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The model of factors influencing the quality of e-service improvement process

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Elektroninių paslaugų tobulinimo proceso kokybės veiksnių modelis

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INTRODUCTION

The quality of services, as well as electronic services is an acute topic in quality management. Although the issue of the quality of electronic services has already been addressed by many authors (Agrawal et al., 2014), in recent years it has received a special attention in an attempt to summarize the characteristics and criteria of the quality of electronic services while seeking new methods for assessing the quality of electronic services, monitoring consumer behavior online, their use of electronic technologies, the impact of service quality on customer satisfaction and loyalty. On the other hand, scholars emphasize that the research, especially empirical, is still scarce and many questions in the field of management remain unanswered. According to the authors (Field, et. al., 2004), structuring the e-service quality to make it understandable to professionals performing in this field would make sense for future research. The findings of the future research should help in identifying the key factors for the components of the e-service quality system and the transactions that improve the quality of e-service and ultimately the level of customer satisfaction. Therefore, it is especially important to allocate more of the scientific potential in improving the process of electronic services quality.

Another important area of the research into the improvement of the electronic services is the examination of the factors of the quality of these processes. An increasingly growing amount of organisations are investing in e-service design, development and improvement to attract new and retain the existing customers, to ensure their satisfaction in line with their fast-growing expectations. In order to achieve a targeted scientific performance in this field, there is a lack of a conceptual model of the factors influencing the quality of the e-service improvement process.

Scientific problem

In scientific literature, the issues related to the design and quality improvement of electronic services, such as information technologies, public administration and management, are solved in isolation. The

major focus is on the improvement of technological aspects of the quality of e-service systems. However, the research into the field of electronic services management has recently emerged which tends to be based on the e-service concept analysis, the exclusion and categorisation of quality criteria. Yet, it lacks the empirical research into the factors influencing the quality of e-service processes and their interaction.

Riedl et al (2011) emphasises that quality service development is becoming increasingly more important to success, therefore, the elements of outsourcing, re-use, and customer feedback should be integrated into new models of improvement processes. Meanwhile, the process models should be adapted to the rapid design of new services and be cyclical in order to enable sustainable improvement of the existing services and the design of new services.

In summary of the arguments presented above, it can be stated that the scientific literature in the field of management is lacking a conceptual **model of the factors influencing the quality of the e-service improvement process** based on empirical research that would reveal the integrated impact of key factors on the quality of the improvement process.

Research question:

What should be the model of the factors influencing the quality of the improvement process of electronic services?

In order to solve this problem of management science, the main ***aim of the dissertation is to reveal the key factors that influence the quality of the e-service improvement process and their relationship and to create a conceptual model of the factors influencing the quality of the e-service improvement process that would help in seeking a better quality in the improvement process.***

In order to achieve this aim, the following ***objectives for the research*** were formulated:

1. To clarify the concept of the e-service quality and their qualitative characteristics by taking into account the challenges of a

rapidly changing technological and business environment that impact the concept of the e-service quality.

2. To distinguish the factors of the e-service improvement process and provide a theoretical model of the system of their relationship, based on the outcomes obtained from the analysis into the existing e-service design and improvement models.

3. To justify the research methodology and on the basis of this methodology, to empirically examine the factors of the e-service quality improvement process, their importance for the process quality assurance.

4. To create a conceptual model of the factors that influence the quality of the e-service improvement process.

The object of the study - factors influencing the e-service improvement process.

Research methods

The triangulation principle served as the basis in applying various methods of theoretical and empirical research. The review of scientific literature and a systematic analysis were used to clarify concepts, examine the existing processes, criteria, characteristics, and model the process quality factors. In parallel to the theoretical analysis, an exploratory survey was also carried out - an expert survey aimed at clarifying the current e-service improvement status in organisations and highlighting the most practical need for future research and recommendations in terms of their content and form. The empirical data were collected according to the methodology of quantitative research and using the method of structured interviews. Structured interviews with targeted e-service owners and developers in organisations were needed to find out the factors of the e-service quality improvement process, their importance and interactions. Finally, all the empirically collected data were examined using a statistical data analysis method.

The dissertation consists of three sections:

1. The first section (chapters 1-3) is dedicated to the analysis of the research carried out into the e-service design and quality improvement process. This section provides an overview of major transformations taking place in technological environment and affecting e-service expression, the concept and qualitative characteristics of the e-service are examined, the existing e-service design, development and improvement models and factors are analysed.
2. The second section (chapter 4) provides justification for the research methodology, including the justification for the creation of the empirical research instruments.
3. The third section (chapters 5 and 6) is devoted to a statistical analysis of the research data and also to the modelling of factors that impact the e-service quality improvement processes, to the creation of a conceptual management model that would ensure the e-service quality improvement process. E-services are services that integrate electronic networks, the Internet or mobile technologies as well as the service providers and other participating parties involved and their processes and information systems.

Scientific novelty and theoretical significance

1. E-service concept, term and quality characteristics have been clarified.
2. Factors of the e-service quality improvement process and their interactions in the process quality assurance have been empirically justified.
3. The impact of strategic orientation towards e-services on factors related to improvement team has been revealed.
4. A common statistical model for DL factors has been created.
5. A conceptual model for the factors impacting the e-service quality improvement process and their interactions has been created.

Practical significance of the dissertation

The newly created model for improving the quality of the e-service will allow the managers of businesses or leaders of diverse fields to take a bolder approach to operational reforms, changes, transformations, and ensure more targeted investment in improving the quality of operations, based on the recommendations for model application. The results of the study reveal the impact of team factors on the quality of e-service improvement process. According to an organisation‘s strategic orientation to e-services on the basis of which recommendations for team building principles are provided, which will allow for better quality of the e-service improvement process. Also, recommendations for the inclusion of customers in the e-service improvement process are provided.

Publications containing the main findings of the dissertation

Scientific periodicals recognised by the Research Council of Lithuania

1. Afarjanc E. The refined concept and quality characteristics of e-services. International Business: innovations, psychology, economics), 2017, Vol. 8, No 1 (13), p.76-87).
2. Afarjanc E. The effect of Agile process and Scrum practices on the rework and defect level of e-services. Organisational Studies and Innovation Review, 2018 Vol 4 issue 3. p. 17-45.
3. Afarjanc E., Serafinas D., Daugvilienė D. Study of employee involvement in implementation of quality management system Economics and Management, 2008, vol.13, p. 776-783.

The findings of the research were presented at international conferences:

1. Presentation on „The Effect of Agile Process and Scrum Practices on the Rework and Defect Level of E-services“, delivered by E. Afarjanc at Management and Business Academy: MBAcademy International Business Conference. December 14–16, 2018, London (UK).

2. Presentation on “Quality Management Systems Implementation Experience“, delivered by E. Afarjanc at a Economics and Management conference. April 10-11, 2008. Kaunas (Lithuania)
3. Presentation on „The Research of Corporate Social Responsibility Progress Factors at Macro-Level in Lithuania“, delivered by E. Afarjanc at Economics and Management conference. March 29-30 2012. Tallin (Estonia).

Structure of the dissertation. The dissertation consists of the introduction, six parts, scientific discussion, conclusions and recommendations for future research, recommendations for business, references and appendixes. The volume of the dissertation without appendixes – 191 pages (with appendixes 206 pages). 133 references have been used.

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1. CONCEPT OF E-SERVICES

The issue of e-services in scientific literature has been under discussion for more than a decade, however in a fast-developing market the phenomenon of e-services is being redefined anew and its concept is changing. In examining the concept of e-services, it is necessary to take into account the fact that e- services are the focus of management, manifested in a multidisciplinary environment and exposed to both rapid advancements and radical innovations arising in the technological environment, as well as new management challenges and theories. The latter are addressing new opportunities and challenges related to the use of social networks in management, the specifics of virtual organisations, etc. Nonetheless, the concept of e-services is most likely to be driven by technological advances as e-services are inseparable from the use of electronic networks in providing them.

The earliest definitions (Voss, 2000, Rust, Kannan, 2002) of the e-services are rather narrow, because they only refer to the Internet networks. Recently, e-services are mostly accessed via mobile or hybrid networks. Also, technological media intertwine when the

service is used on different devices.

More recent definitions of e-services are more focused on the nature of the e-services rather than on their technological space (Whitman, Woszczynsk, 2004) and reveal the specific characteristics of interactivity inherent in such services, as a result of an automated user interface.

The authors of the information technology field offer more technocratic definitions of e-services, where services are identified with information systems or applications (Fong, Meng, 2009). In such definitions, e-services are mistakenly identified with technology and the aspect of e-services or their management as an object of management science is not included.

The analysis of the e-service concepts and terms shows that all the researchers agree that e-services are provided via electronic channels, yet many of them emphasise the Internet technology, which has dominated for a long time. However, there is an increasingly growing importance of other information and communication technologies, such as mobile technologies and other electronic networks, as well as diversity of technologies used to provide e-services. The current awareness of the concept of e-services is that this service must be initiated by the client remotely, otherwise it will be considered as a traditional service provided by the service provider and/or initiated by the seller or other party (not the client) where the service can also be provided by using the information or communication technologies. This dilemma has emerged in the context of a widespread use of technology in all areas and in the vertical and horizontal integration of service processes, automation and full self-service. Therefore, in later studies the authors point out that e-services must be remotely initiated by clients. However, taking into account the expansion of the possibilities for the e-services, in the author‘s opinion, this is not so important and this understanding of the e-services may be too restrictive, because the diversity of e-services used on behalf of the service provider is not only continuously growing but they are also used for purposes other than remote handling of errands, e.g. using e-

signature instead of physical signature (even in a direct contact with another party) to ensure easy document handling immediately in the e-systems and integrated into other processes and systems. Another important aspect is that the differences between the services and the products online tend to continuously disappear, while the concept that everything available online is attributed to e-services is increasingly getting more visible. This fact is confirmed by the expert survey that has been conducted and by the analysis of the concept of e-services, where the early definitions were dominated with the traditional perception of services by a direct transfer online, however, in later definitions the gap between services and products online has become increasingly narrower and the definitions have started to emphasize types of e-services. It was determined by the complexity of the e-services, because actually there are no net goods online, as they are usually related to or supplemented with services, as well as the essential differences between the characteristics of the product and the services practically disappear online.

By integrating various approaches and taking into account the changes that have taken place in the technological environment, the author of the dissertation presents a new formulation of a definition of e-services, used in further writing of this work:

E-services are services that integrate electronic networks, the Internet or mobile technologies as well as the service providers and other participating parties involved and their processes and information systems.

This definition comprises the element of the technological environment that determines the specificity of electronic services, recognizes the nature of electronic services as a management object, and includes the roles of clients as the most important participants in the service and the parties involved in the service process.

2. CONCEPT OF THE QUALITY OF E-SERVICES

In general, the quality of e-services is a classical variation of

quality, however, in this case the services are provided through electronic channels. Therefore, the studies on the analysis of the concept of quality of electronic services is most commonly and abundantly based on the theoretical knowledge of the quality of traditional services, where the quality of services is inseparable from the needs and expectations of the client, the compliance of the service with the requirements and the perception of the quality of the customer services. However, in order to disclose the specificity of the concept of the quality of e-services, in-depth analysis of specific criteria for the quality of services should be carried out.

Voss (2000) was among the first authors who characterised the quality of e-services and mentioned three e-service quality levels and features that characterize them: 1) service basics that include *responsiveness* to the site, meaning how quickly and accurately the service can be provided; website *performance*, meaning how well the customer needs are met and the order is fulfilled, including fast delivery and global payment possibility; (2) user-oriented services that include order status *monitoring, configuration, customization, security and trust*; 3) Value-added services that include a *proactive strategy* to assist customers in offering different exchanges, sharing experiences and using information.

The e-service quality criteria also exist in the *Model of Information Systems Success* supplemented by DeLone and McLean (2003). Coker (2013) researched and developed a website usage satisfaction model, similar to the model provided by DeLone and McLean, but more detailed according to one of the criteria - system quality criterion, as it visually illustrates the impact of various qualitative characteristics of the system on customer satisfaction, which further results in customer loyalty and recommendations. The website is one of the most common types of information systems in the e-service sector, therefore Coker's research work is appropriate for examining the concept of the quality of e-services. Coker (2013) distinguished and studied the following qualitative characteristics: ease of use, search convenience, loading speed, visual attractiveness, information quality, relevance of

information and trust.

The quality characteristics of the system are also distinguished as one of the four main elements of the E-S-QUAL model (Parasuraman, Zeithaml and Malhotra, 2005). This model offers a more formulated approach to the quality of e-services, which is not limited to the analysis of the quality characteristics of e-services platforms – e-commerce system, e-service site or others – which is specific to the predecessors of the E-S-QUAL model: WebQual (Loiacono et al., 2002), SITEQUAL (Yoo, Donthu, 2001) or mentioned by other authors (Santos, 2003). Santos (2003) categorises the e-service quality characteristics of a quality model into incubation (development) and active. The first category includes ease of use, appearance, interface, information structure and layout, and information texts. According to this author, **reliability**, efficiency, user support, communication, security and incentives are attributed to the active criteria group. These quality elements characterising the tools deployed for providing e-services should be treated as elements paving the way to the quality of e-services, are related to the element of systems but not identified with the entire system of the quality of the e-services.

According to E-S-QUAL, there are four main quality criteria for e-services: efficiency, privacy, fulfillment, **system availability**.

Recent researchers do not limit their studies with the quality of e-services. The term *sustainable quality of e-services*, which means a long-term quality of e-services (Stamenkov, Dika, 2015) is on the rise. This new concept draws attention to one more criterion of the e-service quality, not mentioned by the authors discussed earlier - *sustainability*.

In summary of the analysis of the studies on the e-service quality, that were previously carried out by various authors, it is possible to conclude that the quality of electronic services is a complex concept encompassing many different elements involved in the e-service provision system and the criteria for the quality of their interaction which are ultimately targeted towards the customer satisfaction leading to the expected customer loyalty and service recommendations. The quality characteristics of the e-services are

related not only to the service itself, its scope and the organisation of the provision, but also to the provision of information about the service and the peculiarities of the service delivery system – solutions of information technology. All of this is determined by e-service quality improvement and development factors that are typically described in the form of models, so they are further analysed in the study.

3. ANALYSIS OF THE E-SERVICE DESIGN, IMPROVEMENT AND DEVELOPMENT MODELS, AND THEORETICAL MODELLING OF FACTORS

This section of the dissertation aims to implement the second objective of the dissertation - to examine the structure of the quality of the e-service improvement process by distinguishing between different activities and factors by content and purposes. Therefore, the analysis involved the existing e-service quality improvement models and reviewed general e-service development models observed in the fields of e-business, e-commerce and e-government in search of complete and more empirically tested elements of the model and interface with the e-service quality improvement process. The purpose of the analysis was to identify the scope of the e-service development and the relationship with e-service design. In response to the experience of the last decade and to the challenges of a rapidly changing business environment, the analysis also involved modern management models, currently applied to the design of information systems services. To improve the quality of e-services, it is important that the results of rapid improvements are immediately introduced into the market, therefore the most popular Agile management models have been examined. The aim was to theoretically discover a possible synergy between the improvement or development processes ongoing in these fields and to form a theoretical model of factors influencing the quality of the e-service improvement process.

3.1. Concept of e-service design, improvement and development and comparison of processes

The literature review of the field of the e-service management shows the most commonly used terms *design* and *development* of e-services, which often include both design of e-services and their introduction into the market or improvement of the existing e-services. In quality management, the design and improvement activities are clearly defined as separate and regulated by standards. The essential quality management terms are defined in ISO 9000 standards. According to the standards, improvement is defined as an *improvement activity that improves performance by further specifying that improvement as activity may be repetitive or single (ISO 9000:2015).* The standard outlines the requirements for quality improvement as a part of quality management that focuses on the increased ability to implement quality requirements which may relate to any aspect of quality - efficiency, effectiveness or traceability. By applying the ISO standard terminology, one can assume that improving the e-service quality is a recurring or single improvement activity that improves the performance of e-services. However, in order to better familiarise with this management area and to clearly identify the design, development and improvement activities and to understand their interaction, it is necessary to carry out in-depth analysis of the existing literature on the e-services and other related areas, such as innovation design activities, which were explored much long before the emergence of online technologies that lead to the design of e-services.

The essential differences between design, improvement and development are shown in Table 1.

Table 1. Comparison of the e-service design, improvement and development processes according to service development evaluation criteria (composed by the author)

Development criterion	Development processes		
	Design	**Improvement**	**Expansion**
Value offer	In process	Unmodified	Modified
Characteristics of a service	In process	Modified without modifying the service system	Modified
Information on product use	Not available	Available	Not available
Most common types of innovation	Radical Incremental Random	Improvement Incremental Combining Formalising Random	Radical Incremental Random

Summarising the analysis of definitions and service innovation models, it can be stated that quality improvement of e-services involves improvement or incremental innovation processes when the characteristics of a few service elements are changed without changing the service system, or the service characteristics are supplemented, removed or replaced with new ones. In other words, *the quality of the e-services is improved when the service is designed and used. If the essential characteristics of the service are changed, the service is moved to a higher level: e-service design processes that also include quality management activities, but are not the object of improvement.*

3.2. Analysis of models of e-service design, improvement and development

The examination of the e-service concept presented in the first section involved the coverage of some of the e-service management models (Cho, Menor, 2010, Lee, 2010, etc.). All these and many more models are targeted towards assessing the quality of e-services (Guseva, 2010,

etc.) and reflect structural or business behaviour peculiarities of the field of e-services, e-service design (Johnson et al., 2000, etc.), innovation design (Åkesson et al., 2016). The structural business model according to M. Saedi (2002) is a model that encompasses many aspects of business that show its structure, i.e. business elements, the relationships between these elements, the roles of each interacting element, while the business behaviour model encompasses all aspects of business and shows their behaviour, such as business processes, rules, methods, states, policies and strategies, and can manifest at different levels: strategic, tactical and operative (Saedi, 2002). The specificity of the business model - to summarise, to illustrate – do not allow them to include the assumptions needed to ensure the success of the process, do not reveal the process itself. The lack of procedural character makes models more difficult to apply in practice and therefore less valuable in the development process of the field of e-services.

Field et al. (2004) are among the first to propose a process model for evaluating, managing and improving the quality of e-services by modelling the components and transactions of the e-service system and by attributing the main quality features to the services. The process model provides several benefits: a) can be used as a diagnostic tool to help identify quality problems; (b) proposes quality management and quality improvement techniques. The structure of the model allows you to concentrate both on the system components according to many quality dimensions and to focus on the quality dimensions according to the different system components.

The systematic process model for service design was proposed by Bullinger and Schreiner (2006). The model distinguishes six stages and one or several different activities in each: the idea is generated at the initial phase, the requirements are examined and the idea is evaluated during the analysis phase, the specifications are designed at the design phase, resources are assigned during the preparatory stage, the specifications are tested during the testing phase, the concept is implemented at the implementation phase.

Cyclicity and customer involvement ensure greater speed and responsiveness to customer needs, which are changing very rapidly in line with all technological and other globalisation developments. The modern innovation models discussed earlier are more advanced than the concept of linear innovation design in the past century. The latter can be illustrated by the Cooper (1994) stage gate model, according to which its evaluation and the decision to continue or stop the improvement is compulsory after each activity. Therefore, from the idea, its preliminary research, the detailed research and the design, testing and validation of a *business case* to the final production and launch into the market, after every step, one has to go through new solutions gateways to move on to the new step, until the last activity in the linear system is the review of the results after implementation.

One of the most comprehensive quality management models in the field of e-commerce - an integrated quality management model for the field of e-commerce – was proposed by Kumar and co-authors (2006). The model shows the basic elements involved in the management system, and their interfaces, results and impact on the organisation. The model also offers management practices found in global quality management through a quality management cycle to plan-do-check-perform, and a variety of approaches to quality management: **customer orientation**, long-term commitment, social responsibility, education and training, research and continuous innovation. However, it should be noted that the model is more theoretical.

In a rapidly changing operating environment, it is important to have a process that allows businesses to respond quickly and flexibly to customer needs. The models under analysis tend to be structured according to the traditional process algorithm, which is often criticised for lack of flexibility and a long time period that lasts from the idea to the demand for the system startup. One of the most flexible and advanced techniques in the field of e-systems is a set of Agile management techniques. It summarises the various methods of Agile project management, product or service design and improvement.

The Agile methodology is developed by IT professionals and is

designed to systematize and describe the principles and processes of software development. This method is still considered to be new as it emerged in 2001 and its use in practice has accelerated over the period from 2004 through 2005. Until now, many other software methods that are currently considered traditional, such as a waterfall or a sequential software development method, have been developed and applied. According to Fitzgerald (2000), these classical software development models find it difficult to cope with today‘s software requirements, therefore new models are under way. They are better meeting today‘s requirements to design faster, easier, cheaper, and better. The Agile methodology is flexible, therefore it can perfectly fit into fast changing requirements and can even be applied in designing complex systems.

The quality of the e-service improvement process is the least analysed issue in literature in the field of management, however, the theory of information system development largely focuses on the online products and services design and their improvement management processes. In this area, scientists have developed highly successful and popular Agile creation methodologies and tools. Denning (2012) published the article “The Best-Kept Management Secret on the Planet: Agile“. In this article, the author discusses why Agile methodologies have not been recognized in the field of management so far, although they are successfully applied in the development of information systems, because they can provide fast and continuous innovation and create them in a controlled disciplined way.

According to Agile, the process of designing and improving a product or service is organised **in the shortest possible cycles - it is an iterative approach**. A few weeks after the first version of the product or service starts operating, IT managers get a clearer understanding of the size of the project, the potential risks, and feedback from the users. **User involvement in the process and their feedback are the most important elements of Agile processes.**

Agile methodologies have been developed by IT professionals to manage complex IT projects. The design of e-services is inseparable

from the design and improvement of the part of information technologies; **therefore, Agile methods are relevant in the discussion and design of factors influencing the quality of the e-service improvement process.** Rico (2007) explored the impact of Agile methods on e-commerce seeking to answer the question whether these methods help improve website quality. **The author recommended linking the use of Agile methods to the quality of the site, although no direct strong and close relationship was established.**

Scrum is perhaps the most popular Agile method. There are many more of them. Each method describes the roles and rules for implementing the activities. The most popular and best-known Agile methods are as follows: Scrum, Kanban, Extreme Programming, Lean Software Development, DSDM Atern, Crystal, including Crystal Clear, Unified Process (e.g. RUP, AUP, OUP) and other methods.

Sharma et al. (2012) conducted a comparative study of several Agile methodologies and processes, compared with other traditional software development methods (linear and spiral) and **concluded** that projects which follow Agile methodologies are better than all others in terms of their productivity, performance, risk assessment and faster market entry.

An analysis of the models of improvement of services, quality management and improvement of e-commerce suggests that most of the existing models are of a structural nature. They comprise many systemic elements, but they are difficult to apply in practice, as the recommended process and the interaction between factors or the impact on quality are not clear. The model proposed by Field, Heim and Sinha (2004) is a process model but very detailed and more applicable for IT developers in designing technical e-services rather than quality management for which the responsibility is delegated to e-service managers operating in business (e-commerce) or public sector areas. In addition, the models do not adequately reflect the need for a rapid response and rapid improvement fulfillment as a result of modern technology. For this purpose, it is appropriate to adapt the

iterative process proposed by the Agile methods, which is theoretically integrated into the e-service quality improvement process, as discussed in the next section. Also, we can distinguish some important quality of e-service improvement **factors**: top management support, policy and strategy, organisational culture, business model, organisational structure, resource allocation.

3.3. Theoretical model of factors influencing the quality of the e-service improvement process

To assure the quality of the e-service improvement process, not only to focus on its evaluation, it is necessary to understand and facilitate the existence of the necessary assumptions, also referred to as success factors in the literature.

After summarising the findings of the analysis, it can be stated that the evaluation of the quality of e-services must be a periodic activity aimed at determining the degree of achievement of quality improvement objectives and their compliance with the organisation‘s strategic goals. The key to success in the e-service quality improvement process is the assurance of the **main assumptions to success**, such as **priority of the client**, **an efficient and empowered team**, **a fast iterative process, management support, sufficient resources, a culture of innovation and quality, and policies.** A combination of success assumptions and detailed process factors distinguishes a generalised theoretical model of factors influencing the quality of the e-service process (see Figure 1). According to the theoretical model, the factors are divided into 4 groups: organisational factors, service factors, team factors and process factors. The model illustrates the possible relationships of factors with the quality of e-service improvement process. Possible moderating links are depicted by dotted arrows, direct - by solid arrows.

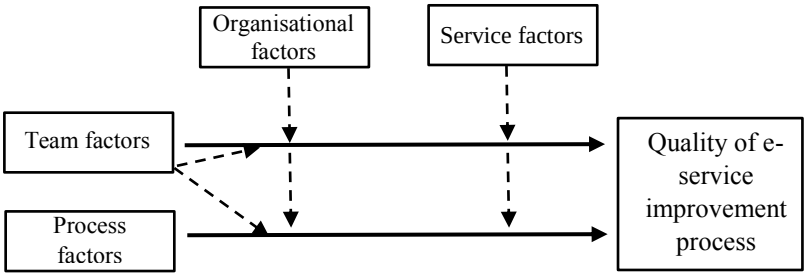

Figure 1. A generalised theoretical model of factors influencing the quality of the e-service improvement process (compiled by the author)

The aim of this study is to propose a model of e-service quality improvement factors that responds to the key challenges of today's world - to continuously improve the quality and to ensure the **process quality**. Accordingly, the most important factors influencing the quality of the e-service improvement process by factor groups have been selected (Table 2).

Organisational and service group factors are anticipated as moderating factors. Team factors are considered as direct and moderating factors. Factors of the improvement process are envisaged as direct, but in order to respond to conceptual issues, after determining the moderating effects, the reversal analysis will be carried out to determine the correctness of the model. The empirical study does not examine any of the organisational factors: **leadership support, sufficient resources, innovation and quality culture and policy, as the research aims to focus on team and process factors and key organisational and service factors that allow a detailed analysis of the selected key factors that conceptually raise a number of questions and discussions between scientists**.

Table 2. Specification of research model factors by groups of factors and the type of relationship tested

Group of factors	Factors	Type of relationship tested
Organisational factors	1. Number of employees in the organisation 2. Strategic orientation to e-services	Moderating
Service factors	1. Type of e-service 2. User of e-service 3. Complexity of e-service improvement	Moderating
Team factors	1. Team size 2. Involvement of team members 3. Team size by task 4. Team experience 5. Team composition 6. Team motivation 7. Team competence	Direct and moderating
Factors for the improvement process	1. Intensity of the ITIL process 2. Intensity of testing the assumptions 3. Intensity of the Agile process 4. Intensity of applying Scrum practices 5. Involvement of customers	Direct

The research hypotheses formed on the basis of the literature review are as follows:

H1: The higher the team member inclusion, the higher the quality of the e-service improvement process is.

H2: The higher the team experience, the higher the quality of the e-service improvement process is.

H3: The more internal the team composition, the higher the quality of the internal e-service improvement process is.

H4: The higher the team motivation, the higher the quality of the

e-service improvement process is.
H5: The higher the team competence, the higher the quality of the e-service improvement process is.
H6: The higher the ITIL process intensity, the higher the quality of the e-service improvement process is.
H7: The higher the intensity of testing assumptions, the higher the quality of the e-service improvement process is.
H8: The higher the Agile process intensity, the higher the quality of the e-service improvement process is.
H9: The higher the intensity of scrum practices, the higher the quality of the e-service improvement process is.
H10: The higher the client inclusion, the better the quality of the e-service improvement process is.

4. RESEARCH OF FACTORS INFLUENCING THE QUALITY OF THE E-SERVICE IMPROVEMENT PROCESS

4.1. Methodology of research of factors influencing the quality of the e-service improvement process

The main purpose of this section of the dissertation is the achievement of the fourth objective of the dissertation - the development of research methodology that has lead to the design and empirical justification of a conceptual model for factors influencing the e-service improvement quality aa well as the empirical research carried out into the e-service design and quality improvement characteristics to reveal their importance and the impact of management process and other factors.

Survey method

The survey method was deployed to meet the objectives of the research. The survey involves interviewing respondents in five ways: personal interview, telephone interview, by mail, by email, by fax (Arbnor and Bjerke, 2009).

A personal structured interview was carried out to obtain the

evaluations of the experts of the field on the factors of the e-service improvement process quality.

A questionnaire was prepared for the survey. A matrix form was selected, allowing experts to evaluate the impact of each e-service improvement characteristic on process quality. The structure of the questionnaire corresponds to the structure of the factors influencing the quality of e-service improvement process defined in the theoretical part of the dissertation.

The structured interview method was chosen because the structure of the questionnaire allowed to cover all the theoretically justified and selected factors of the quality of the e-service improvement process. Meanwhile, an unstructured interview would have hindered the experts to mention all or most of the factors, taking into account the fact that design and improvement of e-services is often a process that is accompanied by operational needs and practical actions without deep theoretical preparedness for these tasks.

The survey was designed to answer the questions about the impact of the factors in question on the quality of e-service improvement process. For this purpose, the author has developed a research instrument, an online questionnaire, which was filled in by the enterprises after their targeted selection. The criteria used by the author in selecting the research instruments were important for the quality of the e-service improvement process:

1. Organisational characteristics
2. E-service characteristics
3. Team characteristics
4. Process factors
5. Process quality (defect level DL% and a subjective process quality assessment) (SPQA)

The criteria listed above have been identified by the author in accordance with a qualitative analysis of the Agile and Lean software development indicators (over 120 different indicators were examined),

conducted by Kupiainen and others (2015). According to the research, Kupiainen and others (2015) selected the most important indicators by number of mentions and by importance. To ensure the reliability in the selection of key indicators that best indicate the quality of the process, the indicators have been selected by mention in sources more than 3 times and by their significance factor of 2 or more. Also, a criterion from the author‘s theoretical model was assigned in order to select only process quality criteria. After carrying out this analysis, the defect level (DL) after e-service release was found to be the most appropriate indicator in evaluating the quality of e-service improvement process. Likewise, the subjective evaluation of the quality of the e-service improvement process was performed according to the Likert scale in line with the established criteria.

For each criterion, at least one or two research questions were formulated in the research instrument. The questions involved rank, relative, interval and percentage scales. The survey consisted of 27 questions, each respondent spent from 30 to 60 minutes to answer the survey questionnaire. The respondents' target sample was 101 companies – e-service developers. The respondents were purposefully selected according to Lithuanian e- stores and a list of e-service development companies published on the Webconsulting portal, according to data of visits of statistical e-service portals in 2017. The targeted survey was conducted by interviewing project or product managers who are responsible for the e-service development in companies, one representative from each company. A total of 101 respondents from different organisations were interviewed.

The process quality is assessed by two criteria: 1) objective indicator of defect level (DL) after e-service launch and 2) subjective evaluation of the quality of the e-service improvement process according to the constructed model. The process quality evaluation criteria and their selection and construction are described in the research instrumentation section.

To collect data from the e-service developers, the website at http://www.apklausa.lt was used where a questionnaire was posted,

the content of which is presented in Annex 2. Analytical tables, Ms Excel calculation software, and IBM SPSS statistical analysis software were used to process the data.

4.4 Assumptions and limitations of the research

Taking into account that the survey was conducted online and the service developers themselves evaluated the factors of their activity, the study assumes that these evaluations are correct and correspond to the real situation within the organisation.

The main dependent variable on the empirical study was the DL, which is determined by the extent of defect detection level and how much attention is paid to correcting the defects. These factors are assumed to be the same in organisations.

The survey focused on the evaluation of e-services provided by private organisations, so the survey results may not be suitable for the e-service improvement processes in public sector. This is an object that requires additional research.

The research does not include the dependence of respondents' evaluations on the analysis of their demographic characteristics, which would require a separate study.

There is no final list of e-service providers. Taking into account that most commonly the provision of e-services is closely linked to the provision of traditional services, it is hardly possible to draw up that list at all. The size of the sample is therefore more difficult to determine due to the absence of reliable statistics on population.

5. STATISTICAL ANALYSIS OF FACTORS INFLUENCING THE QUALITY OF THE E-SERVICE IMPROVEMENT PROCESS

In this study, the quality of the e-service improvement process is evaluated using both objective evaluation indicators and subjective process quality assessment. Objective evaluation of the process quality

is performed by defect level indicator after e-service release (DL). Subjective evaluation of e-service improvement efficiency are conducted according to a subjective quality assessment construct. The construct consists of three statements, which are evaluated according to the Likert scale from 1 to 5. We will start statistical analysis from the objective assessment of process quality.

5.1. Statistical analysis of factors influencing the defect level (DL) of the e-service improvement process

The statistical analysis, first of all, focused on the direct relationship of the team and process factors and DL. After the linear regression analysis, no statistically significant linear relationships between the team, process factors and DL were identified. It should be noted that only the organisational factor, the improvement frequency, was identified as a statistically significant factor of linear regression. The linear regression analysis allowed to determine the following model: $R^2 = 0.05$, $p = 0.02$, $b = 2.48$. We can construct a DL predictive linear regression equation of $Y = 2.48 *$ (improvement frequency) from which we can see that with the improvement frequency increase by one level, DL increases by 2.48 percentage points. The equation explains 5.20 per cent of DL relationship and is statistically significant $p = 0.02$.

The results obtained after conducting the regression analysis can be impacted by the fact that the study evaluates diverse service projects provided by organisations and businesses of different areas and sizes, different strategic orientation to e-services, different team characteristics and different e-service improvement complexity.

Therefore, it is important to evaluate the influence of moderating factors on the relationship between team and process factors and DL. The Hayes (2013) PROCCESS moderator analysis performed by the IBM SPSS program according to Model 1 is shown in Figure 2.

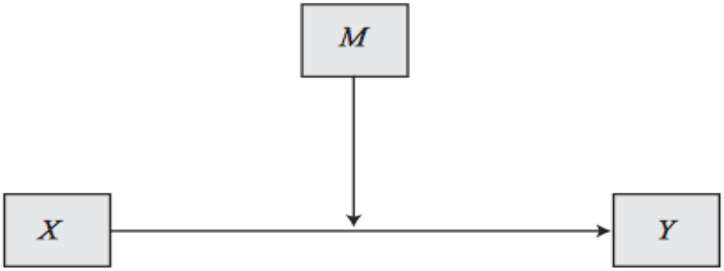

Figure 2. Conceptual model for investigating moderators (Hayes, 2013)

The conceptual model for the investigation of moderators shows a moderating effect (M). The effect of the moderating factor on the X and Y relationship is evaluated. If the M value changes, the effect of X on Y changes, in which case a moderating effect appears, in the statistics it is called the interaction effect. The statistical model is depicted in Figure 3.

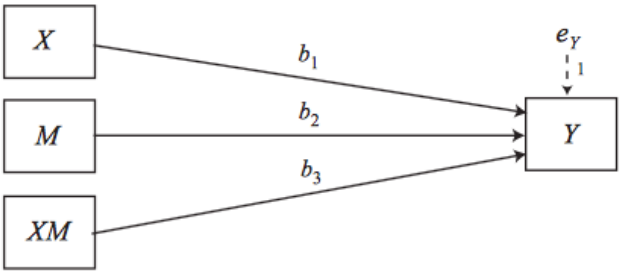

Figure 3. Statistical model for investigating moderators Research (Hayes, 2013)

As we can see from the statistical model, the direct relationship of the basic factor X and the moderating factor M is calculated with respect to DL and the relationship of the interaction of factors X * M with DL. If statistically significant differences between R^2 are detected, a moderating link is considered to exist. The equation for the statistical model is described as follows: y = a + b1 * X + b2 * M + b3

* X * M. When a moderating link is determined, it is important to assess the relative impact of the moderator. The relative effect of X is assessed by determining the central value of M, equating to 0, obtaining the equation Y = a + b1 * X (Hayes, 2013). Calculate The differences between the lower and upper M values from the center (mean value) where M = 0, are calculated. This allows to evaluate the effect of X on Y according to three conditional M values: low, mean and high.

5.2. Statistical analysis of moderators that determine the impact of team and process factors on DL

According to the research model, three groups of moderating factors have been identified, potentially affecting the relationship of e-service improvement process and team factors with DL: organisational factors, service factors, and team factors. A total of 89 moderating links were evaluated. There are 3 statistically significant moderators: strategic orientation, improvement complexity, and team competence.

Statistical analysis of strategic orientation as a moderator of the e-service improvement team and process factors' impact on DL

The analysis of the influence of moderators found that the organisational factor: strategic orientation - moderates the relationship of process factors (Agile process intensity, customer involvement) and team factors (member engagement, experience, composition and motivation) with the DL. Table 3 shows the data obtained from the statistical analysis of strategic orientation as moderator of the relationship between team factors and the DL. Statistically significant data are highlighted in bold text.

Table 3. Statistics on team factors interacting with strategic orientation and impacting DL

Factor (X)	Statistical model R^2 p	Interaction statistics (X*M) R^2-chng p	Moderator: strategic orientation (M)			
			E-service strategic orientation		Traditional activity orientation	
			E-service effect p	E- service + traditional effect p	Traditional + e-service effect p	Supporting e-service effect p
Team size	0.40 0.00	0.02 0.13	-	-	-	-
Involvement of team members	0.25 p<0.01	**0.07 0.00**	**-4.83 0.00**	**-2.82 0.00**	-0.49 0.63	1.85 0.24
Team size by task allocation	-	0.00 0.95	-	-	-	-
Team experience	0.20 p<0.01	**0.04 0.04**	**-6.45 0.01**	**-4.07 0.01**	-1.30 0.34	1.47 0.52
Team composition	0.19 p<0.01	**0.05 0.02**	**-3.87 0.01**	**-1.84 0.05**	0.15 0.88	2.31 0.14
Team motivation	0.18 p<0.01	0.03 0.07	**-6.29 0.03**	**-3.59 0.04**	-1.28 0.41	1.42 0.56
Team competence	-	0.01 0.46	-	-	-	-

Table 4 shows that the strongest interaction of strategic orientation with the team factors under analysis is with team member involvement factor R^2-chng = 0.07, p = 0.00 (the impact on DL). It also shows that a statistically significant conditional effect is only found in strategic orientation directions 1 and 2, which are attributed to group 1 when the activity is oriented to e-services. The highest effect of team factors on DL is observed in strategic orientation direction 1. The statistically significant effect is negative, which means that team factors reduce DL. The statistical reliability of the team motivation interaction is slightly higher than 0.05, but when analysing the conditional effect by direction, statistical significance is sufficient and the overall trend remains the same as in other statistically significant relationships between team factors and DL.

Table 4 shows the data obtained from the statistical analysis of the relationship of strategic orientation as a moderator of **process factors** and the DL. Statistically significant data are highlighted in bold text.

Table 4. Statistics on process factors interacting with strategic orientation and impacting DL

Factor (X)	Statistic model R^2 p	Interaction statistics (X * M) R^2-chng p	Moderator: strategic orientation (M)			
			Orientation to e-service		Orientation to traditional activity	
			E-service effect p	**E-service + traditional** effect p	**Traditional + e-service** effect p	**Supporting e-service** effect p
ITIL process intensity	-	0.00 0.97	-	-	-	-
Assumption testing intensity	-	0.02 0.18	-	-	-	-
Agile process intensity	0.23 0.00	**0.05 0.02**	**-8.28 0.00**	**-5.28 0.00**	-1.77 0.21	1.73 0.47
Use of Scrum practices	-	0.01 0.35	-	-	-	-
Customer involvement	0.22 0.00	0.03 0.07	**-6.10 0.00**	**-4.14 0.00**	-1.86 0.19	0.43 0.85

The table 4 shows that the strongest interaction of strategic orientation with the **process factors** under analysis is with the Agile process intensity factor R^2-chng = 0.05, p = 0.02 (the effect on DL). It also shows that the same effect principle remains as with team factors. The statistical reliability of the interaction of customer involvement is slightly higher than 0.05, but when analysing the relative effect by direction, the statistical significance is sufficient and the overall trend remains the same as in other statistically significant relationships between the process factors and the DL.

The analysis of the strategic orientation moderator was conducted according to four directions of strategic orientation, but the moderator's analysis showed that the fundamental differences in strategic orientation as a moderator occur at the level of strategic orientation groups. A typical moderating effect occurs in directions 1 and 2. Significant differences have been identified between 1.2 and 3.4 directions, which are assigned to different strategic orientation groups. Strategic orientation directions 1 and 2 are attributed to the strategic orientation group oriented to e-services, while strategic orientation directions 2 and 3 are attributed to the strategic orientation group oriented to traditional activities. It is also important to note that there are differences in the strength of a conditional effect between strategic directions 1 and 2. The strongest conditional effect of the organisation's strategic orientation was determined in direction 1.

Statistical analysis of a moderator for e-service improvement team complexity process factors' impact on DL

The analysis allowed to determine the improvement complexity as a moderator of the process factor of the Agile process intensity. The relationship between team factors and improvement complexity has not been found. The statistical analysis of the interaction between improvement complexity and process factors is presented in Table 5.

Table 5. Statistics on process factors interacting with improvement complexity and impacting DL

Factor (X)	**Statistical model** R^2 p	**Statistics of interaction (X * M)** R^2-chng p
ITIL process intensity	-	0.17 0.20
Assumption verification intensity	-	0.02 0.14
Agile process intensity	0.14 <0.01	**0.06 0.02**
Use of scrum practices	-	0.01 0.29
Customer involvement	-	0.00 0.75

After evaluating the moderating influence of the service factor improvement complexity, the relationship between the Agile process intensity and DL (R^2-chng 0.06, p 0.02) was determined. Other factors showed no statistically significant effects on DL. The conditional effect of Agile effect on DL according to improvement complexity levels is shown in Table 6.

Table 6. Conditional effect of the Agile process impact on DL according to improvement complexity levels

Factor **(X)**	**Moderator: improvement complexity (M)**		
	Low effect p	**Mean** effect p	**High** effect p
Agile process intensity	-3.62 0.07	**-7.22** **0.00**	**-10.11** **0.00**

Table 6 shows that there is no statistically significant relationship between Agile and DL when the improvement complexity level is low, although the p value (0.068) is very close to the statistical significance

threshold. When the improvement complexity increases, the effect of Agile process on DL becomes statistically significant and the effect accelerates.

An analysis of the improvement complexity moderator shows that the improvement complexity, as a statistically significant moderator, only manifests as a process factor in the Agile process intensity. This may be due to the impact of a strategic orientation factor that is related to the improvement complexity (β-0.40, b-2.38 p 0.00). Therefore, the complex moderator analysis is projected to evaluate the relationships under consideration by assessing the influence of both the moderators together.

Statistical analysis of team competence as e-service improvement team and process factors' impact on DL

Team competence emerged as an exclusive team factor. First of all, no relationship was found with DL even after the effect of moderators was evaluated. Secondly, team competence is the only factor of the entire team characteristics that has a moderating effect on other factors.

The moderating relationship of team competence between the Agile process, team motivation and DL has been identified. No other factors (organisational size, e-service user, team size, ITIL process, Agile scrum practices, assumptions verification) relate to DL.

Table 7. Conditional effects of the process and team factors interacting with team competence and impacting DL

Factor (X)	**Moderator: team competence (M)**		
	Low Effect p	**Mean** Effect p	**High** Effect p
Agile process intensity	-1.44 0.45	**-5.42** **0.01**	**-9.40** **0.01**
Team motivation	1.72 0.43	-2.26 0.26	**-6.23** **0.04**

When the team competence level is low, there is no relationship between the Agile process intensity and DL ($p = 0.45$). With mean and high levels of competence, the relationship between the Agile process intensity and DL is statistically significant and increases with the level of competence. Since moderation is a interaction of factors, if one of the interacting factors moderates the effect of another factor on the dependent variable, the interaction is also observed by exchanging an independent variable (X) and a moderator (M). In the case of this research, this is particularly relevant, because we seek to answer the research question what namely impacts a lower DL – the Agile process or team competence. Therefore, it is important to evaluate the influence of Agile, as a possible moderator, on the team competence impact on DL. Correspondingly, according to the conditional levels of the Agile process intensity (effect = 5.81 $p = 0.02$, effect = 2.10, $p = 0.28$, effect = -1.08, $p = 0.67$). The reverse analysis of moderators shows that the team competence influences DL only when the Agile process intensity is comparatively low. However, it is obvious that the effect is positive, which means that with the relatively low Agile process intensity, the increasing team competence increases DL. Thus, in terms of mitigating DL, the team competence is a moderating factor of the the Agile process impacting DL.

Only with a high level of team competence is there a statistically significant relationship (p 0.04) between team motivation and DL. The reverse analysis has shown that team competence has no statistically significant conditional effects on DL based on conditional levels of team motivation. The analysis allows to conclude that team competence is a moderator.

It was also determined that team competence is related to improvement complexity (β 0.52 b 3.90 p 0.00). Therefore, it is important to evaluate a complex influence of these moderators on the relationships in question.

The empirical model of the interaction of factors (moderation) impacting DL is shown in Figure 4.

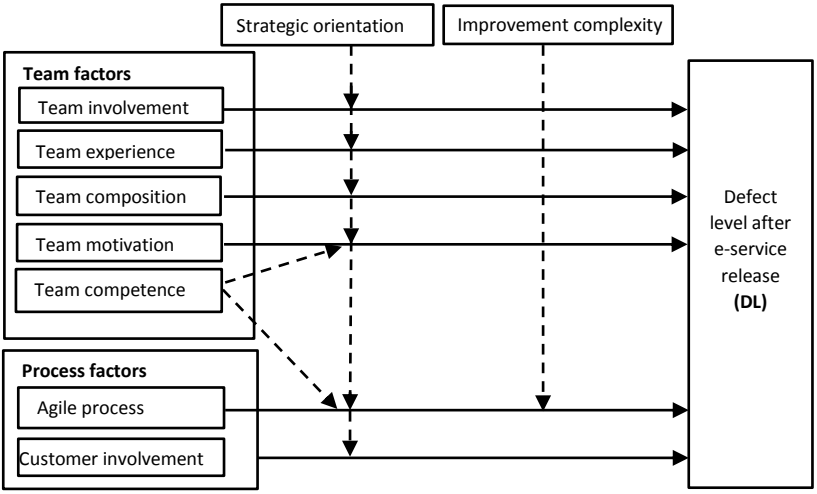

Figure 4. Empirical model of interaction (moderation) of factors impacting DL (compiled by the author)

5.4. Statistical analysis of factors influencing a subjective evaluation of the quality of the e-service improvement process

A subjective evaluation of process quality was carried out according to three criteria. After calculating the mean values of the estimates, subjective process quality assessment values of each e-service project under analysis were measured.

A linear regression analysis was performed seeking to evaluate the influence of factors on subjective process quality assessments. Firstly, the relationship between team factors and subjective process quality assessments was examined. The strongest links were determined between team motivation and team competence, and subjective assessments of process quality. When team motivation assessment increases by 1 point, process quality assessment increases by 0.59 points, $p = 0.0$ ($b = 0.59$, $R^2 = 0.25$). When team competence assessment increases by 1 point, the subjective assessment of the quality increases by 0.49 points $p = 0.00$ ($b = 9.49$, $R^2 = 0.17$), respectively. Detailed data on linear regression of subjective assessments of team factors and process quality are presented in Table 8.

Table 8. Statistics of the linear regression analysis of team factors

Team factor Statistical method	**Mean of subjective process quality assessment (SPQA)**
Size of e-service improvement team Linear regression	β = 0.14; p = 0.16; R^2 = 0.02 constant p = 0.00 N = 99
Member involvement of e-service improvement team Linear regression	**B = 0.34; p = 0.00; b = 0.22; R^2 = 0.12** **constant b = 2.85; p = 0.00** **N = 101**
Size of e-service improvement team by task allocation Linear regression	**B = 0.23; p = 0.02; b = 0.02; R^2 = 0.05** **constant b = 3.27; p = 0.00** **N = 100**
Team experience Linear regression	**β = 0.22; p = 0.02; b = 0.22; R^2 = 0.05** **constant b = 2.68; p = 0.00** **N = 101**
Team composition Linear regression	**B = 0.23; p = 0.22; b = 0.15; R^2 = 0.05** **constant b = 2.90; p = 0.00** **N = 101**
Team motivation Linear regression	**β = 0.50; p = 0.00; b = 0.59; R^2 = 0.25** **constant b = 1.17; p = 0.00** **N = 101**
Team competence Linear regression	**β = 0.41; p = 0.00; b = 0.49; R^2 = 0.17** **constant b = 1.52; p = 0.00** **N = 101**

Table 8 shows that subjective quality assessment has relationships with all team factors, except for the improvement team size factor, which is statistically insignificant (p = 0.16). Assessing the complex of all individual statistically significant team factors, it was found that such a statistical model shows team motivation as the only statistically significant factor impacting a subjective quality assessment.

The evaluation of the relationships between process factors and subjective assessments of quality revealed that all process factors have statistically significant relationships with subjective assessments of quality. The strongest relationships were established between the Agile

process intensity and customer involvement in e-service improvement and evaluation of the quality of subjective processes.

Table 9. Statistics of the linear regression analysis of process factors

Process factors Statistical method	**Mean of subjective process quality assessment (SPQA)**
Quality assessment process according to ITIL theory Linear regression	**β = 0.42; p = 0.00; b = 0.39; R^2 = 0.18** **constant b = 2.01; p = 0.00** **N=101**
Intensity of testing improvement assumptions Linear regression	**β = 0.49; p = 0.00; b = 0.39; R^2 = 0.24** **constant b = 2.11; p = 0.00** **N = 101**
A. E-service improvement according to Agile Scrum practices Linear regression	**β = 0.41; p = 0.00; b = 0.27; R^2 = 0.17** **constant b = 2.61; p = 0.00** **N = 101**
E-service improvement according to Agile process Linear regression	**β = 0.60; p = 0.00; b = 0.63; R^2 = 0.36** **constant b = 1.09; p = 0.00** **N = 101**
Intensity of customer involvement in e-service improvement Linear regression	**β = 0.51; p = 0.00; b = 0.49; R^2 = 0.26** **constant b = 1.83; p = 0.00** **N = 101**

A complex assessment of all individual statistically significant process factors revealed that in such a statistical model only the Agile process intensity and customer involvement are statistically significant factors impacting subjective quality assessment.

In order to better understand the dependencies of subjective evaluations, it is important to construct a linear regression equation according to factors with highest influence on the subjective assessment of the quality of the e-service improvement process: team motivation, team competence, Agile process intensity, customer involvement. We get the model R^2 = 0.43, p = 0.00, Durbin-Watson 2.23, it is a quite strong model. Having assessed this model, it was found that according to this model the influence of team competence is negative, but

statistically insignificant p 0.74, so team competence is eliminated from the model. In addition to team competence, we get the model $R^2 = 0.43$, p = 0.00, Durbin-Watson 2.23. It is obvious that the model after exclusion of team competence has practically lost its significance. This confirms that the team competence factor in the complex assessment is insignificant from the aspect of subjective quality assessment.

Analysis of predictive factors provided in the statistical model:

- *Factor 1.* Team motivation (b = 0.26, t (97) = 2.43) is a statistically significant factor (p = 0.02), when team motivation increases by 1 point, subjective quality assessment increases by 0.26 points.
- *Factor 2.* Agile process intensity (b = 0.39, t (97) = 3.63) is a statistically significant factor p <0.01. As Agile process intensity increases by 1 point, subjective quality assessment increases by .29 points.
- *Factor 3.* Customer involvement (b = 0.19, t (97) = 2.04) is a statistically significant factor p = 0.04. With 1 point of increase in customer involvement, subjective quality assessment increases by .19 points.

As we can see from the analysis of the static model, the intensity of the Agile process has the greatest impact on subjective quality assessment. The impact of other factors is also significant. We can **construct a subjective quality assessment equation (Y)**

Y = 0.26 * (team motivation) + 0.39 (Agile process intensity) + 0.19 (customer involvement).

(1)

The evaluation of quality of the process and the impact of the team factors on the subjective process and the assessment of the influence of the moderators under both moderator models revealed no statistically significant moderating relationships. <u>However, it has been observed that the presence of statistically significant</u>

conditional effects identified during the objective process quality assessment remain. Conditional effects will be described by complex moderator analysis based on statistical model No 2.

6. MODELLING OF FACTORS INFLUENCING THE QUALITY OF THE E-SERVICE IMPROVEMENT PROCESS

The aim of the dissertation is to create a conceptual model for factors influencing the quality of the e-service improvement process. This section of the dissertation is designed to construct a conceptual model. The statistical analysis presented in section 5 of the dissertation revealed certain regularities and interactions of the factors under analysis.

The structure of statistically significant factors influencing DL

Firstly, it is important to clarify the effect of the statistically significant factors on DL and to justify the statistically significant linear regression equations. A total of 13 factors were identified with a significant effect on DL.

The statistical analysis of individual factors showed that DL increases most depending on: strategic orientation, improvement complexity. The factors that mitigate DL areas follows: Agile process, Agile process with team competence, team competence with team motivation, team experience, customer involvement. We will try to combine the equations determined by linear regression and one and two moderators in a general statistical model. For this, linear regression analysis is used to model different combinations of factors to determine the statistically strongest model with the highest R^2, the one that could explain the largest part of relationships between the factors and DL and the impact of the factors in question would be statistically significant.

Construction of a general statistical model of DL

The general statistical model is constructed by testing 3 statistical models (A, B and C). The first model consists of all statistically

significant factors identified in previous statistical analyses. Three factors that are the least statistically significant according to the statistical model under analysis are further excluded.

General Model 1 ($R^2 = 0.24$. Durbin-Watson 2.06. $p = 0.00$).

The equation of the constructive DL model is formed as follows:

$$\mathbf{Y = 27.42 – 8.95\ (strategic\ orientation\ group) + 2.17\ (improvement\ complexity) -0.48\ (Agile\ process - improvement\ complexity)} \quad (2)$$

Furthermore, the overall effect of the process and team factors according to the defined constructive model was tested and an overall statistical model for DL was designed.

After testing a total of 11 additional factors according to the defined constructive model, two more factors were obtained that are statistically significant in the general statistical model: team competence and team experience. Team competence has been identified as a factor triggering the increase in DL while team experience - as a mitigating factor for DL. After constructing the statistical models, a general statistical model for DL consisting of 6 statistically significant factors was obtained. It is also important to note that team motivation along with team competenc also demonstrated the DL mitigation effect ($b = -0.62$) however, the statistical significance was insufficient ($p = 0.16$). It should be pointed out that the impact of the interaction is 5 times less due to the difference between the scales, harmonised scales showed that the interaction of team motivation with team competence reduces DL by about 3 percentage points. Therefore, the interaction of these factors is necessary to be taken into account when modelling the final overall conceptual model for the quality of the e-service improvement process. The general statistical DL model for e-service improvement is presented in Figure 5.

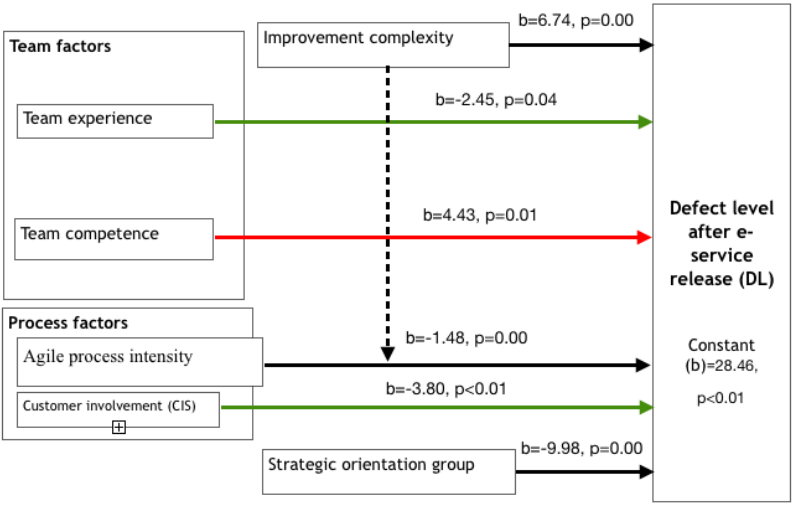

Figure 5. General statistical DL model (compiled by the author)

Three basic elements for the quality of the e-service improvement process have been identified: improvement complexity, strategic orientation group and Agile process with the improvement complexity.

The effect of these elements in the model is marked with black arrows, the moderating effect in the model is marked with a dotted arrow. According to the general statistical model, two statistically significant team factors have been identified: team experience and team competence. Team experience reduces DL, as shown by the green arrow on the model. Team competence, among other factors, has been identified as a factor increasing DL (a red arrow in the model). Customer involvement (CI) reduces DL.

7 hypotheses were accepted, 3 hypotheses were rejected. According to the general statistical model, 4 statistically significant DL mitigation factors have been identified: strategic orientation, intensity of Agile process in interaction with complexity of improvement, team members experience, customer involvement (CI). There are also 3 statistically significant factors increasing DL: improvement complexity, improvement intensity and team competence. According to the general

statistical model, 6 factors have been identified that demonstrate the effect of mitigating DL, but insufficient statistical significance in the general model: involvement of team members (b = -1.23, p = 0.16), team motivation in interaction with team competence (b = -0, 62, p = 0.16), Scrum practices intensity (b = -0.94, p = 0.35), team motivation (b = -2.00, p = 0.24), team composition (b = -0.70, p = 0.36), Agile process intensity in interaction with team competence (b = -0.40, p = 0.55).

Discussion of the empirical research results

1. The Agile process construct, evaluated in this study, involves all the standard process activities that were supplemented by Scrum practices. Since the intensity of the use of Scrum practices in the organisation did not demonstrate a statistically significant effect on DL, it can be stated that the Agile process construct in this study tends to reflect a systematic nature of the process. Therefore, in conceptual conclusions, the Agile process intensity construct will be assessed as a systematic application of the e-service improvement process. This explains the logical structure of the factors of the general statistical model for DL, which allows us to claim that DL is impacted by the following:

a) **Strategic orientation to e-services group**. If the activity is focused on e-services, DL is typically about **10 percentage points higher** compared to a traditional business-oriented organisation, affected by the differences in the scope and complexity of the e-service improvement processes that were not examined in this dissertation due to the complexity of their assessment and the scope of the research;

b) **Improvement complexity**. The higher the complexity of e-service improvement, the higher DL is, respectively, **about 6.7 percentage points** per level of improvement complexity group;

c) **Process systematicity and the improvement complexity**. The higher the complexity of the improvement, the more systematic compliance with a process decreases DL, respectively, from -

1.48 to -7.42 percentage points for each level of the systemic compliance with a process depending on the level of complexity of improvement.

The moderators' analysis has also shown that strategic orientation and improvement complexity are the moderators of team and process factors. The importance of a systematically applied process was confirmed by a subjective process quality assessment (SPQA) analysis, which found that the intensity of Agile process is a key factor affecting SPQA both individually ($p = 0.00$, $b = 0.63$, $R^2 = 0.36$) and in complex with other factors. This is confirmed by the general equation (Y) of the subjective quality assessment (Y) Y = 0.26 * (team motivation) + 0.39 (Agile process intensity) + 0.19 (customer involvement). Although no statistically significant SPQA moderators were found, however, the analysis of conditional effects has shown that the impact of Agile process intensity on the subjective process quality assessment is very similar to the effect on DL. The results of the empirical research confirm the fundamental principle of quality management that in order to achieve better quality, first and foremost, processes must be systematically managed. It has also been found that the more intensive the improvement process of the e-service is, the more important the application of a systematic process is.

2. According to the general statistical model of DL, two statistically significant team factors have been identified: **team experience** and **team competence**. Team experience, according to the general statistical model, statistically significantly reduces DL (-2.45, $p = 0.04$). When **team experience** changes by one level, DL **decreases by about 2.50 percentage points**. Also, the team experience demonstrated a statistically significant effect on DL reduction on statistical models of one and two moderators and a statistically significant effect on SPQA ($p = 0.02$, $b = 0.22$, $R^2 = 0.05$). The results of the empirical study confirm that in achieving a higher quality of the e-service improvement process, it is important to ensure a high level of team experience.

3. **Team competence**, apart from other factors, has been identified as a factor increasing DL. This is an unexpected result of the research that can be explained in several ways. First of all, as team competence grows, team confidence increases. Secondly, with the increasing competence, e-service improvement actions are more complex and involve larger scope of operations. Thirdly, in this study, team competence was rated quite high, according to the moderators' analysis, the relatively low rating was 3 points, which is an average competence according to the scale. Therefore, we can assume that either team competence assessment tends to be better than it is, or, what is more likely, e-service improvement procedures require a very high level of competence due to the needs for specific skills, thus the competence of the e-service improvement team is quite high. Thus, it can be claimed that to improve the e-services, a very high basic competence is needed without which the e-service improvement is practically impossible. After the basic competence is ensured, the impact of its growth on DL is slight and may not be reflected by the general statistical model. However, the most important conclusion is that with the increasing competence and without ensuring the required level of other important factors, DL tends to increase. The moderators' analysis has determined the moderating effect of team competence on **Agile process** and **team motivation** on DL. The moderating effect of team competence on the Agile process after complex moderator analysis proved to be rather insignificant, as well as the negative impact was observed according to the general statistical model ($b = -0.33$, $p = 0.62$). Meanwhile, the moderating effect of team competence on **team motivation** with respect to DL was determined as statistically significant, while according to the general statistical model - statistically insignificant but relatively close to the statistical significance threshold ($b = -0.62$, $p = 0.16$). After assessing the differences in scales, the impact would be about -3 percentage points. Therefore, it can be concluded that team competence, among other factors (process systematicity, team motivation), increases DL. Also, we can conclude that it is very important to ensure the basic (at least relatively mean) team competence

so that the process is applied systematically, increases the team motivation and produces a significant impact in mitigating DL. There was also a significant relationship between the assessment of team competence and SPQA ($p = 0.00$, $b = 0.49$, $R^2 = 0.17$). After evaluating the arguments and facts presented, team competence as a moderating factor in team motivation and process systematicity should be included in the general conceptual model.

4. **Team involvement** in testing hypotheses based on a general statistical model showed a statistically significant reduction in DL ($b = -1.23$, $p = 0.16$). The analysis of moderators showed that team involvement reduces DL only when the organisation is focused on e-services. The analysis of the SPQA effect showed that involvement of team members impacts SPQA ($p = 0.00$, $b = 0.22$, $R^2 = 0.12$). Our analysis confirms that team involvement in e-service improvement is an important factor in enhancing the quality of the e-service improvement process when an organisation's activities are focused on e-services.

5. **Team composition** according to the general statistical model has demonstrated the mitigating effect of DL, but it proved to be statistically insignificant ($b = -0.70$, $p = 0.36$). The analysis of moderators showed that team composition reduces DL only when the organisation is oriented to providing e- services. The team composition effects SPQA ($p = 0.02$, $b = 0.15$, $R^2 = 0.05$). The analysis confirms the importance of teams in e-services as a factor influencing the quality of the e-service improvement process when an organisation's activities are oriented to e-services.

6. **Team motivation** according to the general statistical model of DL showed the mitigating effect on DL, but it proved to be statistically insignificant ($p = 0.24$, $b = -2.00$), as well as, according to the general DL model, the statistically insignificant effect on DL reduction was found in interaction with the team competence ($p = 0.16$, $b = -0.62$). However, the moderators' analysis has shown that the interaction of team motivation with team competence is statistically significant and reduces DL by about 3.50 percentage points. Also, team motivation has

a strong impact on SPQA both individually (p = 0.00, b = 0.59, R^2 = 0.25) and in complex (Y = **0.26 * (team motivation)** + 0.39 (Agile) process intensity) + 0.19 (customer involvement) R^2 = 0.43. The analysis shows that team motivation is an important factor in improving the quality of the e-service improvement process, with an extremely positive impact observed in interaction with team competence.

7. **Customer involvement**. According to the general statistical model of DL, only the involvement of customers as an information source (CIS) in e-services (b = -3,80, p = 0.00, R^2 = 0.40) was statistically significant. The overall indicator of customer involvement and their involvement in e-service development was statistically insignificant and did not show a mitigating effect on DL according to the general statistical model. However, the analysis of moderators and SPQA showed statistically significant relationships both individually (p = 0.00, b = 0.49, R^2 = 0.26) and in complex (Y = 0.26 * (team motivation) + .0.39 (Agile process intensity + 0.19 (customer involvement) R^2 = 0.43 Therefore, we can state that customer involvement is an important factor in improving the quality of e-services, especially in terms of CIS.

8. Quality assessment process according to ITIL theory (b = 0.58, p = 0.69), **intensity of testing the improvement assumptions** (b = -0.45, p = 0.72) and improvement of e-services according to Agile Scrum practices (b = -0.94, p = 0.35) did not demonstrate a statistically significant effect on DL, as shown by the general statistical model. No significant effect of these factors on DL was found on the basis of moderators' analysis or directly. In the empirical study, these process factors demonstrated mild relationships with SPQA, but only in individual evaluations (p = 0.00; b = 0.39; R^2 = 0.18) (p = 0.00; b = 0.39; R^2 = 0.24), (p = 0.00, b = 0.27, R^2 = 0.17). Therefore, it can be said that these relationships are more the consequence of the tendency of evaluation than the impact of factors. When evaluating the results of the analysis in a complex way, it can be stated that no significant impact of these factors on the quality of the e-service improvement process was found.

Conceptual general model of factors influencing the quality of the e-service improvement process

After performing the literature and statistical analysis and summarizing the impact of the investigated factors on both the DL and SPQA, we can distinguish the following important factors that should be included in the conceptual general model of factors influencing the quality of the e-service improvement process:

1. **Structural factors of the model** are the basic elements of the model that create the basis for identifying the impact of other factors influencing the quality of the e-service improvement process: a) **improvement complexity**; it is important to define the extent of the complexity and frequency of the e-service improvement that is planned and in accordance with this estimate, to design the improvement process; b) **strategic orientation to e-services** determines the basic DL and the impact of team involvement and team composition on the quality of the e-service improvement process; c) **process systematicity interacting with improvement complexity**; the higher the improvement complexity, the more important the systematically managed process is.

2. **Team factors**: a) **team involvement** impacts the quality of the e-service improvement process when an organisation's activities are oriented to providing e-services; b) **team experience**, one of the most important factors to ensure the quality of the e-service improvement process, especially aiming at lower DL, c) **team composition influences** the quality of the e-service improvement process when an organisation's activities are oriented to providing e-services; d) **team motivation** impacts the quality of the e-service improvement process when the basic **team competence** is ensured and is increasing along with the increasing team competence.

3. **Process factors:** a) **process systematicity interacting with team competence**, it is important to ensure at least the basic level of team competence so that a systematically managed process could ensure the quality of the e-service improvement process; b) **customer involvement** assists in seeking a better quality of the e-service

improvement process, it is especially important to involve customers in terms of CIS.

4. **Organisational factors** (based on literature analysis) are the most important assumptions for quality assurance, which are distinguished by many authors: a) management support is an important factor, b) allocation of resources, c) organisational culture.

In the conceptual model, green arrows indicate the positive effect on the quality of the e-service improvement process. Black arrows indicate the effect of structural factors. Dotted arrows indicate a moderating effect of factors. The effect of theoretical factors is indicated by no arrows.

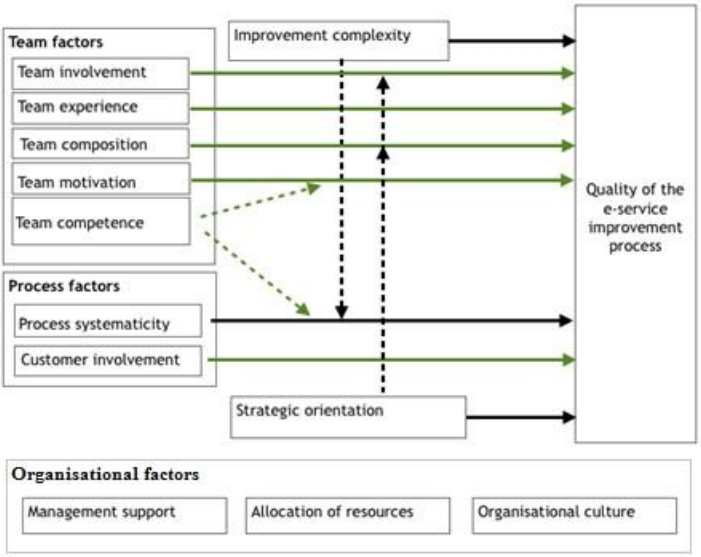

Figure 7. Conceptual model of factors influencing the quality of the e-service improvement process (compiled by the author)

The conceptual general model of factors influencing the quality of the e-service improvement process reveals the main factors and their interactions that influence the quality of the e-service improvement process. These factors are grouped as follows: team factors, process factors and structural factors, organisational factors. Organisational

factors are selected based on literature analysis. Other factors and their impact on the quality of the e-service improvement process were identified during the empirical study.

CONCLUSIONS AND RECOMMENDATIONS

Base on the research carried out the following conclusions can be drawn:

1. The analysis of the studies published by other authors examining the concept of e-services, showed that the accelerating transformation in the field of technology is triggering changes in the e-service concept:
    1.1. It covers not only nternet technologies, but also other electronic networks and mobile technologies that are increasingly integrated into a single system, combining the processes of service providers and participating organisations, focusing on the users of the service and the improvement of their experience in using the services.
    1.2. The concept that e-services is related to all you can access online is getting stronger. This is confirmed by the expert survey conducted in this study and by the analysis of the e-service concept, found in the early scholarly definitions where previously dominated the traditional perception of services. It was directly transferred online. However, in later definitions the gap division between service and product was diminishing and more definitions began to emphasize e-service types. It was determined by the complexity of e-services where virtually no pure products are found online because they are usually accompanied or supplemented by e-services as well. The essential differences of the features between goods and services are virtually eliminated.

After clarifying the definition of the concept of e-services, the author suggests the definition of e-services as follows: *E-services are services*

that integrate electronic networks, the Internet or mobile technologies as well as the service providers and other participating parties involved and their processes and information systems.

2. After carrying out the analysis, the e-service quality characteristics were defined and divided into 4 e-service quality elements to supplement the existing e-services with an element of **sustainability**: a) information quality (includes information structure and layout; information texts; relevance of information); b) system quality (includes ease of use; convenience of search; visual attractiveness or appearance; access to the system; efficiency, loading speed; privacy; localization), c) quality of e-service (includes trust or reliability; communicating with user, among users and support; security; efficiency; fulfillment; simplicity or predictability of service; favoured delivery conditions; after-sales service or policy; quality of payment organisation; e-offer or continuous innovations, d) **e-service quality sustainability (to ensure long-term customer satisfaction). The analysis of e-service quality characteristics provided by different authors and expert interviews revealed that e-service quality characteristics and their importance vary depending on types of e-service and the time when they were defined, so e-service quality characteristics should be assessed using dynamic models, which would allow to specify both their characteristics and their importance**.
3. **The study found that the basic factor in aiming at the quality of the e-service improvement process is a systematically applied improvement process.**
   3.1 The examination of all the statistical models showed that the increase in the Agile process intensity significantly reduces the defect level (DL). The general statistical model showed that the Agile process intensity is moderated by improvement complexity and is the base factor for mitigating DL ($p = 0.00$, $b = -1.48$, $R^2 = 0.40$).
   3.2 The importance of the systematically applied process was also

confirmed by a subjective quality assessment analysis, which found that the intensity of the Agile process is a key factor affecting subjective process quality assessment (SPQA) both individually (p = 0.00, b = 0.63, R^2 = 0, 36), and in complex with other factors. This is confirmed by the general statistically significant equation of the subjective quality evaluation (Y) Y = 0.26 * (team motivation) + 0.39 (Agile process intensity) + 0.19 (customer involvement). Although no statistically significant moderators of subjective process quality assessment were found, however, the analysis of conditional effects showed that the effect of the Agile process intensity on the subjective process quality assessment is very similar to the effect on DL.

The results of the research confirm the principles of a process approach that dominates in the quality management: systematic management of processes is important to ensure higher quality. Only when we systematically manage the e-service improvement process, favourable conditions are created to sustain quality assurance and other factors that can reveal positive effects. We can also state that the more intensive the improvement process of the e-service, the more important the systematic process is.

4. The research results revealed that the most active moderator of the relationship between process factors and process quality is **improvement complexity**, while **strategic orientation** is the most effective moderator of team factors. Therefore, it can be claimed that team characteristics should be more dependent on the strategic orientation to e-services, while process characteristics - on the complexity of improvement. Undoubtedly, this division is very conditional, as the analysis has shown that strategic orientation and improvement complexity are closely related and important moderators of factors in the process of improving the quality of e-service processes. **This is also confirmed by the general statistical model of DL, in which the improvement complexity and strategic orientation are determined as basic factors.**

5. **Customer involvement** in the improvement of e-services was identified as an important factor increasing the quality of the improvement process. The empirical research also confirmed the importance of customer involvement in e-service improvement process as highlighted in the theoretical analysis. Statistical analysis found that customer involvement has an impact on DL, as well as on SPQA both individually ($p = 0.00$, $b = 0.49$, $R^2 = 0.26$) and in complex (Y = 0.26 * (team motivation) +0.39 (Agile process intensity + 0.19 (customer involvement) $R^2 = 0.43$. The general statistical model showed that customer involvement only impacts DL in terms of CIS ($p = 0.00$, $b = -3.80$, $R^2 = 0.40$), i.e. when the customer is included in the improvement process of e-services as a source of information (CIS). This research finding can be explained by the fact that customer involvement into the e-service improvement process before launching the e-services facilitates better focus on needs and specifics of performance, defects are better detected and more precisely defined. Overall, the results show that it is important to involve customers in the e-service improvement processes, especially in terms of CIS.
6. An unexpected result of an empirical study revealed that **team competence** without the assurance of a systematic e-service improvement process management and appropriate team motivation increases DL. There was also a significant relationship between assessment of team competence and SPQA ($p = 0.00$, $b = 0.49$, $R^2 = 0.17$). **Therefore, we can say that aiming at e-service improvement, it is important to ensure the basic level of competence leading to the quality of the process. These results confirm the ISO 9001 standard approach to competence. A positive impact of team competence on the quality of the service improvement process is manifested only by ensuring systematic management of the improvement process and team motivation**.
7. The **team experience** in the study was identified as the most important team factor reducing the DL according to the general statistical model ($p = 0.04$, $b = -2.45$), as well as demonstrated a

statistically significant mitigation effect on DL according to the statistical models of one and two moderators and a statistically significant effect on SPQA ($p = 0.02$, $b = 0.22$, $R^2 = 0.05$). According to the results of the analysis, we can conclude that **team experience is an important team factor for higher quality of the e-service improvement process, in particular to achieve lower DL**.

8. T**eam motivation** is strongly related to team competence and moderates its impact on DL. The general statistical model of DL showed a mitigating effect of team motivation on DL, but it was statistically insignificant ($p = 0.24$, $b = -2.00$), also by means of the general statistical model of DL, a statistically insignificant effect of mitigating DL in interaction with team competence was determined ($p = 0.16$, $b = -0.62$). However, the moderators' analysis showed that team interaction with team competence is statistically significant and reduces DL by about 3.50 percentage points. Team motivation strongly impacts SPQA individually ($p = 0.00$, $b = 0.59$, $R^2 = 0.25$), and in complex (Y = **0.26 * (team motivation)** + 0.39 (Agile process intensity)) + 0.19 (customer involvement) $R^2 = 0.43$. **Therefore, we can state that team motivation improves the quality of the e-service improvement process, especially in interaction with team competence**.
9. **Team involvement and team composition** appeared less important factors in influencing the quality of the e-service improvement process, but a positive effect of these factors was also identified. The general statistical model showed a mitigating effect of these factors on DL, but according to a general statistical model, this effect is statistically insignificant, respectively ($p = .158$, $b = -1.23$) and ($p = 0.36$, $b = -0.70$). Team involvement and composition have demonstrated a statistically significant reduction effect on DL when the organisational activity is focused on providing e-services. The analysis of the effect on SPQA showed that team involvement influences SPQA ($p = 0.00$, $b = 0.22$, $R^2 = 0.12$). The effect of team composition on SPQA is lower ($p = 0.02$, $b = 0.15$, $R^2 = 0.05$). Therefore, we can conclude that **the impact of team involvement**

and team composition on the quality of the e-service improvement process is manifested when the organisation is oriented to provision of e-services. This can be explained by the fact that the teams in the traditional e-service oriented organisations are frequently external.

10. Quality evaluation process according to **ITIL theory, intensity of testing assumptions for improvement** and e-service improvement according to **Agile Scrum practices are not important factors** in terms of the DL mitigation aspect**.** An individual assessment of these factors have demonstrated their mild relationship with the subjective quality evaluation. When evaluating the results of the analysis in a complex way, it can be stated that these factors are essentially insignificant in improving the quality of the e-service improvement process. **According to the conceptual model of factors influencing the quality of the e-service improvement process, it can be claimed that practices are not as important as systemically managed processes, customer orientation and experienced, competent and motivated teams.**
11. **Neither the number of employees in the organisation, nor** the number of members of the e-service improvement team, or type of e-services or the users do not influence the quality of the e-service improvement process. The statistical models under analysis did not show any significant effect of these factors on either DL or SPQA, and there were many contradictions and doubts in the scientific literature regarding the influence of these factors. The results of the survey confirm the dominant approach in quality management that quality does not depend on the organisation size or the team size, types of service or users. It is important to ensure a systematic process management, customer orientation and team building in organisations of different size and service types.
12. **Objective Evaluation of Process Quality** (DL) is influenced by the specifics of the organisation and e-services, therefore, the relationships under analysis are revealed only after evaluating the differences between improvement complexity, strategic orientation

and systematic process management. Meanwhile, **the subjective process quality assessment (SPQA)** is directly related to the evaluation of research factors, therefore no statistically significant moderators were found. However, the results of conditional effects obtained according to moderating models were very similar to those received after objective evaluations. Thus, it can be stated that objective process quality evaluation (DL) and SPQA are related only if obtained by different methods of statistical analysis. Therefore, the conclusions of the study can be summarised according to the criteria of DL and SPQA as analysed.

13. Having conducted the literature and statistical analysis, summarised the impact of both the analysed factors on DL and the impact on SPQA presented the results and conclusions, we can provide this conceptual model of factors influencing the quality of the e-service improvement process and constructed by the author: **1. Constructive model factors** are the basic elements of the model which create preconditions for the influence of other factors on the quality of the e-service improvement process: **a) improvement complexity**; it is important to define how complex and frequent the e-service improvement process is planned and in accordance with this, to design the improvement process; b) **strategic orientation to e- services** influences the basic DL and determines the impact of the factors of team involvement and team composition on quality of the e-service improvement process; c) **systematic process interaction with improvement complexity;** The higher the complexity of the improvement, the more important the systematically managed process is. **2. Team Factors: a) team involvement** influences the quality of the e-service improvement process when an organisation focuses on providing e-services; **b) team experience** is one of the most important factors to ensure the quality of the e-service improvement process, especially aiming at lower DL, **c) team composition influences** the quality of the e-service improvement process when an organisation's activity is oriented to provision of e-services d) the impact of **team motivation** on the e-service

improvement process is revealed by ensuring the basic **team competence** and increases along with the increasing team competence**. 3. Process Factors**: a) **process systematicity in interaction with team competence**; it is important to ensure at least the basic level of team competence so that the quality of the service improvement process is assured by a systematically managed process; b) customer involvement helps in achieving a better of the e-service process improvement, it is especially important to include customers in terms of CIS aspect (customer as information source). **4. Organisational factors** (based on literature analysis) are the most important quality assurance assumptions, distinguished by many authors: a) management support is an important factor; b) allocation of resources; c) organisational culture.

Summarising the research carried out and presented in the dissertation, the following suggestions can be made:

1. First of all, to improve the quality of the e-service improvement process is important to ensure a systematic process management, basic team competence and their high motivation. Also, e-service customers should be included in the e-service improvement process.
2. If an organisation's activity is focused on providing e-services, the organisation should be oriented to the creation of internal teams and the maximum involvement of team members in the e-service improvement process, so that the team members could focus on a specific e-service. If an organisation is oriented to providing traditional services, the orientation to external teams for the e-service improvement process is more reasonable, while internal resources are deployed on core activities. Also, from external resources it is easier to attract larger experience and competence for the e-service improvement process, which in-company is sufficiently complicated to implement when oriented to providing traditional services and in that case there is no need to take care of

the external team motivation.

3. In order to extend the scientific model, in the future studies, it is proposed to include as many factors influencing the quality of the e-service improvement process and empirically justify them. For better awareness of the e-service improvement, it would be useful to carry out the research to verify the relationships of the factors not only with the quality of the process but also with other aspects of the efficiency of the e-service improvement process. It would also be important to test the model and expand it by using the experience of public sector organisations and to empirically test the applicability of the model.

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REZIUMĖ

Elektroninės paslaugos yra nauja technologinės aplinkos progreso paskatinta inovacija, pasireiškianti tiek verslo, tiek viešojo valdymo erdvėse bei aktyviai analizuojama informacinių technologijų mokslininkų. Kaip ir paslaugų, taip ir e. paslaugų kokybės tema yra itin aktuali kokybės vadybos tema. Nors e. paslaugų kokybės klausimas jau yra nagrinėtas daugelio autorių (Agrawal ir kt., 2014), pastaraisiais metais jam yra skiriama ypač daug dėmesio, bandant apibendrinti e. paslaugų kokybės charakteristikas, kriterijus, ieškant naujų e. paslaugų kokybės vertinimo metodų, stebint vartotojų elgseną elektroninėje erdvėje, jiems naudojantis elektroninėmis technologijomis, bei paslaugų kokybės poveikį kliento pasitenkinimui ir lojalumui. Kita vertus, dažnai tyrėjai pastebi, kad mokslo tyrimų, ypač empirinių, dar vis maža ir apstu neatsakytų vadybos klausimų, problemų. Pavyzdžiui, Field‘as ir kt. (2004), sukūrę e. paslaugų tobulinimo modelį, teigia, kad šio modelio kūrimo tyrimų tęstinumui reikalingi tyrimai, kuriais būtų nustatyti kiekvienos e. paslaugų sistemos komponentės kokybės vertinimo matai, nes esami e. paslaugų projektavimo įrankiai, padedantys valdyti nuolatinį kokybės tobulinimą, vis dar palieka e. paslaugų kokybės sampratą atvirą sistemų analitikų, architektų ar programuotojų interpretacijoms, kurie dažnai tik ribotai supranta e. paslaugų kokybės sritį ir mažai gilinęsi į šios srities literatūrą. Anot autorių (Field ir kt., 2004), e. paslaugų kokybės struktūrizavimas, kad ji būtų suprantama šį darbą dirbančiam profesionalui, būtų prasminga būsimų tyrimų sritis. Būsimi tyrimų rezultatai turėtų padėti nustatyti pagrindines sistemos dedamųjų kokybės veiksnius ir e. paslaugų kokybę didinančias transakcijas bei galiausiai kliento pasitenkinimo lygį internetinėje erdvėje. Todėl ypač svarbu daugiau mokslinio potencialo skirti e. paslaugų tobulinimo proceso kokybės tyrimams.

Dar viena svarbi e. paslaugų tobulinimo procesų tyrimų sritis – šių procesų kokybės veiksnių tyrimai. Vis daugiau organizacijų investuoja į e. paslaugų kūrimą (angl. *design*), plėtrą (angl. *development*) bei tobulinimą (angl. *improvement*), siekdamos pritraukti naujus ir išlaikyti

esamus klientus bei užtikrinti jų pasitenkinimą, sparčiai augant jų lūkesčiams. Investicijos reikalauja tiek finansinių lėšų, tiek žmogiškųjų išteklių laiko, todėl itin svarbu vertinti investicijų pasiekiamą rezultatą, siekiant užtikrinti klientų pasitenkinimą kaip esminį kokybės aspektą. Šioje srityje empiriniais duomenimis pagrįstų tyrimų yra dar mažiau. Siekiant kryptingos mokslinės veiklos šioje srityje, labai trūksta konceptualaus e. paslaugų tobulinimo proceso kokybės veiksnių modelio.

Mokslinė problema

Mokslinėje literatūroje gana izoliuotai sprendžiami kelių krypčių – informacinių technologijų, viešojo administravimo ir vadybos – e. paslaugų kūrimo ir kokybės tobulinimo klausimai. Daugiausiai dėmesio skiriama technologiniams e. paslaugų sistemų kokybės tobulinimo aspektams, pastaruoju metu atsiranda e. paslaugų vadybos krypties tyrimų, kurie dažniau paremti e. paslaugų koncepcijos analize ir kokybės kriterijų išskyrimu bei kategorizavimu, tačiau stokojama e. paslaugų kokybės tobulinimo procesų veiksnių empirinių tyrimų, pagrindžiančių veiksnių poveikį proceso kokybei ir jų sąveiką.

Riedl‘is ir kt. (2011) pabrėžia, kad naujų paslaugų plėtros tyrimuose egzistuoja tam tikros spragos, susijusios su pagrindiniais e. paslaugų požymiais ir jų įtaka naujų paslaugų plėtrai. Kokybiška paslaugų plėtra tampa vis svarbesne sėkmei ir todėl į naujus tobulinimo procesų modelius turėtų būti integruoti išteklių nuomos (angl. *outsourcing*), perpanaudojimo (angl. *re-use*) elementai, klientų grįžtamasis ryšys. O patys procesų modeliai turėtų būti pritaikyti greitam naujų paslaugų kūrimui ir būti cikliški, kad įgalintų nuolatinį esamų paslaugų tobulinimą bei naujų paslaugų kūrimą.

Norgaard‘as ir Hoegh‘as (2008) tyrimuose daro išvadą, kad vis dėl to mažiausiai tyrinėta sritis yra kaip sistemų kokybės vertinimus perkelti į e. sistemų gerinimą.

Taip pat atlikus ankstesnių e. paslaugų plėtros tyrimų analizę pastebėta, kad šioje kryptyje dominuoja tyrimimai, kuriuose analizuojami pavieniai veiksniai ar praktikos. Kas tipiškai tokių tyrimų autoriams neleidžia pateikti vienareikšmiškų išvadų ir sukelia

mokslininkų konceptualias diskusijas pavyzdžiui Lindvall'as ir kt. (2002) pastebi, kad yra teigiančių, kad konkreti praktika nėra svarbi, kai dirbate su „gerais žmonėmis" (taip autorių vadinami tie, kurie yra kompetentingi, pvz.: turi realią patirtį technologijų srityje, anksčiau yra sukūrę panašių sistemų, turi gerus bendravimo įgūdžius). Diskutuojama, kad galbūt „Agile" metodų sėkmė gali būti priskiriama „gerų žmonių" grupėms, o ne praktikai ir principams. Kita vertus, pastebima, kad dalyviai teigia, jog „Agile" metodai yra iš esmės vertingi.

Apibendrinant anksčiau pateiktus argumentus, galima teigti, kad vadybos mokslo literatūroje stokojama empiriniais tyrimais pagrįsto konceptualaus **e. paslaugų tobulinimo proceso kokybės veiksnių modelio**, kuris integruotai atskleistų esminių veiksnių poveikį tobulinimo proceso kokybei.

Tyrimo klausimas:

Koks turi būti e. paslaugų tobulinimo proceso kokybės veiksnių modelis?

Siekiant išspręsti šią vadybos mokslo problemą, pagrindinis ***disertacijos tikslas*** yra ***atskleidus e. paslaugų tobulinimo proceso kokybės esminius veiksnius ir jų ryšius sukurti konceptualų e. paslaugų tobulinimo proceso kokybės veiksnių modelį.***

Siekiant tyrimo tikslo, buvo iškelti šie ***tyrimo uždaviniai***:

1. Atsižvelgiant į sparčiai besikeičiančios technologinės ir verslo aplinkos iššūkius, darančius įtaką e. paslaugų kokybės koncepcijai, patikslinti e. paslaugų kokybės sampratą ir jų kokybines charakteristikas.
2. Vadovaujantis atlikta esamų e. paslaugų kūrimo ir tobulinimo modelių analize, išskirti e. paslaugų tobulinimo proceso veiksnius bei pateikti jų ryšių sistemos teorinį modelį.
3. Pagrįsti tyrimo metodologiją ir ja vadovaujantis empiriškai ištirti e. paslaugų tobulinimo proceso kokybės veiksnius, jų svarbą proceso kokybei užtikrinti.
4. Sukurti konceptualų e. paslaugų tobulinimo proceso kokybės

veiksnių modelį.

Tyrimo objektas – e. paslaugų tobulinimo proceso kokybės veiksniai.

Tyrimo metodai

Tyrime trianguliacijos principu taikyti įvairūs teorinio ir empirinio tyrimo metodai. Mokslinės literatūros apžvalga ir sisteminė analizė taikyta, siekiant patikslinti koncepcijas, išanalizuoti esamus procesus, kriterijus, charakteristikas, modeliuoti proceso kokybės veiksnius. Lygiagrečiai teorinei analizei buvo atliekamas ir žvalgybinis tyrimas – ekspertų apklausa, kurios tikslas buvo išsiaiškinti esamą e. paslaugų tobulinimo situaciją organizacijose ir išryškinti didžiausią praktinį būsimų mokslo tyrimų ir rekomendacijų, atsižvelgiant į jų turinį ir formą, poreikį. Empiriniai duomenys buvo renkami vadovaujantis kiekybinių tyrimų metodologija ir pasitelkiant struktūrizuoto interviu metodą. Struktūrizuoti interviu su tikslingai atrinktais e. paslaugų savininkais ir vystytojais organizacijose buvo reikalingas, siekiant išsiaiškinti e. paslaugų tobulinimo proceso kokybės veiksnius, jų svarbą bei jų tarpusavio sąveikas. Galiausiai visi empiriniu būdu surinkti duomenys buvo analizuoti pasitelkiant statistinės duomenų analizės metodą.

Disertacijos struktūrą sudaro trys dalys. Pirma dalis (disertacijos 1–3 skyriai) yra skirta e. paslaugų kūrimo ir tobulinimo proceso kokybės mokslinių tyrimų analizei. Šioje dalyje apžvelgiamos pagrindinės technologinės aplinkos transformacijos, darančios įtaką e. paslaugų raiškai, nagrinėjama e. paslaugų samprata, e. paslaugų kokybinės charakteristikos, analizuojami esami e. paslaugų kūrimo plėtros ir tobulinimo modeliai bei veiksniai. Antra dalis (disertacijos 4 skyrius) yra skirta tyrimo metodologijai pagrįsti, įskaitant empirinio tyrimo instrumentų sukūrimo pagrindimą. Trečia dalis (disertacijos 5 ir 6 skyriai) yra skirta tyrimo duomenų statistinei analizei ir e. paslaugų tobulinimo procesų kokybės veiksniams modeliuoti, sudaryti konceptualaus vadybos modeliui, kuris užtikrintų e. paslaugų tobulinimo proceso kokybę.

Mokslinis darbo naujumas ir teorinis reikšmingumas

1. Patikslinta e. paslaugų samprata ir jų kokybės charakteristikos.
2. Empiriškai pagrįsti e. paslaugų tobulinimo proceso kokybės veiksniai ir jų sąveikos proceso kokybei užtikrinti.
3. Atskleista strateginės orientacijos į e. paslaugas įtaka tobulinimo komandos veiksniams.
4. Sudarytas bendras statistinis KL veiksnių ryšių modelis.
5. Sukurtas konceptualus e. paslaugų tobulinimo proceso kokybės veiksnių ryšių modelis.

Praktinis darbo reikšmingumas

Sukurtas e. paslaugų kokybės tobulinimo modelis leis verslo organizacijų vadovams ar sričių lyderiams drąsiau imtis veiklos reformų, pokyčių, transformacijų ir, vadovaujantis modelio taikymo rekomendacijomis, užtikrinti, kad veiklos kokybei tobulinti skiriamos investicijos būtų tikslingesnės. Tyrimo rezultatai atskleidžia komandos veiksnių poveikį e. paslaugų tobulinimo proceso kokybei pagal organizacijos strateginę orientaciją į e. paslaugas ir tuo remiantis pateikiamos komandų formavimo principų, kurie leis užtikrinti geresnę e. paslaugų tobulinimo proceso kokybę, rekomendacijos. Taip pat pateikiamos klientų įtraukimo į e. paslaugų tobulinimą rekomendacijos.

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