarding cost control introduced by HAKOM (Croatian Post and Electronic Communication Agency) in June 2011, i.e. the possibility to set a monthly spending limit. By applying for the monthly spending limit, users can ban outgoing calls after reaching the agreed limit during one calculation period. The cost control service is provided to the public communications service users in mobile and fixed networks. As a telecommunication regulatory authority, HAKOM has the obligation to work on the cost control for the citizens. The operators are obligated to warn the users about an overrun, after they have doubled their average spending in the past three months. On the users' request, operators are also obligated to provide records with telephone bills (in the electronic or written form), the possibility to activate the service of informing the consumer about numbers transferred to other mobile networks and the possibility to ban phone calls to certain numbers or groups of numbers such as international phone calls, phone calls to numbers with high tariffs, etc. By offering a choice of different services, which are provided in addition to the tariff packages (such as special offers for certain phone calls and special tariffs in roaming services[1]), the operators ensure additional cost cutting and cost control. [1]

4. Croatian telecommunications market

Telecommunications have been present in the Croatian market for a long period of time. The first telephone line was established on 8th January 1881, only five years after the first telephone in the world was put in use. The first telephone line in Zagreb was 3.5 kilometres long. The advantage of telephone communication became obvious very quickly, telephones were soon ordered by respectable Zagreb merchants and businessmen and not long after that the first public telephone network was set up.

The most significant change in the Croatian telecommunications market was the end of monopoly over the fixed network. During the second quarter of 2005 the first alternative fixed network operators began to operate. The mobile network market was liberalised in 1998 when the first private mobile network operator entered the market and began to operate in July of 1999. The second stage of liberalisation was reached when the third mobile network operator entered the market in October of 2005. Further stages of liberalisation were marked by the third mobile network operator becoming stronger and by making it possible to transfer a number from one network to another in October 2006. [1] This makes it obvious that the Croatian telecommunications market experienced a great boost at the beginning of the 21st century. At the beginning of 2005 HAKOM issued the document "Overview of Croatian Telecommunications Market". According to this document the fixed network had 1,676,000 users who provided earnings of 5.3 billion Kuna with the average earnings per user of 200 Kuna a month. The mobile network had 2,750,000 users with

the earnings of 5.5 billion Kuna. The average earnings per user amounted to a little less than 160 Kuna per user. Regionally, Croatia had the most developed telecommunications industry in former Yugoslavia. The revenues grew steadily in the course of 4 years. In 2006 they increased to 11.8% and in 2007 to 18%. From the beginning of 2008 to the beginning of 2010 the total gross profit in the telecommunications market grew by about 8%. Growth is a little lower than in the previous years, bit still remains stable. Figure 2 shows the total number of users of mobile communications networks from 2000 to 2010 and a constant growth is obvious. The most significant rise occurred from 2004 to 2005. It is highly likely that the rise was caused by lifting the monopoly which allowed competition and reduced the prices. In 2006 the mobile telephony market got saturated but the number and the density of users (number of users in relation to number of inhabitants) are still on the increase. Since 2008 the rise in the number of users has slowed down. In the period from 2009 to 2011 the number of mobile network users slightly fluctuated. The number of active public network users decreased even by 18.38% in the first quarter of 2011. The user who has used the mobile network service at least once or has refilled their prepaid account in the past 90 days is considered to be an active user, so the decrease can be attributed to a high number of outdated SIM cards. One of the reasons for this might be the tourists who purchase local SIM cards in order to use them while in Croatia and then do not use them afterwards (the so called plastic users). The revenues of the mobile communication network rose by 6.03% in the second quarter of 2011, while the increase in the number of users was a slight one.

Figure 2: The number of mobile network users

The total number of mobile communication networks

Source: HAKOM (statistics), http://www.hakom.hr/default.aspx?id=329

According to HAKOM's report from 2010, the market shares of the two mobile communications networks are almost equal, i.e. Croatian Telecom or HT (T-mobile and BonBon) 45.60% and VIPnet (VIP and Tomato) 42.80% and the remaining 11.60% are held by Tele2. The number of fixed public communications network users remained stable at 42% of the population. At the beginning of 2011 the number of telephone service users fell slightly by 3.27% and in the second quarter of the same year it mildly increased by 0.41%. This was followed by a rise in revenues of 2.46%. However, they are still lower by 23.10% as compared to the same quarter of 2010. Therefore, revenues in the fixed communications sector in Croatia are falling seriously, while density does not present a problem. HT is the leader in the fixed telephony market. Since its fixed networks hold a market share of 68.77% and its mobile networks 45.60% it is considered the total market leader in Croatian telecommunications. Croatian telecommunications market is one of the most developed markets in the former Yugoslav countries. From

the very beginning of introducing telecommunications services their increase was stable and constant until the crisis in 2008 when it slowed down and even dropped. Such a development is logical considering the population does not have the means for long telephone calls and similar services, so they turn to the Internet which is in most cases free of charge. Croatian Telecom, the leading operator in Croatia, experienced a decrease of 4% in revenues in the first half of 2011, but an increase in profit of 0.7% (828 million Kuna). Revenues from the voice services in the private and business segments dropped by astonishing 12.8%, so Croatian Telecom was forced to impose severe cost reductions in order to end the half-year period with a profit.

5. Overview of ideas (solutions) for a systematic costs optimisation

PSE d.o.o., a company which deals with optimising telecommunications costs, claims on their website: "The key to cutting costs is finding out about the business – business processes and segments as well as technical abilities of the telecommunications infrastructure. In most organisations a detailed analysis of telecommunications needs and of the existing infrastructure can contribute to considerable cuts." As mentioned above, PSE believe that in most organisations it is possible to cut costs from 15-30% and in some cases even more than 50%.After analysing possibilities for lowering communications costs of the high technology segment in fast-growing companies, several methods for a systematic optimisation of costs have been presented. They are:

5.1. Rationalisation of use

Individual spending can be influenced by rational use. Employees often do not use company mobile phones rationally and have no spending limit. This can result in running up high bills which cannot be justified by phone calls made exclusively for business purposes. It was mentioned above that HAKOM issued a regulation in 2011 by which spending can be limited to 50 Kuna a month. This way, users have to justify their spending and are limited to a certain number of telephone calls until their account is blocked. This, however, is not rationalisation of spending but limiting of spending. As mentioned before, costs are rationalised by reducing the extent and changing the way telecommunications are used. The extent is the amount of use (which can be limited). It is important to educate the employees about how to optimise the extent of use, so that the cost is reduced. Private telephone calls, for example, should not be considered as a cost the company covers. This can be regulated by having a prefix number which user must use when making a private telephone call, which then redirects the call to a private account. Long business telephone calls cannot be optimised, but there are other ways to rationalise this type of a service. The second optimisation model for rationalising the use of telecommunications is the way telecommunications are used. International telephone calls are very expensive and the calls from a mobile to a fixed network (and vice versa) are more expensive than calls made within the networks. For all the situations there are options users can activate. Individual users can activate special options for certain services with extra charge. For example, if a user sends SMS messages often, they can pay a certain amount in advance in order to save when sending a high number of messages. If a user makes a lot of telephone calls within the operator's network, they can pay a certain amount in order to receive free minutes. These minutes are, of course, not free, but users do not have to pay the more expensive tariff until they spend them. Activating these options is one of the ways costs can be optimised and it can cover a wide range of telecommunications use within a company (international phone calls, SMS, Internet, etc.) International phone calls, as the most expensive segment of telecommunications, are a significant problem for every international company. Aside from activating special options and shrinking the extent, there are different methods of rationalisation. One of them is purchasing international phone call cards which can be used in any mobile phone. The card is inserted in the mobile phone as any other SIM (Subscriber Identity Module) card, the local operator needs to be contacted for the

card to be activated, PIN typed in and the phone call can be made. Another way is to purchase an unlocked mobile phone or to use local SIM cards. This way, users can lower the expenses of their (local) card, while using a card of another country. For example, if one travels to Check Republic on business to have a meeting with the Check part of the company it is advisable to buy a Check SIM card and make cheaper phone calls rather than use Croatian account. In Europe, there are many stores which sell unlocked mobile phones, while in the USA mobile phones are tied to one operator and in that way locked.

5.2. Use of alternative communication types

Technology is developing fast as well as communications. Alternative types of communication are those which are outside the scope of traditional communication. This mainly relates to the use of Internet as a cheap and efficient means of communication. VoIP (Voice over Internet Protocol) is a technology which uses Internet for making phone calls. This is done in such a way that the voice the user sends via Internet is divided into separate packages, which then reach the other side. That is the reason why the receiver gets an intermittent signal. This way of communicating exists since Internet has started developing but the technology has not developed sufficiently to put it to everyday use. VoIP also offers its users the possibility to purchase a number abroad and make phone calls as if from the country in question. For example, a person living in the USA who has relatives in Great Britain has to pay expensive international tariffs for phone calls. If the person purchases a British number all the phone calls are charged according to the local and not the international tariff. VoIP technology is gradually becoming a company standard in the developed countries. In the interview with Mr Željko Ćurković, the CEO, and Mr Gordon Šafran, an expert consultant in SIGNUM telekomunikacije d.o.o., a company whose main activity is telecommunications systems, it was said that plans have been made to introduce VoIP as a standard in Croatia, the successful implementation of the digital television signal in Croatia being a successful example of migration from the analogue to the digital signal. Using VoIP, calls can be made to all the fixed and mobile networks. Namely, VoIP telephony connects the call to a data network, then to a telephone exchange (switchboard) in Zagreb. The exchange connects to another one anywhere in the world (the nearest to the destination), and reaches the final destination through the local telecom. Since there are no multiple transfers through international networks, the call is much cheaper. The employees of a company that introduces VoIP can make free of charge phone calls within the company, provided that the data transfer is not charged (unlimited data transfer). If the data transfer is charged, the cost of the data has to be covered. In one minute one spends 90 kilobytes of data on average. This cost is low, so the calls are not expensive if one considers the cost of data traffic with the telecom operators in Croatia. The disadvantage of using VoIP is its unreliability. The telephony network that is currently in use is reliable and rarely breaks down. Telephones always function properly and people get used to such a way of life. Computers, emails and similar services sometimes crash. Moreover, VoIP depends on electricity. If there is a power outage, the user cannot make telephone calls (a high number of analogue telephones only need connecting to a telephone line). This presents a major problem, if one considers emergency phone calls. Emergency phone calls are also a problem because VoIP cannot be located, so if the caller cannot tell where he or she is, he or she cannot be found). Finally, since VoIP telephones are connected to computers they are susceptible to all types of viruses and hacking. Due to the poor quality of the connection, VoIP is not well developed in Croatia. There are several companies who provide it, but they are not too successful. Services such as Skype, MSN, ICQ, Google Talk, etc. are quite popular. These are free programmes which two or more users can connect to and talk similarly as with VoIP, by exchanging data packages. If the users have flat rate internet or free WiFi (Wireless Fidelity –a wireless network) they can talk free. The only disadvantage is the impracticality of its use in the domestic market due to the poor speed of internet connections. Skype, the most

popular service of this type, offers the possibility of dialling a fixed number almost anywhere in the world for a lower tariff than those offered by telecommunications operators. The research which was conducted in 2007 by Skype among 250 companies that use it showed that 90% of the companies were able to cut telecommunications costs and 80% stated the employee productivity increased. The majority agreed that Skype improved the communication with their clients as well as the working atmosphere in the company. However, few serious companies use Skype because of the poor quality of transfer and Internet congestion (VoIP services use rented lines).

There is a way to avoid roaming[1] tariffs, which use the return call service, i.e. the users register the telephone with the international service for return calls. The users then get a number for local access (similar to international call cards). In order to activate the service, the users dial a number and hang up. After that they can make a call to their country as if they were there. The use of alternative types of communication is becoming more popular because of cost cutting in companies. However, the alternative types are not possible in certain situations. For example, in areas where Internet is inaccessible, it is necessary to use "traditional" telecommunications. Although these areas are getting rarer, they still exist. Education is yet another problem. Young people accept technology and modern way of communicating more easily than their older colleagues. Companies should organise workshops or ad-hoc courses to help employees familiarise with all the offered possibilities which speed up communication and reduce decision-making time, influence the company image and cut costs. VoIP technology is not complicated and it is getting simpler in order to make the transition from out- to up-to-date technology easier. Some companies offer staff training in order to simplify the transition to VoIP.

5.3. Monthly cost analysis

The third idea (solution) for a systematic cost optimisation is to analyse monthly costs by checking all the monthly expenses (call records) thoroughly in order to identify areas which could be optimised. According to the Business Intelligence Concept, analyses are the "knowledge" which enables company leaders, together with other factors, to acquire a deep, a complete and an accurate insight into the environment they work in. The analysis is an activity which includes planning, data gathering, data processing and data analysing as well as the finished product distributing and its use. Firstly, it is necessary to set the goals. The main purpose of analysing monthly expenses on telecommunications is to optimise the costs. Therefore, it is necessary to identify areas where spending is unnecessary or too high. The data on spending of all the employees is gathered on the principle of access to specific data collection as opposed to a general approach. Business intelligence is efficient only if it is implemented in accordance with strictly established principles, whereby causes and effects are connected to a detail. Moreover, a high-quality decision cannot be taken based solely on the past or the present. It needs to be substantiated by the data which indicate what is going to happen in the future. Only a human source (employees) can predict what will happen in a future period. Therefore, when collecting information it is important to know the business strategy and future needs of all employees. The analysis is preformed after gathering all the data. It is important to sort the data in order to make the analysis simpler. For example, it is necessary to sort by the amount of spending, ways of spending, duration of phone calls, international phone calls or departments. The analysis is the basis for adequate data interpretation and accurate conclusions, i.e. the basis for reaching the final aim of the analytical activity – production of final information products and final business reports. This requires allocating a certain amount of time and personnel, finding mistakes or sudden increases in spending and linking them to events that caused them. If the spending is justified they can be ignored, though not completely, because they can be the basis for introducing different options. This is a lengthy and a complicated process which requires developing different models in order to make the analysis simpler and more precise. In the modern era of infor-

mation technology, the majority of data is stored in computers or online. That is the reason why the analysis is preformed electronically, without the need to sort the data physically. All the data are entered into a database which is then analysed by using statistical methods such as grouping, the *nearest neighbour* method, preference trees, etc. Then data mining is preformed whereby new, previously undetected but undisputable data and inner relationships are identified. This increases the amount of available information, which is one of the most valuable resources in the "new economy". The last stage is the presentation of the product (results) to its final user (company leaders). However, the distribution of the analysis to its final user is not the end of the cycle. If the company leadership establishes deficiencies or contradictions, it can require new analysis and initiate a new cycle. When monthly spending on telecommunications is in question, the leadership may request expanding the analysis in order to gain a deeper insight into the problem with an aim to implement the best optimisation strategy. Therefore, regular communication between the leadership and the employees, who are responsible for business intelligence tasks, is crucial. The employees who carry out the monthly spending analyses are obligated to write reports which are clear to all the interested parties. Telecom operators should deliver specialised interactive and clear reports rather than long, static and unclear ones. Therefore, the companies should develop a high-quality information system which can better serve both parties.

5.4. Cooperation with the Service Provider

The bills issued to businesses are much higher than the ones issued to individuals (usually for one number only). Company bills include dozens or hundreds of numbers, depending on the number of employees. Therefore, a fast, efficient and precise analysis, which results in costs optimisation, needs cooperating with the service provider. If the user is not satisfied with the service provider, or is only satisfied with some of the services, the existing contract can be altered. However, contracts signed for a particular period usually cannot be altered or terminated without an extra payment and previously determined penalties. One can therefore presume that the users will continue their existing cooperation with the service provider. Some operators are willing, under the agreement with the client, to alter the terms of the contract without the extra payment. If the client chooses to alter or terminate the contract, or the contract is about to expire, it is important to cooperate with the service provider and arrange special tariffs, which are adapted to the amount of the company's spending. In such dealings, good and poor service providers can be differentiated; the good ones will think and act long term and will wish to keep their existing clients. If the client decides to change the operator, they risk not having an active network for a while as well as having to make an extra payment for the infrastructure required by the new operator. The investment can prove to be profitable in the long run, but this depends on the customer's needs and the way the operator satisfies them.

Under the agreement between the client and the service provider, a spending limit may be introduced, as mentioned before. The possibility to limit the spending is not an indicator of service quality because such a possibility has to be available to all the users according to the Croatian law. Service providers should communicate constantly as business partners. Damir Hrupački, an expert on costs optimisation in T-HT, explained in his email: "Service providers improve all their services continuously, which means they become less expensive for the end users: small, medium and large companies."

5.5. Cooperation with companies to optimize the cost of telecommunications

If the client decides to cooperate with such a company, a meeting is arranged where the cooperation is deepened. Companies, whose main activity is optimisation, often offer not only technical solutions, but also advice on how to cut costs. The cost analysis is performed by the client or the client gives authorisation to another company to do so (if the company offers such a service). It is difficult to control the telecommunications costs due to the unclear bills

(commonly available only in hard copy), non-transparent offers, understaffed operators, different tariffs for different services, etc. The specialised companies are capable of performing a much better costs analysis than the company itself. A transparent relationship between a client and the optimisation company is therefore the key to a successful cooperation.

After the analysis has been preformed, the optimisation company can provide the client with specialised advice. This includes ideas (possible solutions) prepared in advance (limiting phone calls, changing the operator, analysing and altering the contract, supervising bills, using alternative types of communication, etc.) as well sa special solutions. There are companies, which provide only technical support. Simply said, the clients are supposed to perform their own spending analysis and then outsource. The outsourced company then installs the infrastructure (e.g. VoIP), maintains it and the client monitors the spending. Outsourcing is beneficial for the companies whose expenses are high. This investment can be returned in the long run because it ensures significant cost cuts.

5.6. The review of the presented ideas (solutions) for a systematic costs optimisation

Table 1 shows an overview of ideas (solutions) already mentioned as valuable for a systematic optimisation of costs and their application possibility. It has been compiled on the basis of the criteria relevant for the analysis of the monitored company. Each criterion is graded from 1 to 5 (1 –poor, 5 – good), but companies might develop a different set of criteria, so this table is not a universal one and has only an illustrative purpose.

Table 1: Solutions for a systematic costs optimisation

	Duration of implementation	Implementation cost	Complexity	Range	Image	Implementation speed	Cost cut	Average
1. Rationalisation	**4**	**4,5**	**3**	**3**	**3**	**3,5**	**2,5**	**3,29**
1.1. Amount of use	4	5	3	3	3	3	2	3,29
1.2. Way of use	4	4	3	3	3	4	3	6,58
2. Using alternative types of communication	**3**	**3,33**	**3,66**	**3,33**	**3,33**	**2,67**	**4**	**3,33**
2.1. VoIP	2	2	4	5	5	5	5	4
2.2. Popular services (Skype, MSN, ICQ...)	4	4	4	3	2	1	4	3,14
2.3. Return call service	3	4	3	2	3	2	3	2,86
3. Expenses analysis per month	**1**	**3**	**2**	**4**	**5**	**5**	**5**	**3,57**
4. Cooperation with the service provider	**3**	**4,33**	**2,33**	**4**	**3,33**	**3,66**	**4**	**3,52**
4.1. Cooperation with the existing provider	3	5	3	4	4	4	4	3,86
4.2. Contract altering	3	4	2	4	3	4	4	3,43
4.3. Operator change	3	4	2	4	3	3	4	3,29
5. Cooperation with the optimisation companies	**3**	**2**	**3**	**5**	**4**	**3**	**5**	**3,57**

Source: the author

The highest average per total quality is calculated for VoIP, one of the most up-to-date ideas (solutions). Considering the fact that VoIP is going to become a standard in the next few years[1], it is obviously most suitable for implementation. Implementation time and duration are not favourable; in fact they are the least favourable in relation to the other possible solutions. However, the total value for the company is significantly higher. The cooperation with the existing service provider and outsourcing to an optimisation company are the following two possible solutions, with the average mean in the middle. Cooperating with an optimisation company is the first step because it enables substantial cost cutting. It is a considerably more expensive way to optimise costs (price of the optimisation service), but more profitable in the long run. Another advantage is that optimisation companies can be the ones which cooperate with the service provider and can alter the contract or change the operator. This way, the optimisation companies can achieve savings and this type of outsourcing is advisable, if the company has the resources for investing in cost control. It is also important to analyse costs monthly, but due to the duration and the complexity of the analysis companies rarely analyse them. This requires taking on an expert, department or outsourcing. In order to perform the analysis it is also important to be familiarised with the company and the cost cutting possibilities. The analysis increases the savings significantly and is useful in the long run (unless there are considerable changes within the company) and the company can inform the service provider at any time, that they are considering to change the service provider, unless the provider is willing to adapt to the existing amount of spending. Rationalising the spending is an equally important optimisation solution. Moreover, it should be the starting point of every optimisation, because the amount of spending is as important as the way of spending. Firstly, companies should rationalise after performing the costs analysis. Then, they can contact an optimisation company, implement VoIP or deepen their cooperation with the service provider.

6. Examples of good practice

This chapter introduces two examples of good practice and their solutions on how to optimise telecommunications costs.

6.1. Example of good practice #1: Fixed-mobile convergence

PSE Business Communications d.o.o. (PSE), implemented the up-to date method called "Fixed-mobile convergence" [1] in a company they refused to name. Although the method has been available since 2005, it has still not become common practice. It is applicable in cases when each employee has at least two numbers (a fixed and a mobile one), sometimes with different operators. This presents a considerable cost because it requires maintaining the fixed line and the calls from the fixed to the mobile line are extremely high (such phone calls were frequent in the company in question). This was an impractical solution because users could not receive phone calls unless they were next to the fixed telephone and could check important voice messages only when they returned to the office. PSE introduced fixed-mobile convergence[1] which enables voice services to be diverted from the fixed to the mobile "communicator", which is actually a third generation mobile phone (smart phone). The phone became a universal communication tool for each employee, which resulted in all the fixed line costs as well as fixed line bills being reduced. The advantages of the optimisation were:

- Optimising the number of telephones
- Diverting the phone calls in a cost-effective way
- Possibility to check voice messages regardless of the location
- Possibility to connect to other communication systems and use all the available services
- Extending the range of available services with additional ones such as *Instant Messaging* or *Presence* to mobile phones
- Better control of the internal communication

6.2 The example of good practice #2: VoIP

Signum (i.e. VoIP direct.net), is a company that offers a range of innovative solutions such as the use of *Broadband Internet*[1], which enables a sharp cost cutting in telecom expenses. They are a specialised SIP operator and they provide complete IP telecom solutions to a wide range of companies with extremely reasonable prices for both domestic and international phone calls. They offer numerous solutions, e.g. *Mobile VoIP*, *DID numeration*, *Fax 2 Email* and *SIP Trunking*. VoIP direct.net believe that users can improve their performance and substantially reduce telecommunications costs, hence their total costs. A concrete case of a client company that successfully cut their costs by implementing the recommended solutions and VoIP telephony is presented hereafter.

"An international company XY has a regional office in Zagreb and about twenty shops in the country and other countries of the region. In the main office in Zagreb Astrix.SIP ENT IP-PBX system has been implemented with about fifty extensions and about seventy mobile locals (SIP clients). All the shops have been networked with the main office into an internal telephony system consisting of about a hundred fixed and mobile extensions. The main office has been connected to the Internet via a 10Mbit/s fibre-optic cable and the shops in the country and abroad via ADSL connection. All the numbers in the main office have been transferred to Signum telecom which prevents any service cuts within the system".

The project aim was to network all the employees into an internal telephony system either by fixed or by mobile extensions, regardless of where they are in a particular moment, in the office or on a business trip. The whole project was carried out in three months, from the planning to the launching stage including the time needed to put it in use. In addition to cutting the costs of internal communication to none, the costs of the phone calls to external networks were reduced dramatically especially the international ones, all by using VoIP operator (SIGNUM telecom). This resulted in major savings in monthly telecom expenses and return on investment was achieved in less than eight months, which can be helpful information if deciding whether to invest in equipment and calculating the return on investment (ROI). Regardless of the fact that the case study concerns an international company the solution is applicable to similar companies in the Republic of Croatia. This approach to cost-cutting is also applicable to all the companies regardless of their size or number of branches. The fact that the investment was returned in less than eight months is impressive. The cost of implementing this type of service depends on the company size and the quality of purchased equipment, which makes it difficult to predict how much time it will take other companies to achieve the same result as the company in the case study. Nevertheless, IP telephony is the telecommunications future. Companies should consider implementing it and devise plans for redirecting the saved resources to the programmes which would enhance their competitiveness. This primarily means education and life-long learning for the employees.

8. Optimisation of telecommunications costs as a factor in social development

Table #1 shows an overview of strategies, recommendations, and suggestions for optimising telecommunications costs. In addition to adopting good practice and implementing such solutions for rationalised spending, it is necessary to deregulate and demonopolise telecommunications. It is possible to directly monitor the cost of an Internet impulse per unit (and by doing so reduce it significantly), and develop a new high quality telecommunications network based on the mistakes from the past. The most common problem of telecommunications costs in companies are as follows: (1) the prices of particular services highly exceed their actual cost (2) the prices of particular services do not reflect the demand for these services and (3) the prices are not compatible with those in the developed markets. If companies cover high telecommunications expenses, the amount of available resources for company development decrease. Developed countries balance the corporate and the private life in a sustainable way due to the strong information and telecommunications technology. By accelerating decision-making processes as well as enabling and supporting creative activities regarding develop-

ment planning, all the social participants would be provided with a better quality of life and offered the opportunities for a complete and fast business activity (access to all the needed information and the possibility to lead the company from outside the office). Prompt reaction in entering a new market niche is too often the key factor for success. By enabling the access to telecommunications services to a high number of people without discriminating them against sex, age, social status or place of living, an important stride is taken towards equal opportunity in integrating all the social groups into the modern society of information and knowledge. Furthermore, there are economic motifs related to significant savings due to the elimination of the classic telephone lines for connecting to electronic networks and using one system instead.

9. Conclusion

The research resulted in recommendations for optimising telecommunications costs in fast-growing companies, the bearers of economic/social growth. The high level of information-telecommunication technology as well as its accessibility will contribute to Croatia's participation in different markets in the European Union on an equal footing. The use of telecommunications and information technology (ICT) power and the possibility to use the knowledge available through these channels will improve the connectivity and increase the competitiveness of the Republic of Croatia. This will also contribute to higher efficiency, social development and reinforce the leading position of the Republic of Croatia in the region. The most developed countries provide an example of how to systematically support innovation by encouraging cooperation among business, academic and public sectors (government). Room for innovation can be made, the necessary prerequisites for achieving competitiveness provided and long-run sustainable growth ensured by using up-to-date information technology and telecommunications (ICT). Optimisation of the telecommunications costs releases substantial resources which are now available for the development of the enterprise (e.g. education, investing in equipment, new market research, product development, etc.). This enhances its competitiveness and indirectly facilitates the development of the community and society at large.

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