

Lean Six Sigma for Visibility Improvement: Case Study at Department of Social Support

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Abstract

This paper addresses quality management in the public sector, namely the application of Lean Six Sigma (LSS) methods to increase the visibility of the flow of procedures in the administration of public institutions. Visibility of administrative procedures flow helps the citizen to better understand how an administrative process begins, how it develops, who is involved, how long it lasts and when it ends. In order to achieve the intended result of this study, public institutions at the local level, respectively municipality and the center for social issues, are observed. The current state of visibility of the procedures has been identified, defects are listed, measured, the causes of the defects are learned, the action plan has been proposed and the change of the situation has been verified. The methodology applied in this study is based on the LSS - DMADV technique (Define, Measure, Analyse, Design, and Verify). Thanks to DMADV methodology, a practical solution has been proposed that improves the visibility of procedures in the municipal administration. The public sector should consider investing in the application of LSS methods in order to

increase creativity among employees for the quality flow of information by making them clear, cheap, simple and fast for citizens.

Key words: Lean Six Sigma, DMADV, Public Administration, Process Visibility, Citizens

JEL: H75, M15, O33, P41

Introduction

Public institutions have political, legal, organizational and economic responsibilities to citizens (Nabatchi, 2017). All are very important, but this research focuses mainly on the organizational and economic responsibility of the public administration towards the citizens who are consumers of the services of public institutions. The quality of a country's public services correlates with the level of trust in public administration, the ease of doing business, and societal wellbeing (European Commission, 2017). On the contrary, lack of trust and complicated processes make citizens feel insecure, stressed and irritated. This is exactly what is happening in many emerging countries where the processes of public administration continue to be challenging at all levels, both local and central. For citizens, public administration processes are not always clear

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and proper ones, as a result they have to move from one office to another, waste a lot of time, spend unnecessarily just to get the necessary information. According to an online survey with 540 respondents for the needs of this study, it results that in the Republic of Kosovo 29% of citizens are completely dissatisfied with the information and guidance provided by public institutions to receive a certain service, 53% are very dissatisfied. According to 35% of respondents, getting a service in public institutions is extremely stressful and 29% of them say that getting services is very stressful. In terms of online services, 59% of them say that they can not get any services they need through digital applications, 37% of them say that for only a few specific services there are digital applications, mainly billing and payments. The result shows that 47% did not find any opportunity to contact any communication channel before going to the building where the service is provided. However, the most relevant result with this study is that 67% of respondents testify that they do not have information on the flow of procedures for the service they need, so they do not know how it starts, how it develops and how it ends. These data confirm that public administration is not in line with the quality standards of public administration and this causes consequences for citizens both economically and socially. According to the European Union (2017), optimizing process flows is a precursor for major advances in front-end service delivery. In this regard, public administrations can learn from successful practices to improve process flows in the private sector, such as techniques of 'lean thinking' from the auto industry. Moreover, the lean philosophy in combination with six sigma suggests the use of tools and techniques which guarantee continuous

improvement in the organization. With the help of Lean Six Sigma tools and techniques, the provision of quality services is guaranteed, which bring value to the citizen (Antony, Rodgers & Cudney, 2017). It is for that reason that the DMADV model is used in this study (Define, Measure, Analyse, Design, Verify) which, as an LSS methodology it enables scanning of the problem, to understand the size of the problem, to analyze the problem, the factors and consequences of the problem, to offer new alternatives and the sustainability of the newly built system (Cronemyr, 2007). To achieve the objectives of this paper, the following two research questions were used:

RQ 1: How can lean Six Sigma help improve the visibility of processes in the administration of public institutions?

RQ 2: How and to what extent does the visibility of processes in public administration improve the lives of citizens?

To find answers to these research questions, a case study was conducted on the child adoption process and procedures. The process and procedures for the adoption of the child are monitored in order to learn how visible they are and how much the LSS can help improve visibility.

Theoretical Framework

This section explains the characteristics of LSS and the journey of this managerial concept from its inception to the present day. Information is provided on the DMADV methodology which is used to build or reorganize operations in the organization. There are also definitions given on public administration, its role and tasks. Definitions are also given for the visibility of the processes and the definitive value required by the citizen.

Lean Six Sigma – DMADV

Lean Six Sigma is a process improvement methodology designed to eliminate problems, remove waste and inefficiency, and improve working conditions to provide a better response to customers' needs (goskills, 2021). According to Timans et al., (2012), the term Lean Six Sigma (LSS) was first introduced into literature around the year 2000 and LSS teaching was established in the year 2003 as part of the evolution of Six Sigma. In the paper of Antony et al., (2017) which reflects the evolution of lean six sigma it is understood that before reaching this stage, this managerial philosophy has gone through different historical stages, is presented in different forms and different designations but in essence has always promoted quality management. In fact this concept started as Lean Philosophy and was applied in the period 1908 - 1927 by Henry Ford in mass production of vehicles achieving very good results. Later, during the Second World War, it was copied and used by the US Army, and later, after the Second World War, it was copied again by the Toyota company, which in cooperation with Taiichi Ohno have advanced this concept in car production, so they become faster and produced at lower cost and thus have become more competitive in the market (Skhmot, 2017). On the other side, the Six Sigma concept was developed and introduced in the 18th century by Carl Friedrich Gauss for scientific purposes and again in the 20th century by Walter Shewhart, where it was used as a standard for calculating and measuring product variations (Bertolaccini et al., 2015). However, six sigma as a trend has been credited to Motorola and its engineer Bill Smith who in the early and mid - 1980's, with Chairman Bob Galvin developed this new standard and created the

methodology to realize powerful bottom-line results in their organization – in fact, they documented more than \$16 Billion in savings as a result of our Six Sigma efforts (iSixSigma-Editorial, 2021). From the year 2000 onwards, exactly from George (2002) is written about the combination of two methodologies as complementary to each other. Facts and developments in this field have shown that lean alone is not well suited to resolving complex problems that require intensive data analysis, and advanced statistical methods which offers six sigma (Antony et al., 2017). So as it is understood, lean six sigma represents a fusion of two separate concepts like Lean Philosophy and Six Sigma Methodology, which complement each other. According to Antony et al., (2017), the integration of Lean and Six Sigma is important as Lean focuses on improving the flow of information and materials between the steps in the process and Six Sigma works to improve the value-adding transformations which occur within the process steps. In addition to application in the private sector, according to the study of Rodgers et al. (2019), there is already a lot of evidence for the successful application of lean six sigma in the public sector, local and central government, education, health and various public companies. According to Radnor & Walley (2008), good results have been achieved in the UK in the public sector, especially in the human resource management sector. Also, Lean Six Sigma has been used in the health sector and beneficial results have been recorded by identifying many defects in various processes during the provision of medical services (Curatolo et al., 2014). With the application of lean six sigma in educational institutions, deficiencies in the organizational aspect have been identified and recommendations have been given for

improvements in the approach of leadership, organizational culture and reorganization of processes (Balzer et al., 2015). Benefits from the use of lean six sigma have also been recorded in the central government, Suárez-Barraza & Ramis-Pujol (2010) have found positive results in improving the work in the process of recruiting employees by using the Kaizen technique. Even at the local level, mainly in different municipalities, lean six sigma has been used for process management, improvement of decision-making, financial transactions, recruitment of human resources, implementation of projects and provision of public services (Zefaj, 2020). Effective use of the lean six sigma concept is possible only by using its various tools and techniques. The DMADV model is one of the most suitable techniques for process improvement. The application of DMADV is used when a client or customer requires product improvement, adjustment, or the creation of an entirely new product or service (Selvi & Majumdar, 2014). The DMADV methodology is a Six Sigma framework for implementing new strategies in a current process. The five interrelated phases of DMADV are explained as follows: the DEFINE phase explains the goals and the design activity. The MEASURE phase focuses on the customer's needs or the Critical – to – Quality requirements. The ANALYZE phase emphasizes on the analysis of innovative concepts and alternatives for aligning them to the needs of the customers. The DESIGN phase includes the product design, process or service, and lastly, the VERIFY phase involves the inspection of the final design for feedback control mechanism before undergoing mass production (Angay et al., 2017). DMADV techniques have shown results everywhere in the world in various service and production activities and this can be verified in the studies

of many researchers who have applied this model. For example, outsourced projects at the University of Miami (Johnson et al., 2006) have significantly improved customer service in their dormitory (Agarwal & Bajaj, 2008). In Taiwan, a defect in the production of surveillance cameras was identified and then the option was found to eliminate the defects and increase their quality (Chiao-Tzu et al., 2010). Wetzel & Thabet (2016) show how the quality of facility maintenance has been enhanced by improving the information exchange system in cases where there is a risk of defects. Whereas Baptista et al., (2020) testify to how the process of the air conditioning system in the automotive industry has been improved by identifying in time and accurately the defects in the system.

Public Administration

The public administration is a set of state and no-state public authority subjects, the key structural elements of which are, firstly, the executive authorities and, secondly, the executive bodies of local self-government (Karpa et al., 2021). According to Eme & Ede (2007), public administration, by extension has been defined as the putting together of human and material resources in order to achieve the objectives of public policy (Essien, 2015). Public Administration is a tool to deliver goods and services to people. Its whole purpose revolves around this function, that is, 'to serve' (Mahajan, 2019). Public administration addresses society's needs, and functions based on organisational structures, processes, roles, relationships, policies and programmes (European Commission, 2017). What is of particular importance in public administration when addressing the needs of citizens is the visibility of processes and procedures.

Visibility and Procedures

Visibility is identified as an essential contributor to supply chain management process performance and its degree depends on the level to which the accessible information is relevant, trustworthy and timely (Berner et al., 2015). Process visibility refers to the ability to see and understand all aspects of a process at any point in time (IGI Global, 2021). Process visibility is a phenomenon which is native to the monitoring phase of business processes and is targeted towards the creation of end-to-end visibility during process execution (Graupner et al., 2015). According to Bannister & Connolly (2011), process transparency becomes more important in more complicated processes where more difficult and / or more complex decisions have to be made or procedures have to be followed. This may include various requirements such as the application for different types of certificates, application for a building permit, application for subsidies, application with bids in the procurement department, business registration, application for identification documents. The process of public administration represents a continuous engagement in the direction of providing professional, modern, service-oriented, transparent, and reporting administration, responsible toward the citizens (Chtioui, 2019). Processes are therefore important to all parties, and therefore need to be maintained, improved and tailored to the needs of the parties involved. Process re-engineering entails looking at how the interface with the administration is experienced from the end-user's perspective and tailoring the 'back-office' processes to make service delivery as user-friendly as possible, which can be achieved through 'co-creation': working with end-users to develop new or

better solutions and cooperating across administrations (Commission, 2017). However, the transparency of processes alone is not enough; the transparency of processes becomes valuable when we include clear and good procedures. According to Ponce (2005), citizens have good reasons to demand good administrative procedures in order to promote good administration, among other important values. Procedures that are easily accessible, easy to invoke and operate, transparent, ensuring that stakeholders are kept informed and sensitive to different social groups help build trust between public administration and citizens. (Brewer, 2007).

Citizens

Citizens want good and fast services! Giving it to them means having quick and effective customer service processes, as well as decluttering the process from the customer side. Even if certain administrative services have high costs, citizens insist on seeking responsibility and professionalism from public institutions in providing services to them. Citizens always welcome the increase in budget investments to improve administrative services, with the desire to make the provision of services as simple and easy as possible (Vigoda, 2002).

Metodology

To conduct this research, initially, the institutions where the case study was conducted is selected. The institutions involved in this project are the municipality and the department for social issues. The municipality, the department and the researched problem in this paper uniquely represent the public institutions and relevant services. Therefore, as long as the selected institution and problem is representative of

public institutions and similar services, its selection may be random (Thiel, 2022). In the second step of the research, an online survey was conducted to obtain the current opinion of citizens about the visibility of procedures and processes in public administration in general. The result of this survey is presented in the introductory part of this study. In the third step, five actions were performed according to the DMADV model where the current situation was identified, the problems were measured, the causes of the problems were analyzed, an option for solving the problem was proposed and this option was verified. The first step was to identify the current situation by searching the internet for various websites. Various phone calls were also made to a public official to try to understand the procedures. The second step was to measure the defects. Defect measurement is done by making personal visits to the place where the services are provided. Firstly, the municipality was visited then the activity was expanded to the center for social issues. This action has enabled the collection of data which in the next action (in the third action) have

been analyzed and have made it possible to understand the causes of the defects for the researched problem. Based on the result of the analysis, in the fourth step an action plan for solving the problem is constructed and then in the fifth step it is verified if it is useful or not. Further, the steps followed and techniques used to identify the current situation, to understand the magnitude of the problem and the root causes are presented and also proposals are given to improve the situation.

Define - Problem Statement

In order to successfully perform the phase of identifying the state of visibility in public administration procedures, the lean thinking technique called “8 wastes check sheet” has been applied (Integris, 2022). Below in Table 1, the process for defining the current situation in public administration is addressed by applying the mechanism called “DOWNTIME”, which describes all wastes such as defects, overproduction, waitings, non-use of talent, transportations, inventory, movements and extra-processings in the process.

Table 1. 8 waste check sheet – Defining the quality of visibility in public administration

8 Wastes Check Sheet				
Process Area:		Quality of visibility in public administration		Date: Jan-22
Waste	Definition	Examples	Impact of waste “High”, “Medium”, “Low”	Description of Issues
D Defects	The website does not provide the necessary information	<ul style="list-style-type: none"> - The section has not been updated for many years - You find irrelevant information - No contact informations for the specific service 	High	There is a website of the municipality available but the citizen can find only general information but no information about specific services

8 Wastes Check Sheet

Process Area:		Quality of visibility in public administration		Date:	Jan-22
O	Overproduction	Conversations and meetings with officials and employees of the administration	<ul style="list-style-type: none"> - Long conversation - To much and useless informations - Interaction with many front desk officials 	High	Citizens are forced to seek information through various internet sites and various offices. It is always difficult to find offices and officials.
W	Waiting	Waiting for information	<ul style="list-style-type: none"> - Waiting for explanations and instructions - Waiting for approval - Waiting for sepcific templates 	High	Officials do not have all the information; they seek approvals from their superiors and do not have relevant templates ready for application.
N	Non-Utilized Talent	Not properly utilizing people's experience, skills, knowledge or creativity	<ul style="list-style-type: none"> - Employees unable to make decisions - Employees not fully trained - Skilled employees doing unskilled tasks 	High	Officials have significant weaknesses in providing accurate instructions and information. Contradictions constantly arise from one official to another
T	Transportation	Unnecessary movement of citizen and information	<ul style="list-style-type: none"> - Officials call other offices for basic information - The citizen must travel from one institution to another - Documents should be validated only in the capital city in specific institutions 	High	To be safe in providing information, officials call other officials on the phone and send phone messages to confirm the information provided to the citizen.
I	Inventory	Only generalized information that does not help the citizen are available	<ul style="list-style-type: none"> - List of services - Cliché Immages - Information for the institution 	High	Officials have presented just some leaflets prepared 5 years ago where is a list of services provided by the relevant institution. That was all.
M	Motion	Locations of relevant service not placed in the same location	<ul style="list-style-type: none"> - Driving and walking between facilities - Chaotic traffic - Difficulties to find parking spot 	High	Traveling from one part of the city to another is tedious, costly and disgusting
E	Extra-Processing	Steps that do not add value in the eyes of the customer	<ul style="list-style-type: none"> - Interaction with many citizens to find the right office - Interaction with many officials for simple instructions - Lots of time spent and unnecessary spending 	High	Interacting with many people on basic issues creates nervousness and boredom

At the first waste, “defects” it is noticed that the administration does not use its website efficiently and does not provide the necessary information to citizens. At the second waste “overproduction” it is noticed

that the citizens spend a lot of time to get the necessary information and spend a lot of time meeting many administrative employees. The third waste has to do with “Waiting”, where citizens have to wait in order to get answers

from the responsible officials because some officials are not fully competent regarding the procedures and actions. Because of this situation, it is necessary for them to get confirmation from senior officials. At the fourth waste “Non-use of Talent” it was noticed that the official who receives the citizens was not the most suitable, because he/she did not have all the necessary information, while in the same institution were available those who were specialized for this service but not engaged in the right position to provide the requested information. At the fifth waste, “Transport” it is noticed that the officials, for bureaucratic issues transfer the information from one official to another until they complete the required information and thus the materials and documents travel from one office to another and from one building to another. At the fifth waste “Inventory” it was

noticed that the institutions do not have much material (catalogs) and information (signs) available for citizens, thus, the only option to get the necessary information remains conversations with officials. At the seventh waste, “Motion” it is noticed that the citizen is forced to move a lot from one institution to another to get the necessary information. And at the eighth waste “Excess processing” it is noticed that the citizen unnecessarily has to participate at many meetings, travel a lot, spend a lot of money and materials, time and human energy in order to get the necessary information.

Measurement – Flow of people

We learned above that administrative procedures have many flaws. In this section the measurement of the waste identified above will be measured.

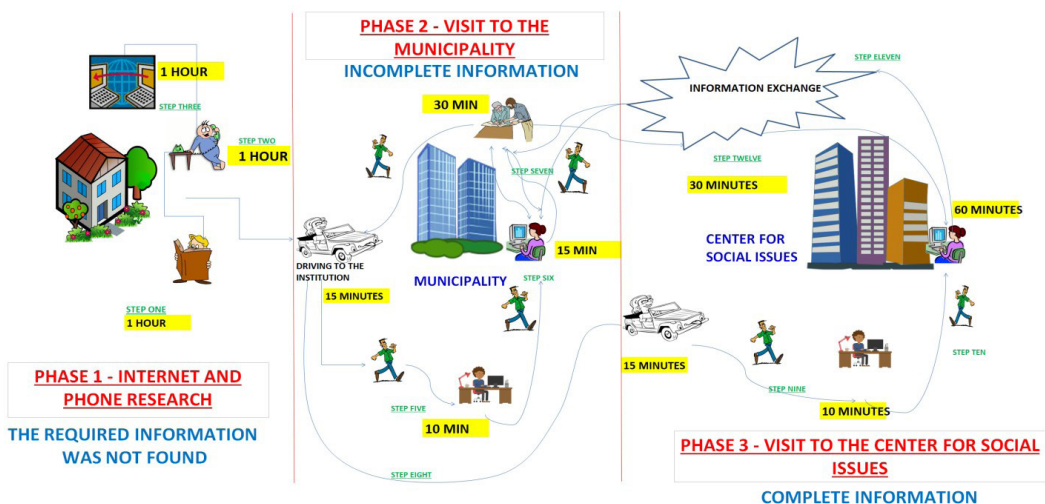


Fig 1. Spaghetti Diagram, measurement of movements and time spent

To carry out this part of the research, a tool called “Spaghetti Diagram” was applied, which is part of the “Measure” phase and which enables the tracking and measurement of the movement of people from one place

to another for a specific purpose (Burduk & Mazurkiewicz, 2018), (ASQ Quality, 2022). As seen in Figure 1, the research activity carried out to understand the adoption processes and procedures lasted a total of about four

hours. About one hour was spent on the Internet looking for information and contacts, one hour to find contact and talk to officials by phone, thirty minutes were spent traveling by car where two different institutions were visited, two and half hours were spent to visit three different offices where the conversation took place with eight different officers. These activities, internet search, telephone conversations, live chats, driving and waiting have caused great fatigue and boredom. However, after these visits and conversations, it was understood that the adoption process goes through twelve procedures involving four different institutions and the process lasts at least one year and more. It is also understood that many documents and interviews with parents are required to successfully complete this process. The positive side of this activity was that all the procedures to be followed

were enlightened, while the waste of time, wasted expenses and fatigue from conversations with officials was the negative side. Exactly these worthless activities are not accepted in LSS philosophy. After this action, the research has moved on to the next action which has to do with the analysis of the root causes of the issue under study.

Analysis - Root causes

To understand the main factors and reasons for this situation, the “Ishikawa Diagram” model was applied, which made it possible to identify the root causes of the problem. According to Desai & Johnson (2013), the Ishikawa diagram aims to identify the variability of a qualitative issue as an effect or consequence of multiple factors and causes. The Ishikawa diagram focuses entirely on its causes and not on its consequences (Suárez-Barraza et al., 2018).

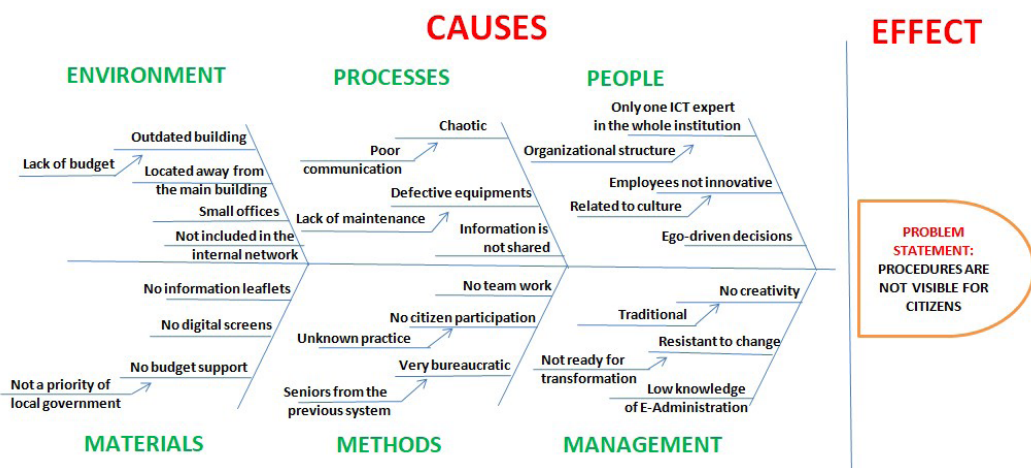


Fig 2. Ishikawa Diagram - Explanation of the root causes why there are no visible procedures in place!

In order to understand the root causes, a center for social work, a center for citizen services and the office for information and communication with citizens in the respective

municipality were visited. According to them, it turns out that the visibility of processes and procedures does not happen because there is no team in charge to perform this work.

Moreover, no company has been contracted to perform this service, while on the other side no training in information technology skills has been organized for administration officials. Graph 2 enables us to understand that the factors that affect the lack of visibility of processes and procedures are: management, methods, materials, people, processes and environment. The management factor shows that there is a lack of creativity, employees prefer to do things in the traditional way, do not prefer change because they are not ready for transformation in the digital world and as a result everyone has low knowledge of e-administration. By the method factor it is noticed that there is a lack of teamwork, there is a lack of citizen involvement and it is almost a practice unknown to them. What is very clear, the old employees prefer to continue the work of the administration in bureaucratic methods as it was in the 20th century. By the materials factor, there is a lack of catalogs, guides, leaflets, digital screens. All this is happening because, improving administrative services is not a priority of local government. By the people factor, which means for public administration employees, it is noticed that due to an inefficient organizational structure, information technology experts are missing. It is also noticed that the current employees are not innovative, the organizational culture is low and it is noticed that they are based very much on personal ego. The process factor has been observed to be chaotic and produce poor communication. Information is not exchanged in the correct and proper way

between employees. The equipment they use is defective and lacks their maintenance. The environment factor shows that due to lack of budget, the building is extremely depreciated. The building is located a few kilometers away from the town hall and there is no parking for vehicles. The offices are small and depreciated, and the communication network is external.

Design - Problem solving

To provide a sustainable solution to the problem, the logical tool of the lean six sigma toolbox called "Action Plan Matrix" has been applied. As shown in Table 2, this tool operates in a structured and logical way by defining responsibilities, setting deadlines for the performance of tasks, determining the necessary and available resources, identifies possible obstacles and barriers and clarifies the communication plan of the parties included in the action plan. The action plan is built on four different steps, starting with the compliance of actions with normative acts, continues with the creation of a section on the municipality website for the publication of official procedures, continues with compilation of all official procedures and ends with the creation of illustrative forms for each administrative procedure. In the "resources" column we see that the key to success is political support. There is now a political will to hire experts and supply technological equipment. There is no resistance anymore to change, which means that there is compliance with the idea of the digitalization of the administrative system.

Table 2. Action plan to improve the visibility of administrative procedures

ACTION PLAN MATRIX					
Action steps	Responsibilities	Timeline	Resources	Potential barriers	Communication plan
		<i>By when?</i>	<i>A. Resources Available</i>	<i>A. Who might resist?</i>	<i>1. Who is involved?</i>
<i>What will be done?</i>	<i>Who will do it?</i>	<i>(Day, Month)</i>	<i>B. Resources Needed</i>	<i>B. How will resist?</i>	<i>2. How is involved?</i> <i>3. How much?</i>
Step 1: Drafting, review and approval of the regulation on transparency of administrative procedures	Functional commission for drafting the draft regulation	5 months	A. Experts B. Political support	A. No resistsens	1. Administration of the municipal assembly, Department of Public Administration, Legal office, information and communication office, mayor's office and civil society. 2. Each party is encouraged to submit its own proposals based on their professional experience. 3. In the whole process
Step 2: Creation of a special section on the website of the municipality for the publication of procedures and processes	Office for Information and Communication with the Public	1 month	A. Web site	A. No resistsens	1. The Department of Administration and the Office for Information and Communication 2. Engagement of experts in the field of law, technology and communication 3. In the construction phase of the website and onwards taking care of the content and maintenance
Step 3: Writing of all administrative procedures	Relevant departments and sectors	12 months	A. Experts B. Political support	A. No resistsens	1. Public officials 2. Type the texts in the appropriate format 3. In the whole process
Step 4: Preparing creative illustrative design for publication	Department of Social Affairs and graphic design expert	2 weeks	A. Employees and legal information B. Expert in graphic design B. Additional IT experts B. Displays		

Verification - Validation of Actions

At this stage, the verification of the solution of the problem is presented, which means testing the functioning of the digital system which is installed in public administration institutions. With some professional

interventions and logical improvements based on LSS philosophy, an essential fourth step has been added to the communication system through the website, which makes the administrative procedures visible. In figure 4 below the actions are presented:

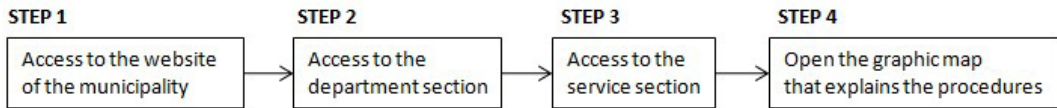


Fig 3. Process of actions for access to the graphic map of administrative procedures

As shown below in Figure 3, citizens can first access the municipality website and enter the title of the website. If they do not have the exact title of the website then it can easily be found through a search engine such as Google.com. After entering the website, as a second step you click on the page of the departments and then as a third step you click on the page of the sectors where the specific services are provided. The title “Graphic map of child adoption procedures” appears on this page. One click on this title displays a graphic map of the child adoption procedures which is shown in Figure 4 below. Depending on the need, users can open other sections of interest and display other graphic maps to complete a specific administrative procedure.

Below in Figure 5 is a graphic map which explains procedures, all steps, actions and all parties involved in the process for child adoption.

As seen in Figure 5, the graphic map clearly shows the flow of procedures and actions which are useful for anyone who is interested in adopting a child. The process goes through three different phases and through twelve different steps. The three phases are divided into: phase one, application for the right to adopt the child; phase two, application for child adoption; and phase three, verification of eligibility and the adoption of the child. Meanwhile, the 12 steps are grouped according to the relevant phases, where four steps occur in phase one, 3 in phase two and five steps occur in phase three. Such a map when published on the website of the municipality explains all

the steps to be followed for the adoption of the child without the need for the citizen to move a lot, without wasting much time and without wasting financial resources. The map also shows that four different specific parties are involved in the process, such as the child recipient, the courts, the welfare department and the social welfare center.

Discussion

The analysis performed above enables us to get answers to the research questions of the study. It is understood that with the correct and proper use of LSS tools and techniques, the administration of processes and procedures becomes more visible and more understandable for everyone, especially for citizens that are asking services. In this study, in the first phase of DMADV, an “8 waste check sheet” was used which helps us to identify the current state of public administration. With the application of this technique it was realized that in the administration there are defects in the system, there are waitings in the exchange of information, the talent of the employees is not used correctly, the citizens make useless movements and do not receive the necessary information and there is duplication of works by officials. The “8 waste check sheet” technique has been shown to be very useful and has enabled us to have concrete actions in the next step to measure the identified defects. The measurement of defects in quantity, time and cost was achieved by applying another LSS technique called “Spaghetti Diagram”. This technique was able to illustrate all the actions

and movements that a citizen must make to get the necessary information. Here is the answer to the research question by showing how the “Spaghetti Diagram”, a technique that conforms to the philosophy of the LSS,

enables any activity to be measurable and easily understood. Further in this case study with the use of “Ishikawa Diagram” it is also confirmed that this technique based on the philosophy of LSS helps in a concrete way in

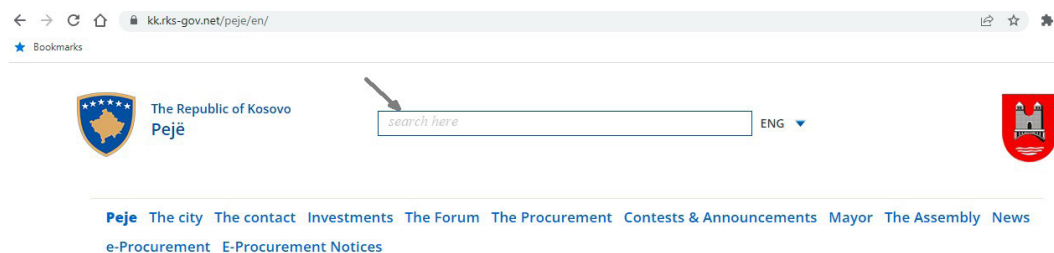


Fig 4. Direct access according to the title in the graphic map for administrative procedures

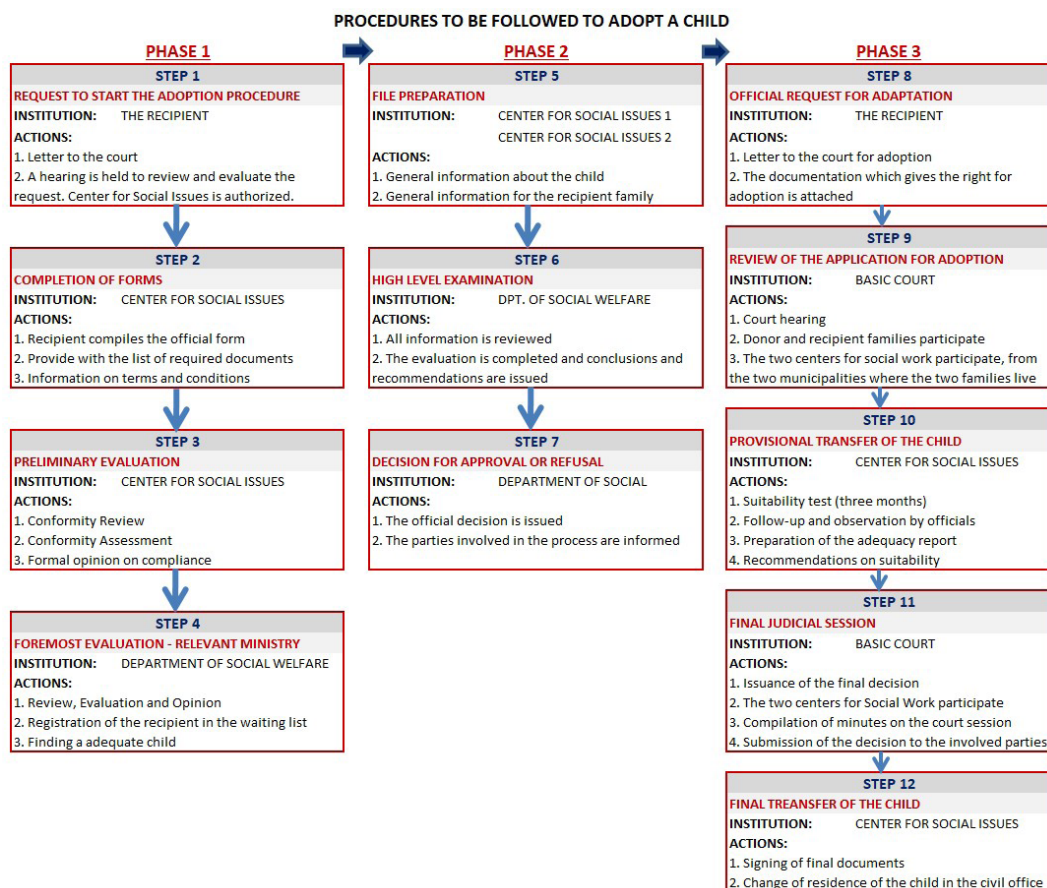


Fig 5. The course of procedures for the adoption of the child

finding the causes of the problem. With the help of this technique it is understood that the main causes of lack of visibility are factors such as: environment, processes, people, management, methods and materials. By understanding the causes of the problem, it is possible to take concrete steps to solve the problem. Subsequently, to solve the problem, the "Action Plan" technique was applied, which based on the philosophy of the LSS has helped to correctly and accurately list the necessary actions, the responsible parties, their roles, deadlines, necessary resources, eventual barriers and a communication plan while actions are being performed. By acting in accordance with the prepared plan, the situation of visibility for the child adoption procedures has been improved. A logical table has been built outlining the steps to be followed for the adoption of the child and that table has been integrated into the website linked to the internet. Specific to this stage is that the key information for the parties involved in this process and for the activities to be carried out in each step separately are visible. This technique, which is based on the philosophy of LSS, enables citizens to be informed in advance about the activities they should follow for the adoption of a child. This visibility enables them to better plan their precious time and needed resources. With the above, the first research answer is being completed and it is understood that LSS tools and techniques help concretely improve the visibility of public administration processes.

Now here the reader gets the answer to the second research question which addresses the fact how and how much the visibility of the procedures improves the life of the citizens. As can be seen from the above, visible processes provide quick, simple, clear and accurate information about the actions of

the institutions involved, their roles, timelines, and what the outcome of each action will be. Moreover, thanks to the technological devices connected to the internet, all this information is provided to the citizen in their home without having to leave the house at all. By providing information effectively, citizens save hours of engagement, wasted financial and material costs, and contribute to their health by avoiding the annoyances and worries that occur during numerous movements and discussions without concrete results. Referring to figure 2, where the waste measurements are presented, building an online system for the visibility of procedures, to understand a specific procedure saves about 4 hours of citizen engagement, avoids at least 8 meetings and conversations with officials and saves material costs and financial such as fuel costs, parking, telephone calls. These costs vary depending on the location of the citizen seeking services.

Conclusion

This case study has produced a concrete result, has made visible the administrative procedures for the adoption of the child. Thus, with this study, the improvement of a specific service provided by the public administration has been achieved. But the main achievement of this study is estimated to be the success of the application of the effective DMADV methodology which enabled the improvement of the service for the adoption of the child. This study confirms that the DMADV methodology, which is part of the LSS philosophy, is one of the methodologies that structures the approach and action to solve the problem and improve the processes in public administration. Going by a logical flow, DMADV structures the process from the beginning to the end of the process and

results in improved visibility of procedures in public administration. At each stage of the action, specific tools and techniques have been applied which have produced concrete, measurable and sustainable results around the problem addressed. By using the “8 waste check sheet” technique, defects have been identified, by using the “Spaghetti Diagram” technique, the defects have been measured, by using the “Ishikawa Diagram” technique, the causes of the defects have been analyzed, by using the “Action Plan” technique, the process and action plan of verification is performed. As a result, with some concrete interventions at all stages where defects have been identified, including the engagement of talented staff, restructuring of the website, construction of procedure maps and their publication, the digital visibility system has been improved. This change in public administration will save time and costs for citizens but will also increase the quality of services in public administration.

Recommendation

In countries where the digital system for the visibility of procedures has not yet been applied, public administrations need to start thinking differently and making changes. The LSS philosophy is an appropriate and recommended methodology for all sectors of public administration. It is recommended to be applied in all sectors and for all formal procedures. By building digitalized systems, on the one hand, the useless visits of citizens to the counters of public administration will be reduced, and on the other hand, the services will be performed in an automated form without wasting time and without unnecessary expenses. Such an approach is useful for citizens seeking services as well as for public administration officials who have a lot of work

to do to serve citizens in the wide range of their needs.

Providing the citizen with information on the Internet, he/she does not need to appear in the institution for basic information. Tell the citizen in which building he/she should go for specific services, he/she will not move unnecessarily on the city streets. Tell the citizen with whom he/she should talk about a specific issue, he/she will not knock on several doors to meet the right official. Tell the citizen which documents should be collected in the file and he/she will not waste time on conversations and explanations. So the more information is provided to the citizen through the digitalization of procedures, the more the process of providing a specific service to the citizen will be simplified.

References

- Agarwal, R.; Bajaj, N. (2008). Managing outsourcing process: applying six sigma. *Business Process Management Journal* , 14 (6), 829–837.
- Angay, K. D.; Buclatin, W.; Lontoc, J. R.; Mendoza, S.; Poniente, J. (2017). Design and development of an enhanced computer based notification system. *IEEE 13th International Colloquium on Signal Processing & its Applications (CSPA)* , 309-313.
- Antony, J., Rodgers, B., & Cudney, E. A. (2017). Lean Six Sigma for public sector organizations: is it a myth or reality? *International Journal of Quality & Reliability Management* , 34 (9), 1402–1411.
- Antony, J., Snee, R., & Hoerl, R. (2017). Lean Six Sigma: yesterday, today and tomorrow. *International Journal of Quality & Reliability Management* , 34 (7), 1073–1093.
- ASQ Quality, P. (2022, January 30). *American Society for Quality*. Retrieved January 30,

- 2022, from <https://asq.org/>: <https://asq.org/quality-resources/spaghetti-diagram>
- Balzer, W. K., Brodke, M. H., & Thomas Kizhakethalackal, E. (2015). Lean higher education: Successes, challenges, and realizing potential. *International Journal of Quality & Reliability Management*, 32 (9), 924–933.
- Bannister, F. & Connolly, R. (2011). The Trouble with Transparency: A Critical Review of Openness in E-Government. *Policy & Internet*, 3 (1), 1-30.
- Bannister, F., & Connolly, R. (2011). The Trouble with Transparency: A Critical Review of Openness in e-Government. *Policy & Internet*, 3 (1), 158–187.
- Baptista, A.; Silva, F.J.G.; Campilho, R.D.S.G.; Ferreira, S.; Pinto, G. (2020). Applying DMADV on the industrialization of updated components in the automotive sector: a case study. *Procedia Manufacturing*, 51, 1332–1339.
- Berner, M., Augustine, J., & Maedche, A. (2015). The Impact of Process Visibility on Process Performance. *Business & Information Systems Engineering*, 58 (1), 31–42.
- Bertolaccini, L., Viti, A., & Terzi, A. (2015). The Statistical point of view of Quality: the Lean Six Sigma methodology. *Journal of Thoracic Disease*, 7 (4), 66-68.
- Brewer, B. (2007). Citizen or customer? Complaints handling in the public sector. *International Review of Administrative Sciences*, 73 (4), 549–556.
- Burduk, A. & Mazurkiewicz, D. (2018). Dynamic Spaghetti Diagrams. A Case Study of Pilot RTLS. *Intelligent Systems in Production Engineering and Maintenance – ISPEM*, 637 (24), 238–248.
- Chiao-Tzu Huang; K.S. Chen; Tsang-Chuan Chang. (2010). An application of DMADV methodology for increasing the yield rate of surveillance cameras. *Microelectronics Reliability*, 50 (2), 266–272.
- Chtioui, S. (2019). The Objectives and Basis of Public Administration Reform (PAR) Strategy. *Journal of US-China Public Administration*, 16 (2), 67-76.
- Commission, E. (2017, 11 22). *European Semester Thematic Factsheet, Quality of Public Administration*. Retrieved 8 17, 2021, from <https://ec.europa.eu/>: https://ec.europa.eu/info/sites/default/files/file_import/european-semester-thematic-factsheet-quality-public-administration_en_0.pdf
- Cronemyr, P. (2007). DMAIC and DMADV differences, similarities and synergies. *International Journal of Six Sigma and Competitive Advantage*, 3 (3), 193-209.
- Curatolo, N., Lamouri, S., Huet, J. C., & Rieutord, A. (2014). A critical analysis of Lean approach structuring in hospitals. *Business Process Management Journal*, 20 (3), 433–454.
- Essien, E. (2015). The Challenges of Public Administration, Good Governance and Service Delivery in the 21st Century. *International Journal of Civic Engagement and Social Change*, 2 (2), 53–66.
- George, M. (2002). *Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed*. USA: McGraw-Hill.
- Global, I. (2021, 08 12). *IGI Global*. Retrieved 08 12, 2021, from IGI Global Publisher of Timley Knowledge: <https://www.igi-global.com/dictionary/increasing-visibility-through-process-mining/39849>

- goskills. (2021, August 26). *goskills*. Retrieved August 26, 2021, from <https://www.goskills.com/>: <https://www.goskills.com/Lean-Six-Sigma>
- Graupner, E., Urbitsch, E., & Mädche, A. (2015). A Conceptualization and Operationalization of Process Visibility Capabilities. *Wirtschaftsinformatik Proceedings 2015*, 38, 557-571.
- Integris, P. A. (2022, January 30). *resource/eight-wastes-check-sheet/*. Retrieved January 30, 2022, from <https://integrispa.com/>: <https://integrispa.com/resource/eight-wastes-check-sheet/>
- iSixSigma-Editorial. (2021, 8 14). *ISIXSIGMA*. Retrieved 8 14, 2021, from <https://www.isixsigma.com/>: <https://www.isixsigma.com/new-to-six-sigma/history/history-six-sigma/>
- Johnson, J.A.; Gitlow, H.; Widener, S.; Popovich, E. (2006). Designing New Housing at the University of Miami: A "Six Sigma" DMADV/DFSS Case Study. *Quality Engineering*, 18 (3), 299–323.
- Karpa, M., Akimova, L., Akimov, O., Serohina, N., Oleshko, O., & Lipovska, N. (2021). Public Administration as a Systematic Phenomenon in Society. *Journal of Interdisciplinary Research - AD ALTA*, 11 (1), 56-62.
- Mahajan, A. P. (2019). *Public Administration for Civil Services Main Examination*. Uttar Pradesh, India: Pearson India Education Services Pvt. Ltd.
- Nabatchi, T. (2017). Public Values Frames in Administration and Governance. *Perspectives on Public Management and Governance*, 1 (1), 59–72.
- Ponce, J. (2005). Good Administration and Administrative Procedures. *Indiana Journal of Global Legal Studies*, 12 (2), 551-588.
- Radnor, Z., & Walley, P. (2008). Learning to walk before we try to run: Adapting Lean to the public sector. *Public Money and Management*, 28 (1), 13–20.
- Rodgers, B., Antony, J., Edgeman, R., & Cudney, E. A. (2019). Lean Six Sigma in the public sector: yesterday, today and tomorrow. *Total Quality Management & Business Excellence*, 1–13.
- Selvi, K., Majumdar, R., (2014). Six Sigma-Overview of DMAIC and DMADV. *International Journal of Innovative Science and Modern Engineering (IJISME)*, 2 (5), 2319-6386.
- Skhmot, N. (2017, 8 5). *The Lean Way*. Retrieved 8 14, 2021, from <https://theleanway.net/>: <https://theleanway.net/what-is-lean>
- Srinivasan, K., Muthu, S., Devadasan, S. R., & Sugumaran, C. (2016). Six Sigma through DMAIC phases: a literature review. *International Journal of Productivity and Quality Management*, 17 (2), 236-257.
- Suárez-Barraza, M. F., & Ramis-Pujol, J. (2010). Implementation of Lean-Kaizen in the human resource service process: A case study in a Mexican public service organisation. *Journal of Manufacturing Technology Management*, 21 (3), 388–410.
- Suárez-Barraza, Manuel F., Rodríguez-González & Francisco G. (2018). Cornerstone root causes through the analysis of the Ishikawa diagram, is it possible to find them? *International Journal of Quality and Service Sciences*, 1 - 15.
- Thiel, S. (2022). *Research Methods in Public Administration and Public Management: an introduction, (Second Edition)*. New York: Routledge.
- Timans, W., Antony, J., Ahaus, K. & van Solingen, R. (2012). Implementation of Lean

Six Sigma in small- and medium-sized manufacturing enterprises in the Netherlands. *Journal of the Operational Research Society* , 63 (3), 339–353.

Union, E. (2017). *The Quality of Public Administration "Toolbox"*. Luxembourg: European Institute of Public Administration (EIPA) and Mackie O' Sullivan Consulting Ltd.

Vigoda, E. (2002). From Responsiveness to Collaboration: Governance, Citizens, and the

Next Generation of Public Administration. *Public Administration Review* , 62 (5), 527–540.

Wetzel, E. M.; Thabet, W. Y. (2016). Utilizing Six Sigma to develop standard attributes for a Safety for Facilities Management (SFFM) framework. *Safety Science* , 89, 355–368.

Zefaj, E. (2021). Municipalities applying Lean Six Sigma. *Balkan Journal of Interdisciplinary Research, IIPCCL Publishing* , 7 (1), 8-17.