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IMPLEMENTATION OF RISK MANAGEMENT IN THE COMMUNITY PUBLIC WATER SUPPLY SERVICES IN ROMANIA

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Abstract
The article explores the practice of risk management in the field of public utility services. The purpose of the present research is to identify the present situation related to risk management practiced in the field of community water supply and sewerage services in Romania and to highlight the future prospects of improving it.
The first part of the article describes the considerable importance of the sector of public utility services. In addition, the special features of this sector of activity are pointed out and the need to practice effective risk management is explained.
In the second part, there is a brief presentation of the Romanian situation connected to the practice of risk management in the case of public water supply and sewerage services and the hypothesis from which the research was conducted.
The research methods are represented by documentary analysis of the official and scientific data in the studied field and by applying a questionnaire to validate the initial hypothesis and to determinate the future possibilities of updating the practice of risk management in the public water services.
The originality of this article consists of identifying the drivers and barriers for risk management, and also the tools for risk assesment and treatment in public water services from Romania by survey of the operators in the field.
Keywords: community public water supply, risk management implementation, challenges, drivers, risk management tools

1. INTRODUCTION

Public utilities are particularly important for maintaining social cohesion, increasing the quality of life and ensuring sustainable development (European Commission, 2003). This is also the reason why, after becoming Member of European Union, public utility services in Romania are in a continuous process of transformation. The main purpose is to achieve the development and adaptation to European requirements, in order to ensure a high level of safety and accessibility, equal treatment, promoting users' rights (Romanian Parliament, 2006).

According to Law no. 51/2006, with subsequent amendments and completions, public utility services are considered to be represented by water supply; sewage and wastewater treatment; rainwater collection, sewerage and drainage; thermal energy supply in centralized system; sanitation of localities; public lighting and local public transport.

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Public utility services present several particularities that have to be taken into consideration in order to practice an efficient management of them and have a complex and dynamic approach. Among their particularities are: the social and economic character, the capacity to meet the public demands and needs, the continuous need to function, the natural monopol imposed by the existence of adequate technical and municipal infrastructure, the responsability of local public authorities. The context in which these services must be provided is constantly changing, due to climate change, urbanization, population growth, deterioration of infrastructure systems and socio-economic conditions (Khatri, 2013; Pollard, 2016).

On the other hand, the multitude of stakeholders of these services (users, operators, regulators, local authorities, etc.) generate the conditions for complex interactions and interdependencies in the planning and decision-making process (MMP, 2008).

All these factors lead to a high level of uncertainty, increase the risk of not reaching the expected level of system performance and effectiveness (Manso, 2007).

Risk management in public healthcare and environment is probably the main goal of any organization or institution in charge of providing water supply and sewerage services (Pollard, 2008).

In the case of water supply services, the risks can be classified into operational, economic, reputational, supply chain and technical risks. Within these broad risk categories there are sub-categories, for example, within the economic risks there are capital investments risks, operating costs risks, costs of unplanned supply disruptions risks, etc.

Adequate regulation is a necessary but insufficient requirement for effective risk management, as formal adoption of existing risk management models will not provide the risk management process itself. An organization working in the field of community water supply and sewerage services (CWSASS) may suffer substantial losses due to improper risk management. Risk management, developed and operated in an appropriate manner, will also promote the continuous improvement of the overall internal control system, so entities are likely to have a greater capacity to cope with risks in achieving the organizational objectives.

The review of risk management processes must be both an organic part and an active tool in the activity of an entity. Risk management will not become an unuseful formality, if it is adapted to specific organizational circumstances and processes and if specific potential measures that mitigate threats that obstruct or influence their operational activity, are considered and then monitored.

Risk management does not provide a guarantee for the efficient functioning of an entity, but without it, the organization's management cannot identify the place and the necessary degree of intervention to avoid harmful consequences.

The supply of safe and reliable drinking water, one of the main objectives of water and sewerage services, is constantly in the attention of scientific research and is influenced by the evolution of technology and the availability of financial resources.

However, there is a prevalence of water quality problems in developed countries, due to causes ranging from technical failures to institutional deficiencies and, sometimes, carelessness from the personal side. Regardless of the particular manifestation of these incidents, all of them derived from organizational capabilities or limited devotion of operators to learn how to prevent failures, in other words, to manage risks.

Planning a sustainable organization in this studied field also requires the analysis of multiple, and sometimes contradictory, social, economic and environmental objectives. The analysis must cover future perspectives, in particular the associated risks and uncertainty, as the performance of the systems will be affected by both internal and external change prices. Risk and uncertainty analyses are necessary to achieve a sustainable organization in the field of CWSASS (Switch, 2006).

Considering this context, using a questionnaire, this paper proposes to analyze the necessity to implement a complex approach to risk management within these organizations in Romania and what prospects are available for this type of process.

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The paper is structured as follows: after the introduction section, the state of research that promotes the need for a risk management system in the organizations working in the CWSASS field is analyzed, then the objectives and methodology of the research are presented, followed by the results of the study and the discussion over them. The paper ends with conclusions and directions for future research

2. RESEARCH ON THE NEED TO IMPLEMENT A RISK MANAGEMENT METHODOLOGY WITHIN THE CWSASS ORGANIZATIONS

Planning a long-term future through risk analysis is not a new approach in this field. However, most existing risk assessment frameworks do not take into account the uncertainty analysis. Or, in the analysis of a complex system such as CWSASS, it is necessary to analyze the interactions between events and the associated uncertainties (Lindhe et al., 2009).

The decision-making framework for long-term strategic planning requires a detailed understanding of the potential risks resulting from future internal and external change pressures (Hall and Solomatine, 2008; Wilby et al., 2009). A stationary approach to infrastructure planning and decision-making in which the future is assumed as a continuation of historical observations, will not work (IPCC, 2012, Hall et al., 2012, Beven and Alcock, 2012). Therefore, a systematic framework is necessary to analyze the uncertainty and risks associated with CWSASS organizations.

These are the reasons why the water industry is undergoing an important change period related to its approach to risk management by replacing it with one that is increasingly explicit and better integrated with the other business processes in the organization.

A study by Ernst & Young (2013) identifies the most important current business risks in the field of public utility services: compliance and regulations, policy interventions on the utility markets, uncertainties in climate and pricing policies, costs' volatility and accessability to capital, implementation of large-scale projects, headhunting, aging of the network and infrastructure, management of planning and public acceptance, but also the study illustrates the opportunities, such as: strong demand growth in emerging markets, procurement or partnerships to acquire new capabilities, strengthened relations with external regulatory and compliance bodies, improved public perception, focus on investor relations and communication programs, etc.

Under these conditions, entities managing public utilities must be able to adapt to trasformations, stimulate innovation capacity, make the most of smart technologies, implement smart land development models. Moreover, these entities have to learn to offer complex solutions. to major problems such as demographic decline, rising quality of life or environmental pollution. Competitiveness and, ultimately, performance in the use of available resources depend to a large extent on their ability to adapt quickly to these changes. (Matei et al., 2016),

Risk management strategies and techniques traditionally applied in the field of occupational health and safety and public healthcare are nowadays targeting a wider application for asset management (Booth and Rogers, 2001; Lifton and Smeaton, 2003) including infrastructure functioning (Stahl and Elliott, 1999; Stevens and Lloyd, 2004).

Beyond this operational context, utility managers are increasingly concerned with managing the inherent risks associated with corporate decision-making. Critical issues include decisions regarding: outsourcing asset maintenance, billing and monitoring, change management, staff retention, long-term viability of investment decisions, and managing external interfaces with the regulators and the competitors (MacGillivray et al., 2006).

Pollard et al. (2004) show that the organizational hierarchy that exists even within "flat" utilities requires that these risks have to be actively managed both strategically and operationally. CWSASS operators need to use a range of techniques to assess risks and develop business and operating strategies that prioritize resources based on risk information.

Successfully implementing a risk management process involves integrating risk management into the organizational culture and decision-making processes (Pollard et al., 2004; Howard and Lourens, 2005) and applying risk analysis tools (MacGillivray et al., 2006).

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It is currently assumed that risk analysis tools and techniques are sufficiently developed, but the organizations lack the capacity to use these methodologies to make better, more credible and easier to defend decisions. The possible dominant cause of this capacity deficit is the high difficulty in establishing, defining and controlling the risk management processes.

This may be caused by the fact that the approach to implementation has focused on complying with the risk management models, instead of adapting them.

Risk management models are essentially standards that describe the fundamentals of the status of technologies and the relationships between its basic elements (Hamilton et al., 2006). Models for drinking water quality management (NHMRC, 2001; WHO, 2002), widely accepted and applied in the sector, have helped to transform risk management, promoting the approach usually met at the enterprise level.

Although these models support the concept that risk management is made up of processes, the treatment of the discipline focuses on organizational structures and procedures. They often fail to explain how risk management tasks and activities can be defined and controlled as processes.

Initiatives to improve risk management must also be supported by organizational learning, education and training, as well as research and development.

The analysis of the uncertainty and the risks arising from it, must be done methodically by applying specific methodologies for a structured implementation of risk management that help CWSASS operators to adapt general management practices to their own activity.

This methodology has to start from the knowledge of all categories of risks, as well as the threats and opportunities related to public utility services, respectively those of water and sewerage. The implementation of a risk methodology should enable utility companies to make efficient use of their portfolio of risk analysis techniques for optimal, credible and sustainable decision-making.

3. OBJECTIVE AND METHODOLOGY OF THE RESEARCH

From the discussions with the representatives of the main operators in Romania and with representatives of the employers in the field, it results that, in general, the treatment of risks by a public utility operator is part of compliance with specific legal provisions or regulations, such as conditions imposed for obtaining operating license (ANRSC, 2002).

The main public utility operators in Romania are ISO 9001 certified. In order to maintain the certification, according to the revised ISO 9001: 2015 standard, the operators must comply with the new requirements of the standard and, thus, must prove the practice of risk management. This is the reason why, since the standard appeared, risk management has entered the collimator of the managers of these operators, concerned with obtaining recertification.

The hypothesis from which the research starts is that in the urban water sector in Romania the risk management activity is not a systematic and structured one, although it should be part of the organizational culture and it should be applied as an usual management tool. This hypothesis is intended to be validated through the following scientific research.

The objective of this research is to analyze and identify the degree of acceptance showed by the regional operators of using methods and techniques specific to risk management.In the absence of reliable sources of information, in order to identify the main risks faced by the urban water services in Romania, the management practices used and the degree of risk management implementation, the research is based on the questioning several CWSASS operators.

The questionnaire aims to obtain information related to the experience of operators and specialists in the field of risk management, their perception on the need to implement risk management in public utilities and assess the demand for developing a methodology for implementing risk management specific to CWSASS operators.

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The research methodology consisted in combining the applied research with the empirical research based on a questionnaire distributed to the CWSASS operators from Romania. For this, a questionnaire was designed in order to obtain relevant information from the main operators in Romania. The questionnaire includes 24 questions, structured in three sections: description of the organization, current level of use of risk management in the organization, ways to improve risk management in the organization.

The structure of the questionnaire aimed at obtaining the necessary data to segment the operators, to allow qualitative and quantitative analyzes and to estimate the degree of the answers objectivity.The elaborated questionnaire was made available to operators in 2020, both in written and electronic format (Google Forms).

In order to increase the chances of obtaining answers, given the reluctance of operators to provide data on their own activity, the survey was carried out in partnership with the National Authority for Regulating the Community Services (ANRSC), the national regulator in the field of community public services, and The Romanian Water Association (ARA), the main professional organization at national level in the field of water.

The request to answer the questionnaire was sent to the 50 operators licensed by National Authority for Regulating the Community Services, which cover 90% of the market of water supply and sewerage services in Romania. 38 of the operators responded from the main operators covering approximately 70% of the water utility services market in Romania.

TABLE 1 - BRIEF INFORMATION ON THE PROFILE OF THE ORGANIZATIONS

No.	Criterion	Answering options	Totals
1.	Launching year	1991 – 2000	14
		2001 – 2010	21
		2011 – 2018	3
2.	Number of employees	≤100	6
		100 – 500	9
		500 – 1000	16
		>1000	7
3.	Served population	<10.000	3
		10.000 – 100.000	9
		100.000 – 500.000	22
		500.000 – 1.000.000	2
		>1.000.000	2
4.	Recorded turnover in the last year	≤ 100.000 lei	2
		100.000 – 1.000.000 lei	2
		1.000.000 – 10.000.000 lei	3
		10.000.000 - 100.000.000 lei	25
		>100.000.000 lei	6
5.	Organization type	Entity within the city hall	1
		Public – private partnership	2
		Private company	3
		Regional operator	31
		Public company	1
6.	Capital type	Mixed capital	4
		Private capital	4
		Public capital	30
7.	Provided services	Drinking water distribution	1
		Drinking water distribution and production	1
		Drinking water distribution and production, sewage services	1
		Drinking water distribution and production, sewage services, water treatment	35
8.	ISO 9001:2015 certified	Certified	35
		Not certified	2
		Have not decided to be ISO certified	1
9.	Functioning license	Have functioning license	36
		Do not have a license	1
		Under licensing	1

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4. RESULTS AND DISCUSSIONS

Although the questionnaires were distributed to 50 operators in the field of CWSASS from Romania, only 38 answered the questions included in the received questionnaires. The organizations that responded were launched between 1991 and 2018, the number of employees was between 100 and more than 1000, the population served varies between less than 10 thousand and more than 1 million inhabitants, their turnover in the last year was ranged from less than 100 thousand and more than 100 million lei. The type of organization is diverse: entities within the city hall (1), public-private partnerships (2), private companies (3) and public capital entities (1), as well as regional operators (majority, 31).

Most of them are engaged in the production and distribution of drinking water, as well as the sewage and treatment of wastewater (35), are ISO 9001: 2015 certified and have a functioning license issued by ANRSC (36).

The centralization of information on the profile of the organizations that answered in the questionnaires is illustrated in Table 1.

4.1. Integration of risk management

Risk management seems to be a new concept for the operators working in the field of CWSASS from Romania. Despite the fact that risk management is absolutely compulsory in a field with various stakeholders, different interests and countless dangerous risks.

According to the respondents that accepted to answer the questions included in the questionnaires, the concept of risk management is starting to win the attention of the operators from the field of CWSASS. The Figure 1 highlights the processes in which risk management is taken into consideration.

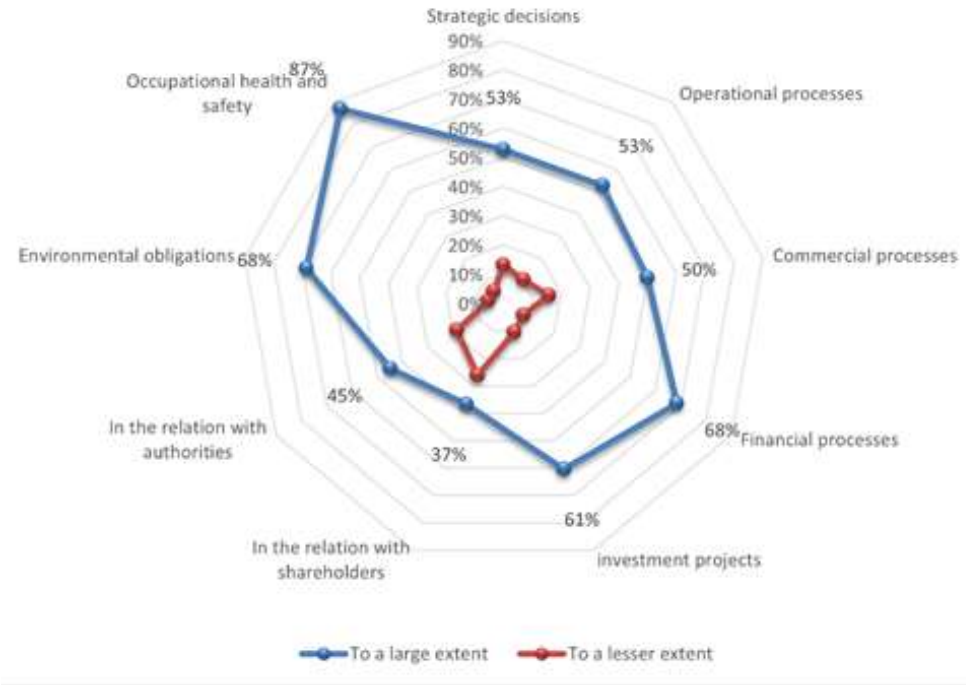

FIGURE 1 – THE PROCESSES IN WHICH RISK MANAGEMENT IS APPLIED
Source: own contribution

As the Figure 1 shows, the main processes in which risk management plays an important role are: occupational health and safety, financial processes, environmental obligations, investment projects, strategic decisions, and operational processes. Over 50% of the operators considered that risk management is used in these processes to a large extent.

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On the other hand, in the case of commercial processes and in the relation with the authorities and with the shareholders, risk management is less used.

The following Figure 2 depicts the degree of risk management integration within the organizations involved in the present research. It can be observed that over 55% of the respondents declared that good practices in risk management are disseminated in the organization and risk analysis and assessment results are important in making managerial decisions. Moreover 39% stated that recurrent activities take place in order to improve the risk management in the organization.

However, 66% of the respondents denied that investments are made to improve the informational capital related to risk management and 42% recognized that the personnel is not trained in the field of risk management.

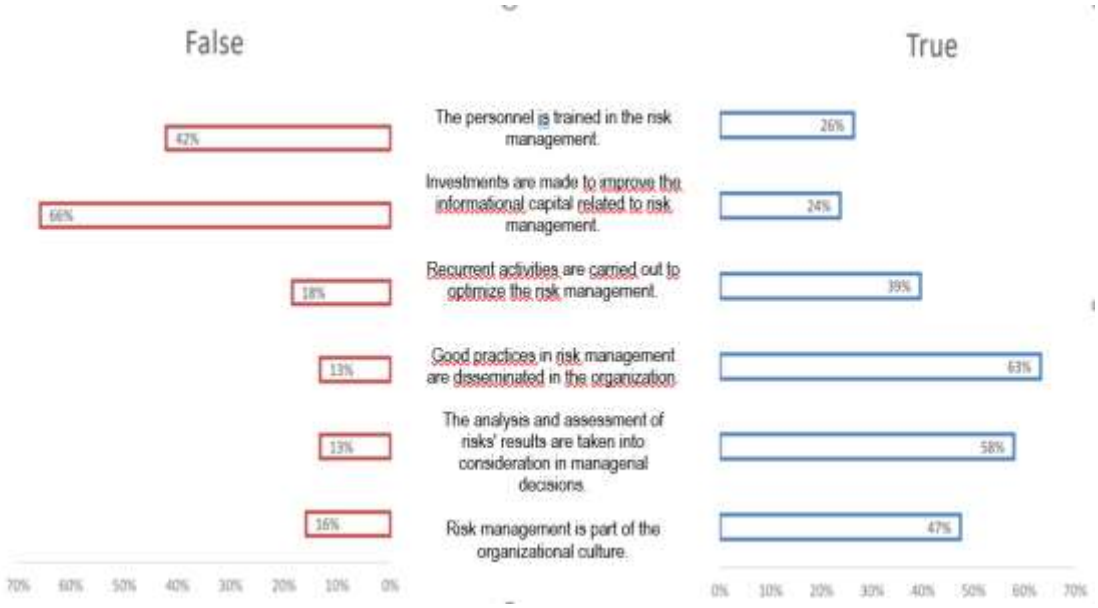

FIGURE 2 – INTEGRATION OF RISK MANAGEMENT
Source: own contribution

A considerable percentage, 47% from the operators stated that the risk management is part of the organizational culture.

It is obvious that risk management is at the beginning of being aknowledged, studied and implemented within the organizations working in the field of CWSASS from Romania. A possible reason for this delay is the lack of investments made in order to update the information related to risk management and to train the employees in this domain.

4.2. Use of risk management tools

Regarding the use of specific tools and methods to identify, assess and treat risks in the risk management process, **most of the operators stated that they do not use them at all**, as Figure 3 illustrates.

When it comes to the **identification of the risks**, over 60% of the operators stated that they use intuitive experience of managers to a large extent in order to discover the risks whereas aproximately 11% declared they do not use this solution to identify risks. Aproximately 29% from the operators declared that they use risk control checklists to a large extent in order to identify risks while almost 40% recognized that they use checklists to a lesser extent or not at all. Over 34% of the operators ask the organization's experts to identify risks and almost 45% consult the experts to a lesser extent or not at all in this process. Aproximately 53% use the experience of the designated employees to identify risks and over 10% do not use their experience at all. Over 13% of the operators involve external experts to identify risks, whereas over 73% contact external experts to a lesser extent or not at all. Structural interviews, Failure mode and effects analysis (FMEA) methodology and

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Cause-Effect Diagram are not used at all by over 50% of the operators to identify risks. Over 47% of the operators declared to use Brainstorming, Scenario Analysis, or Statistical instruments to a lesser extent or not at all in identifying the risks.

With reference to **assessment of the risks** over 55% of the operators confirmed that they use the Risk Matrix to a large extent in the process, whereas almost 32% use the Matrix to a lesser extent or not at all. Over 26% stated that they appeal to experts' opinions to assess risk to a large extent and over 42% of the operators recognized that they use the experts' opinions to a lesser extent or not at all. Simulation techniques, Decision Tree Analysis and Sensitivity Analysis are not used by over 60% of the operators in order to assess risks. Almost 16% of the operators declared that they use Scenario Analysis, while over 47% said that they use this type of analysis to a lesser extent or not at all, in assessing the risks. Less than 10% of the operators use Senzitivity Analysis, Simulation Techniques, HAZOP (Hazard and Operability), Specific IT programs, Risk models based on GIS to a large extent, in order to assess the risks.

Concerning the **treatment of the risks,** over 26% of the operators choose to avoid risks to a large extent, while aproximately 45% avoid risks to a lesser extent or not at all. Aproximately 5,5% outsource the risky activities to a large extent and over 76% use this solution to a lesser extent or not at all. Almost 11% of the operators choose to transfer the risks to insurance companies to a large extent whereas over 63% appeal to insurance companies to a lesser extent or not at all. Over 63% of the respondents confirmed that they implement risk mitigation measures to a large extent and 21% use these measures to a lesser extent or not at all. Less than 15% implement Contingency plans or save Cost and Time for risks to a large extent and over 47% of operators use these solutions to a lesser extent or not at all.

FIGURE 3 - USE OF RISK MANAGEMENT TOOLS
Source: own contribution

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The Figure 3 above depicts the use of risk management tools by the operators working in the field of CWSASS from Romania. Unfortunately, the operators confirmed that most of them do not use these effective tools

4.3. Drivers for and barriers to Risk Management

As concerns the factors that represent drivers or barriers for operators to seriously implement risk management, Figure 4 represent the evaluation of their impact based on the respondents' answers.

Regarding the drivers for implementing risk management, the operators consider that the drinking water legislation, the operators' opinion on utility of risk methodology, the ISO 9001:2015 imposed conditions, the Occupational Health and Safety conditions and the Environmental legislation play an important role and influence risk management implementation to a large extent as over 82% of the operators confirmed their impact. Furthermore, the General Managers' requests, the public services regulations, the funding authorities' imposed conditions, the banks imposed conditions and the shareholders' request are also impacting the risk management adoption as over 35% of the respondents consider that they influence risk management to a large extent.

FIGURE 4 - BARRIERS TO AND DRIVERS FOR RISK MANAGEMENT
Source: own contribution

Regarding the barriers to implement risk management, 50% of the operators stated that the lack of a risk management detailed guide and the human resources resistance to change represent the obstacles that principally affect the adoption of risk management to a large extent. Over 40% declared that the lack of trained personnel, the lack of aknowledgement of risk management by decision-makers and the lask of a risk management related culture also affect to a large extent the implementation of risk management. Among other obstacles are: the lack of financial resources, lack of know-how and the lack of information for risk assessment.

4.4. Common risks

In the completion of the questionnaires the respondents had to select the most frequently met risks within their organizations. Figure 5 illustrates the most common risks indicated by the operators working in the field of CWSASS from Romania who accepted to be involved in the present research.

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It can be observed that the most frequent risks are represented by the old infrastructure, financing risks, human resources risks, lack of prices approval or delay, unpaid invoices, environmental risks, decrease of the water quality, political influences in the managerial decisions, legislation and compliance risks and public healthcare risks according to the operators that completed the questionnaire.

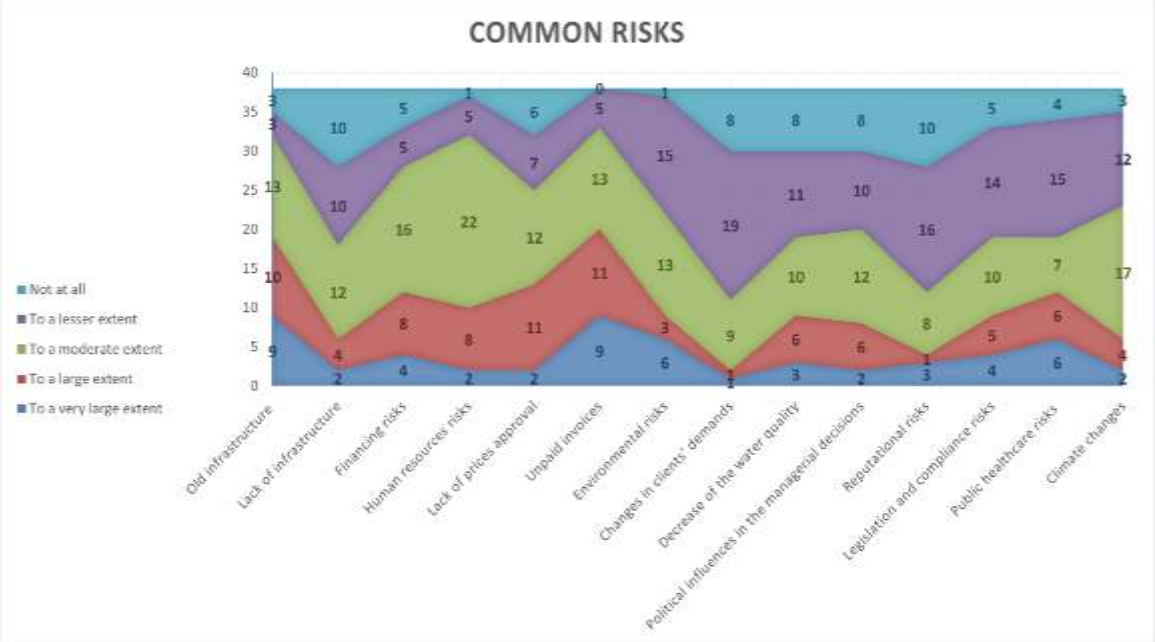

FIGURE 5 – COMMON RISKS
Source: own contribution

All in all, the concept of risk management is starting to be integrated within the operators working in the field of CWSASS from Romania. The lack of information is a considerable barrier to adopting risk management.

One recommendation would be to develop more investment projects related to promoting risk management and elaborating detailed guides to implement the concept. In addition, training employees that work in this field of CWSASS is necessary. In this way, risk management would be integrated in the organizations and risks would be identified, assessed and treated.

5. CONCLUSIONS

After analyzing the answers provided by the 38 main operators on the market of water supply and sewerage services in Romania, the conclusion is that the implementation of risk management in the field of public water supply services is particularly useful for preventing and avoiding many undesirable situations that may arise. The challenge in effective risk management in organizations is the implementation of an integrated management for all types of risk. (Ekwere, N. 2016)

In cities with combined rainwater and sewage systems, floods can destroy treatment facilities and create public health risks (Tucci, 2009). They can also contaminate water reserves, leading to increased incidences of diseases (UN-Habitat, 2011).

The crisis of water management is taking place while the imminent climate changes take place. The latest Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC) presented evidence for "unequivocal" global warming and predicted a warming of 1.80 C to 40 C by 2100.

Water is the main channel for the effects of climate change in urban areas (UN-Water, 2010), and freshwater hydrology will be the most affected by climate change among systems (IPCC, 2007).

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One of the biggest challenges for people is to provide safe and sufficient water for the world's population. For this, many stakeholders use their experience in the field, from economists, specialists and engineers, to political analysts and politicians. (Elimelech, M. 2006).

Unfortunately, the problem related to water is at the global scale. According to a study on water elaborated by World Wide Fund for Nature (WWF), from 2009, despite discussing about using and making water more efficient, the trends forecast the opposite. Until 2025 the water consumption will increase with 13% (WWFb, 2009; Rosegrant et al, 2003). More that 2 billion people will experience water scarcity conditions. (WWFb, 2009; Rosegrant et al, 2003; UNEP, 2002)

The lack of risk management in the water supply industry has already started to produce side effects. For example, water reserves in Cyprus reached the lowest levels in June, 2008 (WWFb, 2009). Consequently, the Greek government decided to transport water to Cyprus with the cost of $70m.

Another example comes from Spain and is represented by the inefficiently controlled water use generally. “The country is perhaps the leading developed-world example of how a long history of investments in water supply infrastructure has failed to provide water security (WWFb, 2009; WWF, 2007)”.

In conclusion, the public water supply and sewerage services have to be aware of the imminent and potential risks, that affect directly the public healthcare, the energy production, all the sectors of industrial and agricultural activities and the financial resources. All operators working in this special field, vital for human survival, have to urgently implement risk management in order to avoid global disasters. (WWFa, 2009)

The results of the analysis show that the Romanian operators apply the risk management sequentially, unsystematically, and only for the business segments in which risk management measures are imposed by regulations, legislation or financial loan agreements. There are also gaps in the knowledge and skills needed to apply specific risk management methods and techniques. Therefore, firstly, the public authorities should aknowledge the global situation regarding the water management. Then, they should impose by legislation the management of risks in this vital field. Investments in risk management courses for operators, decision-makers should be organized in order to disseminate updated information on the importance of effective management of water, the risks, the measures that have to be taken to diminish the negative effects. Consequently, the concept of risk management would be better understood, could be more easily implemented in the organizations and critical risks would be avoided or treated.

The present research can be extended to a larger number of operators working in the public water supply services to discover more information on this topic. Moreover, the analysed questionnaires revealed the need for a detailed guide in implementing risk management. In addition, further research can be carried out in order to identify the most effective risk management tools for risk identification, assessment and treatment.

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