STANDARDS, BEST PRACTICES AND CODES OF ETHICS IMPACT ON IT SERVICE QUALITY – THE CASE OF SLOVENIAN IT DEPARTMENTS

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ABSTRACT: *The purpose of this paper is to explore the critical success factors while implementing standards, best practices and codes of ethics, what their benefits are when they are put in place, and how they impact the quality of information technology (IT) services. Through an extensive literature review and interview with experts in the field, we identified instrumental determinants. Structural equation modelling (SEM) was used for the case of IT departments in large Slovenian companies to test the presented hypotheses. The study is based on 102 responses from IT managers in large Slovenian companies. The research findings confirmed a positive correlation between the factors considered.*

Keywords: *standard, ISO, best practices, code of ethics, ITSM, quality of service, SEM*
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INTRODUCTION

In the global market economy IT as a service has been gaining attention in both practical and theoretical spheres in recent years. While the focus used to be on IT, now it is moving towards services that can be provided with the help of IT (Sandström et al., 2008). IT is relatively new compared to other areas in the company and was merely considered as supporting other functions. Yet, IT is today growing in importance and strategic orientation as it faces challenges. This is best reflected through IT governance which has been gaining ground in practice (Van Grembergen, 2004). In contemporary society, it has never been as important to use international standards (Alič, 2004), best practices (Cater-Steel, Toleman, & Tan, 2005) and codes of ethics (Pivec, 2002). However, not all such efforts yield results. So far, in the literature we can mostly find research confirming positive effects, as well as those without any results or even negative results (Heras, Dick & Casadesús, 2002). The paper's main purpose is to research these trends in the Slovenian environment and ascertain how it impacts service quality in IT departments.

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Research and literature indicates there is vast interest in this issue. It often happens that expected benefits may not be obtained due to previously listed components not being properly used. An in-depth study shows that all components have a lot in common and it is possible to find a common denominator between them. It is therefore necessary to examine the development of the concepts based on a review of a wide range of relevant literature and to then make a list of standards, practices, codes and dimensions that effect service quality, examine their key success factors in the implementation process, and the benefits they provide once implemented. There are studies that have examined the individual components enumerated above. But so far, in the existing literature we have been unable to find a similar study to the one presented in this paper. The main purpose of this paper is to contribute to current knowledge on service quality with a study of Slovenian IT departments. Therefore, empirical research is required to place attention on the construction of a model for service quality criteria and the key success factors while implementing standards, best practices and codes of ethics.

This paper has the following research objectives: To examine the existing knowledge in the areas of standards, best practices and ethical codes used in the IT field and extract the key characteristics of service quality in IT through a review of the research literature. The paper considers the existing standards, best practices and ethics codes as well as their interactions. It empirically verifies whether there is a link between service quality and the use of standards, best practices and codes of ethics in Slovenian IT departments. It also provides a list of components that affect the quality of IT services, thereby offering guidance to heads of IT departments.

The verification of the hypothesis that the use of standards, best practices and an ethics code in the IT department within Slovenian companies leads to higher quality IT services is an essential contribution. This is especially because this is a relatively new and interesting subject of study, while similar research has yet to be carried out, at least not to such an extent or in the Slovenian environment.

The paper consists of an introductory section, followed by a section with a detailed and critical study of scientific literature where we extract basic definitions of the concepts and summarise the existing knowledge gained from research in the field. The following section defines the purpose and nature of the methodology. The quantitative part is presented through the model and hypotheses. In addition, the process of selecting the variables and the measurement's reliability and validity are described. Results of the quantitative research are described in the Findings section. The hypotheses are verified with a SEM model and the latter is followed by an evaluation of the results and the research theoretical and practical contributions. Unsettled questions, which provide a basis for future research, are discussed in the conclusion.

1 THEORETICAL BACKGROUND

In this section, we present a basic outline of the components studied in the relevant research literature.

1.1 Standards

This paper focuses on ISO standards given that they are internationally established and widely adopted (ISO, 2015). Benefits achieved through certification of ISO standards are lower costs (decrease in risk, maintenance, development time, complaints and scrap) and higher income (increase in productivity, efficiency, customer satisfaction, quality level and marketing effects) (Benefits of Standards, 2015). Critics argue that it reduces creativity (Rebernik, 2000), the implementation is complex and costly (Thomas, 2010), while certificates do not guarantee quality.

ISO 9001

This standard is used in 1,138,155 organisations, 1,672 in Slovenia (ISO Survey, 2015). The ISO 9001 has a focus on the customer and process orientation (Alič, 2008). Research literature suggests certified companies perform better (Chow-Chua, Goh, & Wan 2003; Dimara, Skuras, Tsekouras, & Goutsos, 2004; Corbett, Montes-Sancho, & Kirsch, 2005, Han & Chen, 2007), where the benefits improve over time (Brecka, 1994). Certification by ISO 9001 represents a major competitive advantage (Anderson, Daly, & Johnson, 1999; Naveh & Marcus, 2005). Alič and Rusjan (2003) found that indicators were improved by ISO 9001; higher added value per employee, higher profitability and higher ROA. Pivka and Uršič (2002) extracted three categories of factors that measure ISO 9001 success: quality control, quality assurance and total quality management. Heras, Dick & Casadesús (2002) examined as benefits the lower costs of scrap, better quality and higher revenues. Positive internal (better processes and defined responsibilities) and external effects (access to foreign markets, improved customer satisfaction and responsiveness to market demands) were found in Spain (Casadesus & Gimenez, 2000). The strongest motives for certification in Portuguese companies were to improve quality, reduce costs and obtain market advantages (Santos & Millan, 2013). If the motive is internal (process improvement, lower cost, better quality, employee motivation), it will bring greater benefits than when the motive is external (pressure from government, customers or suppliers) (Singels, Ruël, & Water, 2001; Prajago, 2011; Valmohammadi & Kalantari, 2015).

ISO/IEC 20000

This standard prescribes how to manage IT services by monitoring and controlling processes (ISO, 2015). There is a strong correlation between ITIL and ISO/IEC 20000 (Disterer, 2009). Benefits can be divided into internal and external (Cots et al., 2014).

Supplying services at a reasonable price, solving problems concerning the continuity, availability and performance of services, providing tools for ensuring the quality level, retaining a competitive advantage, and maintaining contracts with customers are the main benefits (da Silva Leite et al., 2014).

ISO/IEC 27000

The standard ISO/IEC 27000 is dedicated to Information Security Management Systems (ISMS) and 23,972 companies are certified under it (58 in Slovenia, 97% in the IT sector) (ISO Survey, 2015). The RIV 2004 survey on information security among Slovenian companies showed that human error accounts for the biggest share of security flaws. An established security policy supported by top management is expected to be crucial for awareness about information security among employees (Einspiler, 2007). Disterer (2012) points out that with the growing importance of IT in today's business environment there is also an increased need for a systematic approach to information security. Wright (2006) suggests it is necessary to measure the effectiveness of security using ISO/IEC 27001 on all levels (management, operational and technical level controls).

ISO/IEC 38500

This standard is based on COBIT best practice. There was no evidence of its use in practice in Slovenia, neither in the available sources nor through our survey.

1.2 Best practices

Best practices are defined as procedures that are generally accepted as good, prescribed or most effective and are not the same for every company (Bogan and English, 1994). In this paper, we will focus on the ITIL, COBIT and project methodologies used in IT.

ITIL

ITIL as a best practice is used for IT Service Management. The most comprehensive studies were carried out in 2010 and 2013 by itSMF (itSMF International, 2010; 2013). The primary reasons for introducing ITIL were: to improve the quality and efficiency of IT services, to reduce both costs and risks, to meet the requirements of businesses with specific IT needs, to adhere to global standards and legislation, and to provide a competitive advantage. The key skills needed for implementation are ITIL Foundation, ITIL Intermediate and Project Management. At itSMF Australia, the benefits of introducing ITIL were studied: defining roles and responsibilities, customer satisfaction, the continuity and availability of services. Identified success factors are the involvement of top management, an effective ITIL champion, the ability of IT staff to adapt to change, along with the quality and

capacity of IT staff (Cater-Steel et al., 2005). Iden (2010) made a comprehensive study of the Scandinavian itSMF. The main reasons for introducing ITIL included: a focus on IT services, an increase in professionalism, customer satisfaction, best practice, reduced costs and meeting clients' expectations. Iden and Eikebrokk (2014) found that effectiveness of the group had a greater influence than the involvement of top management. Oražem (2014) confirmed that ITIL helps small and medium enterprises with cloud computing in Slovenia.

COBIT

COBIT 5, unlike similar frameworks, has a wider scope since, in addition to IT management, it covers IT governance. There has been consolidation (Pasquini & Galiè, 2013) with other frameworks and standards in the IT field (ITIL, ISO, PRINCE2...). The purpose is to provide quality information to support business operations and to achieve its strategic objectives, minimise IT risk, optimise IT costs and ensure compliance with laws, regulations and treaties (ISACA, 2015). Preittigun, Chantatub and Vatanasakdakul (2012) examined how research literature and COBIT 5 view IT governance. In a study of 100 articles, they identified articles are mostly concerned with governance (58%), areas of planning (74%) and monitoring (47%). Two years later, Mangalaraj, Singh Taneja (2014) also studied literature on COBIT 5. The research showed COBIT through different perspectives and that the majority of articles concentrated on the overall structure and a comparison with other frameworks (COSO, ITIL and ISO 38500). Some papers, however, dealt with specific COBIT aspects, i.e. safety, risk, systems development, efficiency and internal control. Many published articles related to COBIT are in the field of accounting. The survey results regarding efficiency are not unanimous. Phillips (2013) found a link between COBIT and IT efficiency. Tugas (2010) examined 21 Philippine companies in the food industry and did not find a link between the maturity by COBIT and ROA or ROE. Abu-Musa (2009) found through extensive surveys in Saudi Arabia that for the majority of respondents COBIT had positive effects.

Project management methodologies

While in IT most activities are organised as projects, we also included project management methodologies in the research. We focused on those that are widely accepted, namely PRINCE2 (Patel, 2009) and PMBOK. We also looked at the EMRIS methodology developed in Slovenia. Methodologies comprise a set of principles, processes and tools. The main aspects monitored for ensuring successful projects are budget, time, quality, scope and risks (Bentley, 2015). The biggest reasons for IT projects failing are: absence of clearly defined objectives, an unrealistic financial plan, inadequate staffing, poor communication, poor planning, no monitoring of the project's progress, the scope is not clearly defined, a lack of change control, and no risk management (Graham, 2010). A project managed by PMBOK consists of five processes: Initiating, Planning, Executing, Monitoring and Closing (PMI, 2013). The empirical research that examined project

management in practice made some interesting discoveries. The survey showed the most commonly used methodology is PRINCE2. By far the most used tool was Ganttogram. Five key factors that influence the success of the project: clearly defined objectives, realistic timescales, top management support, adequate resources, and commitment/dedication to end users (White & Fortune, 2002). A comparison of the PRINCE2 and PMBOK project management methodology presented their differences and similarities (Matos & Lopes, 2013). PRINCE2 is a prescriptive and PMBOK a descriptive methodology. The PRINCE2 methodology focuses on the product and the PMBOK methodology on processes. The biggest difference between them is that PRINCE2 does not include procurement. In conclusion, the authors prefer the PMBOK methodology.

1.3 Code of ethics

The rapidly developing information society is driven by constant improvements in ICT. These changes are also reflected in the consciousness of individuals and the whole of society. This raises new ethical challenges not covered by the current system of values. The purpose of a code of ethics is to fill the gap between legislation and practice and to help solve ethical dilemmas. Currently, there is no generally accepted code for the IT sector. Tavani (2001) conducted a review of the literature published on the topic of ICT and ethics for the period 1999 to 2001. In addition to this bibliography, he had previously published a bibliography of books and over 200 articles on the same topic. Pivec (2002) deals with the code of ethics in Slovenia. IFIP addresses the new ethical dimensions brought about by IT through a general code of ethics, but quite unsuccessfully. Koehler and Pemberton (2000) propose use of a model code of ethics which could be adapted to an individual environment. For this purpose, they examined and compared more than 50 individual codes of ethics. Bell and Adam (2004) propose including ethics in the educational process. The efficiency of a code of ethics, however, depends on its quality (Erwin, 2011).

1.4 Quality

The view on quality has changed over time (Bergman & Klefsjoe, 1994): from product review, production control, design of products, process management through to total quality management (TQM) at the end. Crosby (1997), Juran (1989) and Deming (1986) define good quality as a predictable degree of uniformity and reliability with requirements or customer needs. Service quality is a comparison between perceptions of the service received and expectations of the service desired (Fitzsimmons & Fitzsimmons, 1998). Service quality is gaining in importance because customers today expect quality services at a reasonable price (Yoo, Kyoon, & Jeong, 2007). The biggest differences between products and services are tangibility, the measurement of quality, and involvement (Gupta & Chen, 1995). Nevertheless, if we want to achieve consumer satisfaction with services and indirectly ensure companies are profitable, it is necessary to investigate the influences and factors important in achieving these objectives (Parasuraman, A., Zeithaml, V., & Berry,

1985). Ghobadian, Speller and Jones (1994) examined models for the quality of services. They considered seven quality models and determined that no model had all necessary components for the management of these services to identify the source of quality, detect problems in quality, determine the cause of the observed problems in quality, and offer possible actions to address them. The service profit chain (Heskett, Sasser, & Schlesinger, 1997) explains the impact of service quality on the financial results. Gummesson's 4Q model defines the services and goods as part of the service. The model has the following variables: *expectation*, *experience*, *corporate image* and *brand*. *Company image* is the same as in the Grönroos model. The variable *brand* adds a new dimension to the model of perceived quality (Gummesson, 1993). In 1988, Parasuraman, Zeithaml and Berry developed a model to measure the quality of services and named it SERVQUAL (SERvice QUALity), where they focus on the fifth gap in the GAP model. Five dimensions of service quality are (Parasuraman et al., 1988, p. 23): Reliability, Responsiveness, Tangibles, Assurance and Empathy. Kang, Caves and Alexandris (2002) adapted the SERVQUAL model to study the needs of internal services. Cronin and Taylor (1992) also argued that SERVQUAL as measured by the ratio between the expected and the perceived service quality is not supported in practice. Therefore, they proposed the SERVPERF model, which contains the same dimensions and focuses solely on the customer's experience when using a service. Caruana and Pitt (1997) developed a scale to measure the quality of internal services called INTQUAL (INTernal QUALity) and examined the link between the quality of service and business impacts in terms of management. Praeg and Schnabel (2006) developed a model called the IT service cachet, designed to assess outsourced IT.

Looking at ITSM (Shahsavarani & Ji, 2014), quality is measured as service efficiency, service quality or by financial indicators. Gacenga, Cater-Steel and Toleman (2010; 2011; 2013) conducted empirical research in the UK, USA and Australia, studied literature and then suggested their measurement model that combines BSC, SERVQUAL and SERVPERF. Lahtela, Jäntti and Kaukola (2010) proposed real-time measurements (ITIL-MS). Hochstein, Zarnekow and Brenner (2005) suggested three areas for measuring ITSM: benefits, costs, and success factors. Hochstein et al. (2004) adjusted SERVQUAL to IT SERVQUAL with 18 its indicators.

2 METHODOLOGY

2.1 Sample and procedures

A survey was conducted among large Slovenian companies as defined by the Companies Act (ZGD-1H, 2009). Empirical data were collected in January 2016 in order to enable the solving of the hypotheses. The source for the list of companies was the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES). In its 2015 database there were 676 companies listed as large according to the Companies Act. Collecting responses was challenging. We retrieved 373 email addresses from AJPES where under a company's entry the main email addresses were provided, not the addresses

of IT managers. After researching secondary resources, we collected 555 email addresses. So as to obtain 144 responses (a 25.9% response rate) of which 102 (18.5%) were valid for further research, it was necessary to send emails in three iterations and to refine the mailing list between those iterations.

IT managers were asked to assess how the chosen factors influence the implementation of standards, best practices and codes of ethics in IT departments, which benefits arise from implementation and how it all reflects on the quality of IT services as regarded in their company on five-point Likert-type scales (ranging from 1 for "not important at all" to 5 for "very important"). The tool used for this survey was 1KA, an online survey portal run by the Faculty of Social Sciences at the University of Ljubljana. Questions used in the survey were adapted from previous works on standards (Alič, 2013; Buttle, 1997; Cots, 2014; da Silva Leite et al., 2014; Disterer, 2012; Disterer, 2013), best practices (White & Fortune, 2002; Cater-Steel et al., 2005; Groznik et al., 2010; Iden, 2010; itSMF International, 2013; Ahmad & Shamsudin, 2013; Mangalaraj et al., 2014) and codes of ethics (Koehler & Pemberton, 2000; Pivec, 2002). The questionnaire was divided into three sections. The first and last were designed to collect data about descriptive statistics and demographics of the companies and IT managers. The main section of questionnaire included questions about key success factors in the implementation of standards, best practices and codes of ethics, benefits of that implementation and how they are reflected in the quality of IT services perceived by end users. A pilot survey with an interview was conducted with ten experts (five academics and five experts) for the purpose of evaluating the questionnaire. Comments and suggestions made formed the basis for revising the questions before the questionnaire was sent to the target population.

2.2 Method

For conducting descriptive statistics and exploratory factor analysis (EFA) we used the software package IBM SPSS Statistics version 20. For confirmatory factor analysis (CFA) and structural equation modelling (SEM) we used the software package IBM SPSS Amos version 22 in order to present structured connections among the factors for implementing standards, best practices and codes of ethics in IT departments, their impact on ITSM and the company's internal IT services quality assessment.

2.3 Hypotheses

A review of research literature yielded conclusions that were synthesised into the seven hypotheses stated below.

Hypothesis 1: Use of the standards/best practices has a positive impact on the IT service quality.

Hypothesis 2: Use of a code of ethics has a positive impact on the IT service quality.

Hypothesis 3: Personnel have a positive impact on the implementation of a standard or best practice.

Hypothesis 4: The motive for implementing has a positive impact on the implementation of a standard or best practice.

Hypothesis 5: Top management's involvement has a positive impact on a standard or best practice.

Hypothesis 6: Top management's involvement has a positive impact on the code of ethics.

Hypothesis 7: Composition of the code has a positive impact on the implementation of the code of ethics.

2.4 Identification of determinants in the model

Special attention is paid to the definition and operationalisation of concepts covered in the model. The operationalisation is performed by means of a research comparison of already verified questionnaires and tested with findings of qualitative research using semi-structured interviews with two groups of respondents, IT specialists and academics in the IT field. Among the main sources of the key success factors and benefits was the research by Iden (2010; 2014), Cater-Steel et al. (2005), Groznik et al. (2010) and itSMF (2010; 2014) while, for the code of ethics Pivec (2002) and for quality we used the dimensions from SERVQUAL (1988, Parasuraman et al., 1988) and SERVPERF (Cronin & Taylor, 1992).

We had to consider some limitations. Being able to measure the latent construct in the SEM model requires at least two variables per construct. On the other hand, if we had used too many variables, the survey would have been too long and respondents would have been unwilling to complete the survey. In the end, we assembled questionnaire with 49 items. For all items, we used a five-level Likert scale as the method for evaluating the determinants.

For the construct *Personnel* we measured the importance of human resource aspects while implementing a standard or best practice. We measured the importance of a good project manager, the right people in the right positions, the fluctuation of key people, process thinking of the team, knowledge of the team, the team atmosphere, team effort and employee readiness to accept change.

The construct *Motive* was measured with variables including external (image, competitive advantage, legislation, partner requirements) and internal motives (risk reduction, quality improvement, efficiency improvement and cost reduction).

The construct *Top management* measured the role of management when implementing standards/best practices and the code of ethics with variables, the setting of clear objectives

before initiating the project, the establishing of realistic expectations about the project, allocating the necessary resources for the project, actively participating in the problem resolution, monitoring and evaluating the project from beginning to end, support for the project from start to finish, setting an example with their actions, accepting responsibility, establishing a clear mission, values and principles of the organisation.

The construct *Content* was measured with variables taking account of the mission, values and principles of the organisation, defining company policy and how to deal with breaches of the code, and whether it is in accordance with the law, defines personal responsibility, defines the confidentiality of information, defines a conflict of interest, defines the relationship to the environment, and includes current ethical challenges in the IT field.

The construct *Code of ethics* measured the effectiveness of the latter with the variables image, communicating values to all stakeholders, facilitating decision-making of employees in ethically challenging situations, consistency of operations, and degree of compliance with the legislation.

The construct *Standard/Best practice* measured the effectiveness of the latter with variables of processes regulation, the definition of roles and responsibilities, improvement in risk management, improvement in the quality of IT services, reduction of the cost of IT services, and customer satisfaction with IT services.

The construct *IT service quality* was measured with the SERVQUAL/SERVPERF dimensions such as variables reliability, assurance, tangibles, empathy and responsiveness.

3 FINDINGS

By conducting the survey, we acquired valuable data for studying the factors of implementing standards, best practices and codes of ethics and how they impact the quality of IT services. In this section, we start by examining characteristics of the participating IT managers and the organisations where they work. We proceed with exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Finally, structural equation modelling (SEM) was created where the relationship between the use of standards, best practices and codes of ethics vis-à-vis IT services was tested.

3.1 Sample analysis

In Table 1 (in the appendix) a summary is provided of the sample's main characteristics. Among participating companies, the highest share of participants was in the manufacturing sector (23.5%). That was expected since they are the most represented sector in the whole population. They are followed by the Financial and ICT sectors. But if we look at the ratio between all big companies in an individual sector and those participating in the survey we can see we obtained a response from 42% of all ICT companies, whereas in the other sectors this share was between 10% and 15% (AJPES, 2015).

The next relevant characteristic is that more than half (56.9%) of the companies are situated in Central Slovenia. This shows that the country is very centralised in terms of the distribution of companies among regions. The population of large companies (ZGD-1H, 2009) in Slovenia is made up of those with more than 250 employees, revenue exceeding EUR 35 million, assets of more than EUR 17.5 million, have consolidated balance sheets or are from the financial sector (banks, insurance companies and stock exchange). From the sample population we can see that most respondents have between 251 and 1,000 employees (45.1%), followed by those with up to 250 employees (38.2%), some of them had between 1,001 and 5,000 employees (12.7%) and few had more than 5,000 employees (3.9%).

The number of employees in IT for those companies ranges from 0 (IT is completely outsourced) to 230, with an average of 18.2. IT is chiefly organised in a separate department (69.6%) or as part of a bigger department, i.e. Operations (13.7%). To a small extent, IT is handled by individuals or is completely outsourced (7.8%). In one case, nobody is formally in charge of IT. The highest position held by an IT employee is mainly a department manager who is directly responsible to the Board, with a tactical level of decision-making (44.1%). They are followed by those who form part of top management (CIO), with a strategic level of decision-making (30.4%). To a lesser extent, department managers were at the operational level (16.7%) or where there is nobody in a management position (8.8%). Further, gender inequality is clearly shown in that in IT management positions males dominate with 87.3% and females are represented with just 12.7%. These management positions are assigned to experienced (96.1% are older than 30 years) and educated (54.9% hold a Master degree) individuals.

In the sample of 144 respondents, 102 had used at least one of the standards, best practices or codes of ethics listed in Table 2 (appendix). More than half have the ISO 9001 certificate (55%) or an internal code of ethics (56%). The second standard is the ISO/IEC 27001 (16%) that is used primarily by the ICT and Finance sector companies. It is followed by ISO/IEC 20001 (4%), which is higher than expected given that before the survey we could only find one company certified for this standard in Slovenia. None of the companies was certified for the final standard, ISO/IEC 38500. This was expected since this it is the newest standard in the survey and in other countries it is generally implemented by companies that exceed Slovenian large companies in size. Among best practices, ITIL is implemented in 16% of companies, COBIT in 3% and CMMI in none. The PMBOK project methodology is used in 7% of companies; both PRINCE2 and EMRIS are used in just one company.

Most of these findings are not surprising, they are expected and correlate with findings in the literature (Groznik et al., 2010). One fact causing concern is that there is not enough knowledge even about the terminology in the field. There is a possible reason for the low level of implementing those standards, best practices and codes of ethics.

3.2 Exploratory factor analysis (EFA)

We used exploratory factor analysis to reduce the number of variables only to those that are significant (Hair et al., 2009). In this way, we simplified the complexity of the connections between the observed variables and factors.

The first step was data screening. In this process, we removed 42 responses out of 144 that have not implemented any of the standards, best practices or codes of ethics. Then we replaced the values that are missing with the median value for specific variables. In addition, one respondent answered all the questions with the same answer and was thus removed before proceeding with the EFA.

We conducted an exploratory factor analysis and confirmed seven factors and named them Personnel, Motive, Top management, Content, Standard/Best practice, Code of ethics and IT service quality according to our hypotheses. From the 49 variables we selected 19 that were most significant (with the lowest value of 0.674). In the exploratory factor analysis we chose the Maximum Likelihood (ML) method. Metric constructs were obtained by using a Promax rotation and with a Scree plot.

With the use of statistical tests – the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity – we determined whether the link between the observed variables can be explained by the smaller number of indirect observable variables obtained at the end of the factor analysis and that the data are suitable for further analysis. With a KMO value of 0.721, we exceed the 0.5 threshold proposed in the literature and the significance for the Bartlett's test was below 0.001 ($\chi 2$ = 1338,545, df = 171, Sig = 0.000). Cumulative variance explained by factors using the selected variables was 82.6%, meaning the values of these results for those indicators were acceptable to proceed with the Confirmatory Factor Analysis.

3.3 Confirmatory Factor Analysis (CFA)

The model factors were then tested using Confirmatory Factor Analysis. In doing so, we checked whether the individual latent variables explained the observed variables. Finally, we looked at various compliance indicators where we tested the quality of the measurement model. The composite reliability indicators (CR) exceed the threshold value of 0.7, confirming internal consistency. The average variance extracted (AVE) for all factors is higher than the 0.50 threshold proposed in the literature (Fornelli & Lacker, 1981). This means the instrument's high level of reliability in terms of internal coherence and standardised regression weights.

3.4 Model Fit Summary

In structural equation modelling we establish whether the model is acceptable with the fit indicators. In the literature, we can find many different indicators with different threshold values for those indicators that are acceptable for a good model fit. So we relied on several indicators that are used in practice (Marsh & Hau, 1996; Jaccard & Wan, 1996). Basic indicators are $\chi^2 = 153.307$, df= 131, $\chi^2/df = 1.170$, a value between the threshold values 1 and 3. The Comparative Fit Index (CFI) is 0.891 and GFI is 0.841, they are close to the threshold value of 0.9 suggested in the literature (Hu & Bentler, 1998). The Root-Mean Square Error of Approximation (RMSEA=0.041) is below the suggested cut-off value of 0.05 for a good fit model. All chosen indicators show that the model has a fairly good fit and is specified correctly.

3.5 SEM model

After determining that the model is a good fit, we then established whether specific paths in the model are significant. Hypotheses were tested with the SEM model on the factors' direct and indirect impact and the benefits on IT service quality.

As evident from the research model (Figure 1), the connection between standards/best practices and IT service quality is moderate (0.25), positive and statistically significant ($p < 0.05$), so we confirmed Hypothesis 1. The higher the performance of standards/best practices the better the IT service quality. This is also evident in the theory.

The connection between a code of ethics and IT service quality is moderate (0.32), positive and statistically significant ($p < 0.005$), allowing us to confirm Hypothesis 2. The higher the performance of the code of ethics the better the IT service quality. This is also evident in the theory.

The connection between personnel and standard/best practice is moderate (0.33), positive and statistically significant ($p < 0.005$), so we confirmed Hypothesis 3. The better we employ personnel during implementation the better results of the standard/best practice will be. This is also evident in the theory.

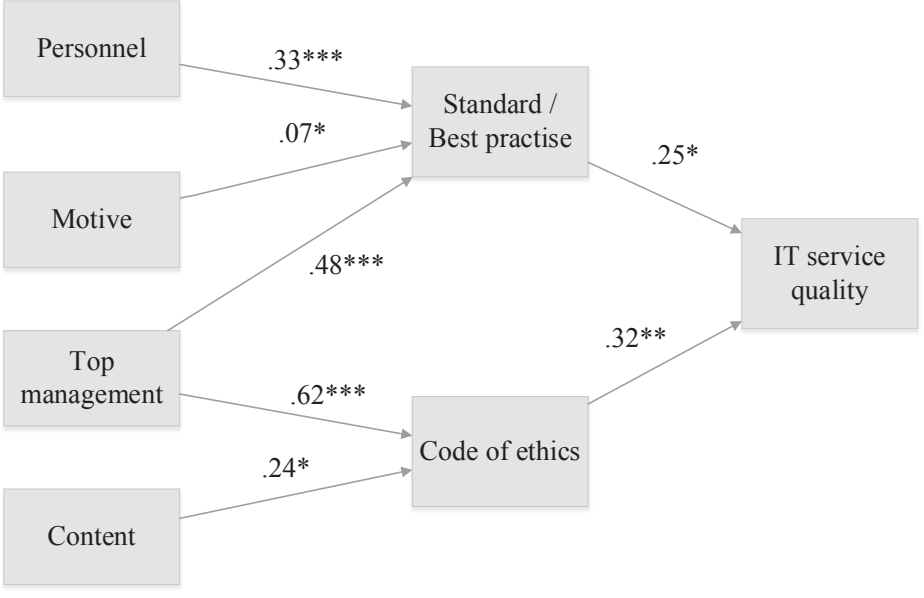
The connection between motive and standard/best practice is weak (0.07), positive and still statistically significant ($p = 0.05$), permitting us to confirm Hypothesis 4 with some consideration, but the connection is too weak and we are therefore ultimately rejecting it. Choosing the right motives to implement a standard/best practice will have only slightly better results than the standard/best practice. These findings are opposite to the theory and research conducted previously.

The connection between top management and a standard/best practice is strong (0.48), positive and statistically significant ($p < 0.001$), so we confirmed Hypothesis 5. The better we employ personnel during implementation the better the results of the standard/best practice will be. This is evident in the theory.

The connection between top management and a standard/best practice is very strong (0.62), positive and statistically significant ($p < 0.001$), allowing us to confirm Hypothesis 6. The more involved top management is during the implementation, the better the results of the code of ethics will be. This is also evident in the theory.

The connection between content and a code of ethics is moderate (0.24), positive and statistically significant ($p < 0.05$), permitting us to confirm Hypothesis 7. The better we prepare the content during implementation the better the results of the code of ethics will be. This is also evident in the theory.

Figure 1: The proposed SEM model for the impact of standards, best practice and codes of ethics on the quality on IT service quality, Slovenian big companies



* significant at the 0.05 level, ** significant at the 0.005 level, *** significant at the 0.001 level

With these results for the SEM model all hypotheses were confirmed, only with Hypothesis 4 is it rejected since the influence is weak.

4 DISCUSSION AND CONCLUSIONS

The empirical part of the paper is followed by the evaluation below in terms of both theory and methodology. We first outline relevant contributions which represent our theoretical and empirical findings. Some open issues are discussed which provide opportunities for future work in this field.

4.1 Theoretical contributions

The main novelty of the present paper is the proposed SEM model. In the above sense, our research findings expand knowledge related to IT service quality. With this SEM model we explore the direct and indirect connection and impact of factors. Practical implications of the research are discussed in the next sub-section.

4.2 Practical implications

With our studies in this paper we have established that the use of standards, best practices and codes of ethics holds direct and positive potential for the quality of IT services. Through correct implementation of standards, best practices and a code of ethics, companies will increase their ITSM performance, ethical behaviour and internal satisfaction with IT services. We can see that most large companies are still using just the general ISO 9001 standard and a code of ethics for the entire company. There is a lot of room for improvement. If these companies wish to remain competitive in future, they need to make some extra effort while implementing the standards, best practices and the code of ethics related to IT. When they decide to take that step it is important to do it with proper preparation, use the right resources and for the right reasons. When they are correctly put in place, there will be positive results reflected in end user satisfaction with IT services. On the other hand, the research results of this paper will give them some guidelines when they start to pursue these goals.

4.3 Limitations and future research

Generalisation of the research results is reduced by certain limitations. The 102 companies included in the sample represent 15% of the whole population. Still, comparing the sample characteristics with those of our population, there are some differences. This study was made on a sample from Slovenia so it should be used for comparison with similarly sized economies. While in most literature on statistical analysis 100 units is perceived as sufficient for the SEM model, some suggest up to 200 units as optimal (Klem, 2000). However, we can also find examples of SEM research with just 60 (Mihalič & Buhalis, 2013) or 70 (Zebec-Koren, 2010) units. Taking this limitation into account, it can be interpreted as a subjective evaluation of IT managers regarding the variables in the survey.

Potential for future research runs in many directions. One possibility is to widen the population to companies in other countries or to even make the research global. The second would be to make it longitudinal and the research could then show how variables are affected by duration of the implementation period. As evident from the descriptive characteristics of the population, we still have a percentage of adopted standards, best practices and codes of ethics specialised in IT. Research into the reasons for the current situation and possibilities to improve it is another topic that should be explored. The last one is to look partially at one pair of components, i.e. how standards influence each other or the link between standards and best practices or standards and codes of ethics.

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APPENDIX

Table 1: Characteristics of the sample used in the research

INDUSTRY					%
	Manufacturing				23.5
	Electricity, gas, steam and air conditioning supply				5.9
	Construction				8.8
	Wholesale and retail trade; Trade; Repair of motor vehicles and motorcycles				11.8
	Transportation and storage				2.9
	Accommodation and food service activities				2.0
	Information and communication				11.8
	Financial and insurance activities				17.6
	Professional, scientific and technical activities				4.9
	Administrative and support service activities				2.0
	Public administration and defence				1.0
	Human health and social work activities				2.0
	Other				5.9
Region					
	Mura				2.9
	Drava				7.8
	Savinja				10.8
	Central Sava				2.0
	Lower Sava				1.0
	Southeast Slovenia				2.0
	Central Slovenia				56.9
	Upper Carniola				8.8
	Littoral–Inner Carniola				1.0
	Gorizia				4.9
	Coastal–Karst				2.0
Number of employees					
	Up to 250				38.2
	251 to 1000				45.1
	1001 to 5000				12.7
	Above 5000				3.9
Number of employees in IT					
	Average	Std.Dev	Maximum	Minimum	
	18.2	36.97	230	0	
How IT is organised					
	Separate department				69.6
	Part of a bigger department (i.e. Operations)				13.7
	Individuals take care of IT				7.8
	Outsourced IT completely				7.8
	Nobody is formally in charge of IT				1.0

Highest position held by IT person		
	Top management, CIO, strategical level	30.4
	Department manager, directly under the Board, tactical level	44.1
	Department manager, indirectly under the Board, operational level	16.7
	Nobody has a management position	8.8
Gender		
	Male	87.3
	Female	12.7
Age group		
	up to 30 years	3.9
	31–40 years	28.4
	41–50 years	39.2
	51 years or more	28.4
Education level		
	High school	6.9
	Bachelor degree (Bologna system)	20.6
	Master degree (Bologna system)	54.9
	PhD	17.6

Table 2: Application of standard, best practices and code of ethics in Slovenian large companies

	Not familiar with term	Familiar with term but do not apply it	Plan implementation	In Implementation phase	Already implemented
ISO 9001	8%	32%	2%	3%	55%
ISO 20001	24%	63%	7%	2%	4%
ISO 27001	12%	55%	13%	4%	16%
ISO 38500	44%	52%	3%	1%	0%
ITIL	18%	52%	8%	8%	14%
COBIT	28%	59%	8%	2%	3%
CMMI	63%	35%	2%	0%	0%
PRINCE2	47%	47%	3%	2%	1%
PMBOK/PMI	54%	35%	3%	1%	7%
EMRIS	67%	30%	1%	1%	1%
ACM Code of Ethics	68%	28%	1%	1%	2%
In-house Code of Ethics	16%	20%	3%	5%	56%

Table 3: Pattern Matrix

	Factor						
	1	2	3	4	5	6	7
Q14f	1.041						
Q14c	.755						
Q14a	.674						
Q19a		.962					
Q19c		.905					
Q19d		.720					
Q17d			.956				
Q17a			.886				
Q17b			.701				
Q12h				.862			
Q12b				.857			
Q12a				.812			
Q13f					.990		
Q13e					.799		
Q16d						.908	
Q16e						.786	
Q18d							.796
Q18c							.746
Q18b							.692

Extraction Method: Maximum Likelihood
Rotation Method: Promax with a Kaiser Normalisation
a. Rotation converged in 6 iterations