

# Comparative Analysis of the Practice of Telecom Operators in the Realization of IPTV Systems Based on ITIL V3 Recommendations for the Supplier Management Process

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**Abstract** – For the business of an organization to be at a high level, it is necessary to define the relationships with an external company (partner) which is going to be helpful in the complete or partial implementation of some project. The main motive for hiring a company as a partner in the process of realization is for finding a high quality solution, and saving your own human resources. The process which deals with the business relationships between your company and an external company in the IT industry, according to ITIL V3 methodology of leading IT services, is Supplier Management. The aim of this article is to describe Supplier Management in the development of IPTV systems for a Telecom Operator, through the creation of a contract between Telecom Operator and an external company which needs to implement and install IPTV systems, and also through the guidelines for performance control of a partnership company by the Telecom Operator, during the project of application and installation of the IPTV system. The result of the comparative analysis has to be a sequence of recommendations for the improvement of relationships with an external company which has implemented the IPTV system and which is responsible for the initial maintenance of the IPTV system, for the purpose of enabling high quality IPTV services to the end users of this Telecom Operator. The measuring of the implementation of recommendations from the Supplier Management process in a comparative analysis was performed as recommended by the Balanced ScoreCard method.

**Keywords** - *Service Management; Information Technology Infrastructure Library; Service Strategy; Service Design; Service Transition; Service Operation; Continual Service Improvement; IPTV; Supplier Management.*

## I. INTRODUCTION

Every company that wants to increase its level of work and business depends on the IT Service Management. If the IT processes and services are led successfully, the operation of the company will become more fortunate and successful, which can be noticed in the decrease of costs, and increase of revenues and achievement of contacts with other business partners. For the IT processes and services to be successfully led, it is necessary for the company to define a

gathering of specialized organizational skills which are offered to clients in the form of a service. That set of specialized skills makes up the Service Management of a company [1], [8].

There are many standards of Service Management practice of which the most important is ITIL [1], [2]. Information Technology Infrastructure Library or ITIL represents the best environment for the practice of a company which offer IT services as their main business function. ITIL poses a tool for implementing a service which one organisation will be able to fully use with realization of the implementation of all the processes or partially use through the implementation of just a few of their processes which are considered to be helpful in developing their business results. According to version 3, ITIL has 5 life cycle stages: Service Strategy, Service Design, Service Transition, Service Operation and Continual Service Improvement [1], [2], [8].

Section II describes the basic meaning and goals of the Supplier Management process. Section III describes the criteria that the Telecom Operator needs to set for the IPTV consultant during the process of selecting a consultant who needs to implement and install the IPTV system. Section IV lists the steps that need to be taken by the Telecom Operator and the IPTV consultant for the implementation of IPTV systems and defines five levels for the maintenance of the IPTV system by the consultant after the system is available for production. Section V is the central part of the paper, which presents a comparative analysis between the actual ITIL V3 recommendations Supplier Management processes and implemented ITIL V3 recommendations Supplier Management in the actual IPTV system, where BH Telecom's IPTV system is taken as the reference model. The conclusion of the contribution should give a result of applications of the ITIL V3 recommendations for Supplier Management in BH Telecom's IPTV system and give suggestions for improving recommendations that are poorly implemented.

The last chapter of the article includes an analysis of the implementation of Supplier Management through the IPTV system of BH Telecom (the leading Telecom Operator in Bosnia and Herzegovina) with the recommendation of implementation, according to ITIL V3 standards, where throughout 6 main recommendations of Supplier Management according to ITIL V3 standards a comparative analysis has been performed regarding the application of ITIL V3 recommendations related to Supplier Management in the IPTV system of BH Telecom.

This contribution represents a continuation of scientific research and application of ITIL V3 standards which is lead in BH Telecom in order to adapt all of the systems under this standard with regard to previously published contributions in this field, a contribution entitled "Implementation of the Information System of the Telecom Operators Using the ITIL V3 Service Methodology for the Service Design Phase" which was published during the SERVICE COMPUTATION 2010 conference.

## II. SUPPLIER MANAGEMENT

Supplier Management process ensures that the external company and services, that they provide, can support the goals of the IT services and business expectations of a company. The aim of this process is to emphasize the importance of working with partner companies, and to provide guidance on how the business can best be directed towards the business benefit of the company by establishing a contract with another company that is used for complete or partial implementation of one or more projects which are of primary importance for the same company [9], [10], [11], [12], [18].

The main goals of Supplier Management processes are to [2], [4], [18]:

- Maintain the value of money from the partner companies and the contracts with them.
- Manage relationships with partner firms.
- Manage the products of partner firms.
- Categorize partner companies according to the quality of the products they offer.
- Examine, renew and terminate agreements with partner companies.
- Manage the performance of partner companies.
- Implement services and plans for improving the partner firms.

When contracting business with partner companies, it is recommended to make a fully formal agreement with the partner company, with clearly emphasised and documented responsibilities and goals which the contract bears during certain phases in its life cycle, starting by defining business

needs all the way to terminating agreements. Key activities of Supplier Management are [4], [8], [10], [16]:

- Identifying business needs and preparation for business activities.
- Assigning new agreements with partner companies.
- Managing the performances of partner companies and contracts with them.
- Defining the final requests with the existing partner companies.
- Categorizing partner companies and contracts with them.
- Evaluating and assigning new contracts with partner companies.

## III. REALIZATION OF THE CONTRACT BETWEEN TELECOM OPERATOR AND EXTERNAL COMPANY WITH THE PURPOSE OF IMPLEMENTING AND INSTALING IPTV SYSTEM

The first step in the realization of IPTV systems of Telecom Operator is the selection of a partner company that will design, implement and install IPTV system and also maintain the same for a certain period [1], [16]. Agreements with external companies-consulate (contracts) are accomplished after a public process with which a company is chosen for projecting the installation of the IPTV systems. The selection of IT consultants is performed through two phases: the prequalification phase and the final phase where the IPTV consultant is chosen. In order for the candidates to pass the phase of prequalification's it is necessary for them:

- a) To not have any legal impediment in their participation in the contest for the choosing the best IT consultant.
- b) To have the right to perform professional services and to be registered in the proper professional registers.
- c) To have economical and financial condition to realize a successful implementation of the contract.
- d) That their technical and professional capacity ensures successful realization of the contract.

Regarding the technical and professional abilities, candidates must fulfil the following minimum requirements which must be confirmed through certified documents:

- a) Employed at least 30 certified IPTV consultants.
- b) A minimum of three references to the implementation of IPTV systems in the telecom industry.
- c) Employed at least 20 certified IPTV consultants that will participate in the implementation of the project provided that at least 10 consultants provide a 12 month software support in the maintenance of the system.
- d) The existence of at least 10 IPTV consultants who have taken part in at least 3 projects of design and installation of IPTV systems.
- e) Possession of own hardware and software infrastructures for the start of the mentioned project

- f) The offered IPTV software has to enable the end users functions such as: watching live TV channels, browsing, the electronic program guide (EPG), recording shows, shopping and an overview of all genres of movies, possibility of integration with VOIP platform, internet access, listening to radio channels, access to live games and encrypt live TV channels and movies.
- g) The offered IPTV software has to provide the expansion of the number of IPTV users in any number, expanding the number of movies to an unlimited number and the expansion of live TV an unlimited number.
- h) The offered IPTV solution must be such that it can be integrated with any type of Set Top Box.
- i) The offered IPTV solution must have a monitoring system that will monitor the activity of the whole system, live TV channels in certain regions of the Telecom Operator and the work of each Set Top Box that is connected to the IPTV system.
- j) The offered IPTV solution must be compatible with the existing network architecture of the Telecom Operator.

The second phase is the phase of final selection for the IPTV consultant between the consultants who met legal, economical, technical and professional skills. There are three main parameters by which an IT consultant is selected from all other consultants: lowest price (with a percentage share of 50%), the quality of offered the solution (with a percentage share of 40%) and a deadline for the shipment of the offered solution (with a percentage share of 10%). The contract must be assigned to the consultant that has submitted the top rated acceptable offer. In the event that two or more firms had the same rating for acceptability in the final assessment, the IPTV consultant with the shortest deadline time for the delivery of the offered solutions is chosen.

The Telecom Operator can terminate the transfer from the prequalification stage into in the final selection phase of the IPTV consultant if the number of providers who have made it into the prequalification stage is less than 3 and in this case can again call a public process for the choice of IPTV consultant for the implementation and installation of IPTV solutions.

**IV. MANAGING THE PERFORMANSE OF THE PARTNER COMPANY BY THE TELECOM OPERATOR IN REALIZATION OF THE IPTV SYSTEM**

With the levels of maintenance of agreement between the Telecom Operator and the partner company it is necessary to define the levels of problems, define malfunctions, response time and eliminating problems which the partner firm needs to solve according to the contract [16] (Table I).

The first level represents the level of noticing problems, second level represents categorization of problems and

setting priorities for solving the same, level three is solving the major problems that are essential for running the system and that must be solved in a matter of hours, level four is solving problems that need to be addressed over longer periods and are not relevant to the operation of the whole system, and the fifth level consists of a team of software engineers who are responsible for changing the functionality of the whole IPTV system, which usually takes place over a period of months or years [4], [16].

According to the signed contract the total time of the project must be 18 months, provided that the time for the design and installation of the system by the partner company is 6 months, and the time for completing the obligations as well as offering software support provided by the partner company is 12 months. After the end of providing software support, after 12 months, Telecom Operator and the partner company can resign the contract again on the software maintenance system which again lasts 12 months. After this period of time, the Telecom Operator should be able to maintain with its own workforce its own IPTV system and to solve any incident or problems that may arise in it.

After defining the levels and types of problems, it is possible to define the workflow for solving the problems for which, according to contract, the partner company is responsible. Table I shows the types of problems with periods that the partner company according to contract has to solve and targeted time for troubleshooting.

TABLE I. TYPES OF PROBLEMS WITH PERIODS THAT THE PARTNER COMPANY ACCORDING TO CONTRACT HAS TO SOLVE

The level of problems	Definition of the problem	The response time for problem solving	Targeted time for troubleshooting
1.	A complete system crash - in the event that the system does not function and there is no alternative to establishing a temporary system operation.	1 hour after receiving a verbal notification of the problem	24 hours after receiving a verbal notification of the problem
2.	The critical problem: if a crucial part of the system does not function and thus prevents the continuous operation of the basic functions of the system (there is no alternative solution for the temporary establishment of functionality).	1 hour after receiving a verbal notification of the problem	24 hours after receiving a verbal notification of the problem
3.	Uncritical problem - part of the system or component that is not critical is not functioning, but the basic functions of the system are operating.	24 hours after receiving notification of the problem	7 work days after receiving notice of the problem

The level of problems	Definition of the problem	The response time for problem solving	Targeted time for troubleshooting
4.	Minor anomalies in the system which do not affect the operation or basic functionality of the IPTV system.	24 hours after receiving notification of the problem	7 work days after receiving notice of the problem
5.	The Telecom Operator's request for additional functions in the IPTV system.	By agreement with the management of the partner firm	In agreement with the management of the Telecom Operator

The company partner is the carrier of liability for the following stages of system development during the design and installation of the IPTV system:

1. The construction of MiddleWare (MW) system that has to monitor the whole system and consists of two servers that work in parallel mode.
2. Design and implementation Oracle data base into Real Application Clusters (RAC) environment and its correlation with the MiddleWare system.
3. The design and implementation of cryptosystems which implicit the formation of two independent clusters: the first cluster consists of Real Time Encryption Servers (RTES) which are used for encrypting live TV channels and the second cluster which consists of Verimatrix Servers (VCAS) which is used for encrypting movie with Video On Demand (VOD) servers and connecting clusters with the MiddleWare system.
4. The design and implementation of video systems for storing recordings and movies which consists from 2 Video On Demand (VOD) servers and their connection with the MiddleWare system.
5. The design and implementation of a Load Balancing (LB) system which is responsible for transferring the entire work of a certain system to another server in the same system in the event that one of the server from MW, RAC, VOD, RTES, VCAS fails.
6. The design and implementation of a monitoring system that needs to monitor the work of live TV channels in all regions of the Telecom Operator, monitoring the work of all the Set Tops Boxes that are registered on the system, to inspect the whole IPTV system, and to display an alarm in the event of a malfunction as well as connecting a monitoring system with the MiddleWare system.
7. The design and implementation of a Network Video Server system which is responsible for emitting video signals directly from the IPTV system through to the net and its connections with MiddleWare system.

8. The design and implementation of a an initial Headend system which consists of receivers and encoders for emitting live TV channels and realising into implementation 50 live TV test channels.

According to the contract the Telecom Operator is responsible for the following activities:

1. Planning, system analysis and specifications of requirements, with all the necessary activities for the development of the project (final project and term plan, defining the framework of the system, defining business processes and the specification requirements that the system must satisfy, as well as the preferences of the technical architecture of the system for hardware-systematic platform needed for the development of the project).
2. Testing the implemented IPTV system by the partner company.
3. Defining the IPTV package in combination with VOIP and Internet services that need to be offered to end users.
4. The integration of IPTV systems with central information system Telecom Operator in order to add users, terminate users, delete users, change system setting, add Set Top Boxes to the system, delete Set Top Boxes from the system, add channel packets, change channel packets, erase channel packets for a user.
5. The construction of a charging system for the IPTV system depending on the IPTV package purchased and the formation of categories for charging movies.
6. The construction of user manuals with a detailed description of the use of IPTV services.
7. Training users on helpdesk that will work in direct contact with the end users.
8. The expansion of the initial Headend system which consists of receivers and encoders that broadcast live TV channels and realizing into implementation 80 production live TV channels at the end of the mentioned project.

V. THE ANALYSIS OF IMPLEMENTATION OF SUPPLIER MANAGEMENT THROUGH THE IPTV SYSTEM OF BH TELECOM WITH RECOMMENDATIONS OF IMPLEMENTATION OF THE SAME ACCORDING TO ITIL V3

Table II provides a description of ITIL V3 suggestions for Supplier Management, description of realizing the recommendations through the IPTV system of the leading Telecom Operator in Bosnia and Herzegovina taking into consideration the examination of realized contract between BH Telecom and the partner company for the implementation and installation of the IPTV system, performance management of BH Telecom over the performance of the partner company in realization and

maintenance of the IPTV system, and an overview of the percentages of implementation of ITIL V3 suggestion for Supplier Management process in the IPTV system of BH Telecom. For the comparative analysis six basic ITIL V3 recommendations for the Supplier Management have been chosen. Measurements of the implementation of ITIL V3 recommendations for Supplier Management have been done according to the recommendation of standardized methods for measuring the realization of ITIL V3 recommendations which is called the Balanced Scorecard [7]. Balanced Scorecard, for each recommendation finds its relation to: the end user, internet processes, finances and growth potential of the system based on all four parameters gives the final results for implementation of one of the recommendations in one particular system.

TABLE II. DESCRIPTION OF REALIZATION AND PROCENTAGE OF REALIZATION OF THE ITIL V3 RECOMMENDATIONS FOR SUPPLIER MANAGEMENT IN THE IPTV SYSTEM OF BH TELECOM

ITIL V3 recommendations for Supplier Management	Realization of ITIL V3 recommendations for Supplier Management in BH Telecom's IPTV system	Percentage of ITIL V3 implementation from recommendations for Supplier Management in BH Telecom's IPTV system
<b>Recommendation 1:</b>  <b>Identification of business requirements and preparation of business</b>	In order to achieve financial gains and expansion of its services, BH Telecom has decided to introduce IPTV service by engaging foreign firms that should have a very high reference, the same as the previous 3 realized project in other Telecom Operators and own at least 20 certified IPTV consultants.	This recommendation has been fully realized (100%)
<b>Recommendation 2:</b>  <b>Assignment of new agreements with partner companies</b>	There are clearly defined criteria for the prequalification stage and the final selection phase of IPTV consultants as the minimum number of consultants who must be at the stage of final selection for the entire procedure to successfully be completed. However, there is no defined criterion for a new business partner of choice in case of the termination of a partnership with a firm partner for the duration of the project. This conclusion is made after examining all	This recommendation has been partially realized (50%)

ITIL V3 recommendations for Supplier Management	Realization of ITIL V3 recommendations for Supplier Management in BH Telecom's IPTV system	Percentage of ITIL V3 implementation from recommendations for Supplier Management in BH Telecom's IPTV system
	the agreements that BH Telecom has with all his suppliers.	
<b>Recommendation 3:</b>  <b>Performance management of partner companies and contracts with them</b>	There is a complete performance management vendor, which is reflected through the work flow of support for which a firm partner is in charge and the types of problem solving in time by a firm partner under the contract must be resolved on the side where the firm partners in problem solving include all categories of technical staff from technicians to system engineers.	This recommendation has been fully realized (100%)
<b>Recommendation 4:</b>  <b>Defining the end requests with an existing firm partner</b>	BH Telecom has not defined clear criteria by which to carry out re-election of the firm partners in the event of failure to fulfil all its obligations during the project implementation and installation of IPTV solutions as well as whether in this case the re-election of the firm partners take place through the public process through the stages of prequalification and the final selection of the IPTV consultant.	This recommendation is not implemented (0%)
<b>Recommendation 5:</b>  <b>Categorization of partner companies and contracts with them</b>	There is no clearly defined procedure for the categorization of suppliers carried out in two phases: the phase in which the prequalification choose only those firms which meet the legal, financial, technical or professional abilities and the final stage of selecting a consultant, where the IPTV consultant will install and deploy IPTV solution based on criteria that include: the lowest price with the percentage share of 50% in the	This recommendation is fully applied (100%)

ITIL V3 recommendations for Supplier Management	Realization of ITIL V3 recommendations for Supplier Management in BH Telecom's IPTV system	Percentage of ITIL V3 implementation from recommendations for Supplier Management in BH Telecom's IPTV system
	selection, the quality of their solutions with the percentage share of 40% in the selection and the time of delivery with the percentage share of 10% in the selection of IPTV consultant.	
<b>Recommendation 6:</b>  <b>Evaluation and mediation of new contracts with partner companies</b>	There is a clearly defined procedure of selection of other firms that may participate in the implementation of solutions where a firm aside from the IPTV consultant can come alone to implement and install a system database, the crypto system, video system, Load Balancing system, monitoring system, Network Video system or Headend system. Choosing this firm can happen at a later realization of the project when the contract expires with the initial IPTV consultant.	This recommendation is fully implemented (100%)

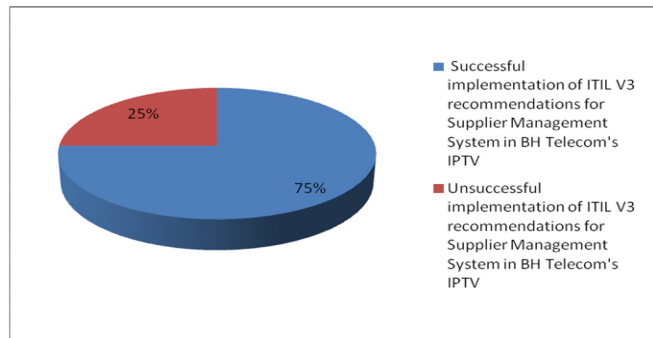


Figure 1. Ratio of successful and unsuccessful part of implementation of ITIL V3 recommendations for BH Telecom's IPTV system

## VI. CONCLUSION

There are two main criterions that have to be taken into consideration upon defining Supplier Management during the implementation of IPTV system of Telecom Operators: criteria for granting contracts with partner companies for the implementation and installation of an IPTV system and criterions for controlling the performance of the partner company by the Telecom Operator [4], [12], [13], [16]. The criterion for granting contracts to partner firms for the implementation and installation of the IPTV system has to satisfy all legal, economical, technical and professional conditions that are set on the public process of choosing the partner company. Granting the contract to the partner company is usually managed in two phases: the phase of prequalification and the phase of final selection of the partner company. The criterion for controlling the performance of the partner company must define the stages of maintenance of the IPTV system by the partner company and phases of the development of the system that need to be defined by the Telecom Operator and the partner company.

The comparative analysis showed that Supplier Management in the IPTV system of BH Telecom has been completely applied in four ITIL V3 recommendations (the identification of business needs and the preparation of businesses, controlling the performance of partner companies and contracts with them, categorizing partner companies and the contract with them, evaluation and intermediation of new contracts with partner firms), partially in one ITIL V3 recommendations (intermediation of new contracts with partner firms), and that it isn't at all applied in one ITIL V3 recommendation (defining the end request with the existing partner company).

If you find the arithmetic mean of all percentages of recommendations from Supplier Management you come to the conclusion that 75% of the recommendations have been successfully applied in BH Telecom's IPTV system (Figure 1). Figure 1 shows the ratio of successfully and unsuccessfully implemented ITIL V3 recommendations for Supplier Management in BH Telecom's IPTV system.

The comparative analysis has shown the applicability of ITIL V3 recommendations for Supplier Management in the IPTV system of the Telecom Operator is 75%. For complete realization of all ITIL V3 recommendations it is necessary to define the criteria of choice of a new partner company for the duration of the project as well as the method of process after which the new partner company is chosen and defining clear criteria in the event that a partnership is terminated with the existing company. The criteria of selecting a new partner company in the event of a termination of the contract with the current partner company has to offer a contract for accepting the best positioned team that on the public process didn't acquire the contract for running the business of implementation, installation and maintenance of the IPTV system. Such a procedure would last only a few days and this way in a very short period a new partner company would be chosen. In the event that none of the companies accept the contract then the public process is reopened, which according to the legislation lasts a few months.

Further investigations in this field should give a similar comparative analysis of the process of Change Management, Incident Management and Problem Management which occurred six months 6 months after the initial installation of the system which would include hardware and software changes of the IPTV system by the Telecom Operator and also conflicts with real incidents generated by the end users and real problems that may occur because of the interruption of one of the essential components of the IPTV system [10], [16], [18].

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