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Enterprise Risk Management (ERM)

MASTER THESIS



Assessing the impact of risk factors in public health projects

Andreas Georgiou

**Supervisor
Pandelis Ipsilandis**

May 2021

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Περίληψη:

Ο κύριος στόχος της διατριβής είναι η αναγνώριση των ρίσκων που επηρεάζουν τα έργα στον τομέα της υγείας και να μελετήσει τις επιπτώσεις που μπορούν να προκαλέσουν στο σχεδιασμό του έργου, στην υλοποίηση του, στην ποιότητα του, στον προϋπολογισμό και στο περιβάλλον.

Η προσέγγιση έγινε μέσω της ανάλυσης του περιβάλλοντος των έργων στη δημόσια υγεία και με την μελέτη περίπτωσης. Η μελέτη περίπτωσης στηρίχτηκε στο γεγονός ότι το τελευταίο μεγάλο έργο στον τομέα της υγείας ήταν η κατασκευή του Γενικού Νοσοκομείου Λευκωσίας. Έκτοτε τα μεγάλα έργα στον τομέα της υγείας σχετίζονται με την αγορά ιατρικού εξοπλισμού για την κάλυψη αναγκών σε νέα τμήματα ή για την αντικατάσταση παλαιού ιατρικού εξοπλισμού.

Η ανάλυση του ρίσκου στηρίχτηκε σε διεθνή πρότυπα όπως το IEC 31010:2019 και το ISO 31000: 2018. Τα στατιστικά δεδομένα συλλέχθηκαν από το eProcurement την πλατφόρμα όπου δημοσιεύονται οι ανοικτοί διαγωνισμοί για την επιλογή του Αναδόχου που θα αναλάβει την προμήθεια, εγκατάσταση και τη μετέπειτα συντήρηση του ιατρικού εξοπλισμού. Επιπρόσθετα, η έρευνα επεκτάθηκε σε ποιοτικά δεδομένα που συλλέχθηκαν από τα έγγραφα των διαγωνισμών για την ανάληψη του έργου, καθώς και με εξειδικευμένη αναζήτηση σε βάσεις δεδομένων.

Κατά την έρευνα υπολογίστηκαν η πιθανότητα του κάθε ρίσκου να συμβεί και οι επιπτώσεις του. Επιπρόσθετα, η έρευνα επεκτάθηκε και στους τρόπους που έχουν αναπτύξει οι οργανισμοί στο δημόσιο τομέα της υγείας για να αντιμετωπίζουν τα ρίσκα.

Τα αποτελέσματα της έρευνας είναι σημαντικά για όλους όσους εμπλέκονται στις διαδικασίες των έργων της δημόσιας υγείας και μπορούν να αποτελέσουν τη βάση για μελλοντική έρευνα.

Summary:

The main goal of the thesis is to identify the risks that affect projects in the health sector and to study their impact on the planning, implementation, quality and budget of the project and to the environment.

The approach was made through the analysis of the health project environment and through a case study. The case study was based on the fact that the last major project in the health sector was the construction of the Nicosia General Hospital. Since then, major health projects have been related to the acquisition of medical equipment to meet the needs of new departments or to replace old medical equipment.

The risk analysis was based on international standards such as IEC 31010: 2019 and ISO 31000: 2018. The statistical data were collected from eProcurement, the platform where the open tenders are published for the selection of the Contractor who will undertake the supply, installation and subsequent the maintenance of the medical equipment. In addition, the research was extended to qualitative data collected from the tenders' documents for the undertaking of the project, as well as by specialized search in databases.

During the research, the probability of each risk to occur and its consequences were calculated. In addition, the research extended to the ways in which public health organizations have developed to address risks.

The results of the research are significant for all those involved in the processes of public health projects and can be the basis for future research.

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Chapter 1

Introduction

In the last decade, due to the financial crisis a lot of reforms and additions to the existing laws were decided by the Government of Cyprus in order to reduce risks and increase the awareness of future crises. The public projects were affected by the reforms, and with the new legislation and regulations the control of the procedures was increased.

The sector of health has a significant share on the Government's budget because one of the main Government's tasks is to provide high quality health services for all its citizens. Additionally, the value of medical equipment, medicines and disposables is high, due to their technical specifications which are either complicated or specific and unique. The estimation of the value of a project is likewise a complicated procedure and additional unexpected costs are hardly to be approved and cause delays on the schedule of the project.

It is a common belief that due to bureaucracy public projects' procedures are more complicated from the procedures of the private sector and thus the public projects need more time to be implemented in comparison with same size projects in the private sector. The bureaucracy is expected due to the fact that the procedures of the public sector are regulated. The public authorities when the project is planned, must consider the relevant articles of the law, the regulations, and the circulars, and simultaneously assess how to

avoid unnecessary delays and unexpected extra costs in contrast with the private companies that their procedures are depending on standards and policies.

However, the projects of the health sector are special, and it is important to be completed as scheduled. Any deflections from the schedule of the project may affect the public health and the expected revenues from the project. Mentionable from international bibliography is the article written by Kraft and others, published in "The Journal of Pediatrics" which concludes among others that delayed care is associated with worse health outcomes (Kraft, et al., 2009). Moreover, another research associates the delayed health care with patients' mortality (Prentice & Pizer, 2007). These two articles are a small sample from numerous other referring to the importance of the timely diagnosis and treatment for cancer, diseases, heart problems and others.

Additionally a recent example, at the beginning of 2020, corona virus was spreading in Wuhan, hospitals in the city had been flooded with concerned residents and pharmacies were running out of medicine (Business Insider, 2020). China was the first country which faced the crisis of the new virus. In order to decrease the consequences of the crisis, the Chinese Authorities were decided the "impossible" and impress the whole world, to build a specialized hospital for coronavirus in just six days. The whole project contained the construction of a two – storey hospital with several isolation wards and 30 intensive care units which can hold up to 1000 patients, the supply of the hospital with equipment, medicines and medical consumables and the recruitment of 150 specialized medical personnel (BBC News, 2020). For the history, the project was fully executed in ten days (Business Insider, 2020), time which is still impressing. In this case Chinese Authorities realized that the virus caused death to its people and acted quickly building a new hospital to treat the infected from the virus patients and protect them. Nevertheless, it is safe to say and a common belief, that hospital or other major health projects can save lives.

Taking into consideration the consequences of unexpected delays and the importance of the on-time implementation of a project related with the health care, the purpose of the thesis is to identify internal and external risk factors during the procedure of public projects of

health sector that affect the planning, the schedule, the quality and the budget of the project as well as the environment and assess their impact.

The thesis aims to underline what can go wrong to a well-planned project and help project managers, procurement managers and officers, decision-making committees and other involved parties in the health sector's projects with the prioritization of the risks. The prioritization of the risks is important for the reduction of the impact of the event to the public health. In cases where the impact cannot be reduced the stakeholders may consider strategies to reduce the likelihood of the event to occur.

Chapter 2

Management of Public Projects in Cyprus

During the last decade, the environment of the Public Project Management in Cyprus has been reformed. As Albert Einstein once said, “in the midst of every crisis, lies great opportunity”. In 2012, when the financial crisis started in Cyprus, due to the large exposure of its financial institutions to the Greek Economy, Cypriot Government asked from the European Union financial bailout (Al Jazeera Media Network, 2012). Troika, the consortium of the European Commission, the European Central Bank, and the International Monetary Fund, during the assessment of the application of the Cyprus Government for funding, spotted weaknesses in the procedures of the Government and sectors where the expenditures were huge, and the controls were limited. More specifically, the Troika in order to proceed with the financing of the Government, demanded the control of the Banks to be centrally conducted by the Central Bank of Cyprus, the enactment of legislation making the balancing of budgets mandatory and for the health sector, controls to decrease the unnecessary expenditures and increase of the contribution of the eligible for public care (Cyprus Mail, 2012).

The Cyprus Government, in March of 2013 agreed with the European Union and the International Monetary Fund to be funded with ten billion euro to prevent the bankruptcy

of the banking system and the exit of the country from the euro zone (e-kathimerini, 2013). For the bailout, the government and Troika signed a memorandum of understanding which generally contained the below:

- Implementation of anti-money laundering procedures and development of legislations for the financial institutions,
- Fiscal consolidation to decrease the deficit of the Government's budget,
- Reforms for restoration of the competitiveness and for macroeconomic imbalances,
- Scheme for privatization of public organizations (European Commission, 2013).

The Cypriot Government to comply with the terms and conditions of the memorandum of understanding applied austerity measures and decrease of the public expenditures. As a result, the budget of the public projects was limited and there was a prioritization of the projects.

To overcome the difficulties in the next couple of years, Government re-organized and renamed the Planning Bureau to Directorate General for European Programmes, Coordination and Development for the optimization of the usage of available European and other funds (DG EPCD, 2013).

Additionally, public authorities when they are not reclaiming European Funding for their projects, they depend on the approval of the yearly budget from the parliament. Recently, at the end 2020 the parliament did not approve the suggested budget for 2021 of the Government of the Republic and all the public projects were frozen until the approval after reforming of the budget in January of 2021 (Press and information Office, 2021).

The requirement for European Union's funding, was the harmonization of the Local Legislation for public projects and procurements with the European and the control of the procedures. The department of the Government that appointed as the Competent Authority for Public Procurement ("CAPP"), to review and secure the procedures of the public projects which were co-financed by the EU, was the Public Procurement Directorate of the Treasury of the Republic (Treasury of the Republic of Cyprus, n.d.).

Since the appointment, the CAPP is responsible to:

- represent Cyprus in the European Union’s Competent Committees for the discussion and definition of procurement policies in European level,
- monitor the Government’s departments regarding the implementation of legislation, regulations and circulars to ensure that the main principles of transparency and equal treatment of the Tenders and the Contractors are respected,
- support, prepare manuals of best practices (now “the manual”) and circulars to acknowledge the Government’s Departments regarding the implementation of legislation and regulations,
- review and update the processes to match with the new regulations related with GDPR, procurements and projects,
- train the public servants who participate at the procedures and provide guidance
- Provide to interested parties tools and support to use the electronic procurement system of the Government (e - procurement) (Treasury of the Republic of Cyprus, n.d.).

The provision of guidance to other public departments is realized with a manual of best practices (now “the manual”) published by CAPP where the procedures are explained analytically. CAPP is additionally responsible to review and update the practices periodically. The manual’s techniques are based on widely used international project management guides and methodologies, such as PRINCE 2, the Project Management Institute's Project Management Expertise Guide (PMI's PMBOK Guide), the NYS (New York State) Project Management Guide, the Agile Project Management (APM) Methodology, the European Union’s Project Cycle Management Guidelines, the MS Project 2000 application (online & offline help) and on the laws, regulations and circulars of the Republic (Competent Authority for Public Procurement, 2019).

2.1 Public Projects in the Health Sector

The definition of project according to dictionary is “an individual or collaborative enterprise that is carefully planned to achieve a particular aim” (Lexico, n.d.) though the translated definition which is given in the laws of the Cyprus Republic is “the result of a set of construction or engineering work, which in itself is sufficient to perform an economic or

technical operation". The non - construction projects, for example projects for acquisition of medical equipment are categorized as procurements and consequently their documents are simplified regardless their estimated value. Nevertheless, the main phases of either a public project or a public procurement as described in the manual of CAPP are the same.

Every project according to the manual has four phases. The beginning phase, the planning phase, the implementation and control of the project phase and the closure phase.

2.1.1 Beginning Phase

The first phase starts with the identification of necessity. The Governmental Department appoints the Project Manager in the case of a project or the Co-ordinating Officer in the case of procurement to write a Business Case Report, a Cost – Benefit report and conduct a Market Research. The purpose of these reports is the estimation of the value of the project, the approval of the funds and the inclusion of the acquisition to the Government's budget.

Upon the approval of funding, the Governmental Department's General Manager, or the approving authority of the organization, appoints along with the project manager or the coordinating officer the other members of the project team. The project team usually consist experienced technicians, counselors and experienced officers and the purpose of its appointment is to prepare a report with:

- the goals and the scope,
- the main activities, the specifications, and the deliverables,
- the management of the project and the roles,
- the risks and
- the budget

2.1.2 Planning Phase

The planning phase begins upon the approval of the aforementioned report by the approving authority. At the planning phase the external associates are chosen after the Tender procedure and along with the other member of the project team, discuss, agree, and finalize the plans of the project.

The Tender procedure is considered as the most time-consuming stage of the planning phase of a public project. In contrast with the private sector, the tender procedure and the sign of the public contracts are conducted according to Laws and Regulations.

Tender's document must be drafted according to standard documents which are written and reviewed by CAPP. The responsibility of the procedure has the procurement manager with the association of the procurement officers and the cooperation of the project team. The standard document consists as Part A the General Terms of the Tender, as Part B the draft Public Contract, as ANNEX 1 the Legal Conditions, as ANNEX 2 the Special Technical Terms and a Form with the analysis of the Technical Specifications as described in the Project Fiche.

The Procurement Manager according to the budget decides the type of the procedure to be followed. There are four available types of procedures which are included in the Law and they are the following:

The simplified procedure when the estimated cost of the project does not exceed the €50.000 then the Procurement Manager is publishing the Tender's documents at least to four (4) interested companies to submit their offer. To avoid the four companies to create a cartel, the Tender's documents are published to the four companies separately.

Restricted procedure: For the projects with estimated cost above €50.000, when a lot of companies have the capability of the implementation of the project and the Tender procedure is split at two parts in order to reduce the number of the submitted offers. At the first part the interested companies are submitting the documents related with their eligibility to participate at the procedure, technical experience, economic results, and their licenses (if applicable). The Evaluation Team of the contract selects the companies that cover all the criteria and publishes them the second part of the Tender's documents which consists the Technical Specifications and expecting their economic offer.

Open procedure: The Tender's documents are published on the electronic platform of the Government called e-procurement and all the interested companies are invited to upload

the necessary documents to prove their eligibility to participate at the procedure, their comply with technical specifications and their economic offer.

Negotiated procedure: This method is used in extreme cases when:

- copyrights exist,
- additional works must be done by the same contractor,
- No offers submitted after the conduction of open or restricted procedure,
- The submitted offers do not comply with the technical specifications or the budget,
- Technical Specifications are unique and complicated.

The contracting authority cannot follow the other procedures for an urgent need and due to events, which the contracting authority could not have foreseen, with the condition that the circumstances used to prove the urgency shall in no case arise from their own responsibility.

Following this procedure, the procurement manager selects and publishes the Tender's documents to the companies which can execute the project. The negotiated procedure is also used by the Contracting Authority to approach two or more companies from different or similar industries to create joint ventures in order to succeed an innovative outcome. The companies are submitting application for their participation in the procedure and the public authority is calling the interested companies and starts the negotiations. The parties are negotiating both the technical specifications and the estimated prize. At the end of negotiations, the evaluation committee of the Contracting authority assesses the last version of the companies' offers in order to reach the best deal.

In case of additional works for a project, the Contracting Authority has the right to approach the contractor and negotiate the technical specifications and the value of the additional works without publishing the procedure at the Government's gazette.

The thesis is based on the projects related with the acquisition of medical equipment. Medical equipment is special, and the suppliers are few. As a result, for these projects the procurement managers are choosing the open procedure.

The open procedure is divided in five major periods. The preparation of the documents period, the publication of the documents and the submission of the offers, the assessment and evaluation of the offers, the acknowledgment of the results and the time given for appeals, and finally the sign of the contract.

The duration varies due to the complexity of each project. The Procurement Manager is setting the timetable of the whole procedure and is responsible for any delays. Moreover, the procedures the timetable must be aligned with the minimum or maximum time defined by the law, the regulations and the circulars for each step of the procedure.

The Law 73 (I) of 2016 is defining the minimum time for the period where the suppliers have to prepare and submit their offers. According to the law, the time depends on the type of the procedure and the estimated value of the project. The Law is splitting the estimated value according to the lowest thresholds that European Committee is setting periodically. The below table is showing the lowest thresholds for the period starts at 01/01/2019 and ends at 31/12/2021:

	Procurements (€)	Constructions (€)
PUBLIC SECTOR Central Authorities (Ministries, Independent Offices and Services)	139.000	5.350.000
BROADER PUBLIC SECTOR Non-central contracting authorities (Public Law Organizations and Local Authorities)	214.000	5.350.000

Table 1. The lowest thresholds of European Committee for Organizations in Public and Broader Public Sector - Retrieved from the circular ΓΛ/ΕΔ 21 of the Treasury of the Republic.

For public contracts with estimated value over the lowest thresholds of the European Committee the minimum time for the submission of the offers is:

Type of Tender Procedure	Reference at Law's article	Description	Minimum Days
Open	24 (2)	The access to Tender's documents digitally, free, direct and complete.	35
Open	52 (1)(β)	The access to Tender's documents is <u>not</u> electronic, free, direct and complete.	40
Open	24 (5)	The access to Tender's documents is electronic, free, direct and complete and the submission of the offers is electronic.	30
Open	24 (3)	Submission period when the contracting authority have already published preliminary notice for the Tender.	15
Open	24 (4)	For duly substantiated urgency.	15
Every procedure	44(3)(α)(i) 52 (2)	Additional time in case of further requirements by the contracting authority	6
	44(3)(α)(i) 52 (2)	Additional time in case of further requirements by the contracting authority and there is a duly substantiated urgency (article 24(4)).	4

Table 2. Minimum days for Open Tenders over the lowest thresholds according to Law N73(I)/2016

For public contracts with estimated value below the lowest thresholds of the European Committee the minimum time for the submission of the offers is:

Type of Tender Procedure	Reference at Law's article	Description	Minimum Days
Open	89 (1)(α)	Submission period for the offers.	14
Open	89 (1)(β)	Submission period for the offers in case of duly substantiated urgency.	10
Open	89 (3)(β)	Submission Period of the participation applications from the interested parties in case of duly substantiated urgency.	10
Open	89 (3)(β)	Submission period for the offers in case of duly substantiated urgency.	10
Every procedure	89 (1)(γ) & 89 (2)(γ)	Additional time in case of further requirements by the contracting authority	4
	89 (1)(γ) & 89 (2)(γ)	Additional time in case of further requirements by the contracting authority and there is a duly substantiated urgency.	3

Table 3. Minimum duration in days for Open Tenders below the lowest thresholds according to Law N73(I)/2016

The above tables are showing that the Law is giving to the interested companies reasonable time to carefully assess the technical specifications of the project and submit their best offer.

The offer's evaluation and assessment period is mentioned at the CAPP's circular ΓΛ / ΑΑΔΣ 102. The evaluation committees as stated at the circular must start the assessment the first

working day after the deadline for the submission. The participation applications must be evaluated within three (3) days and the technical and economic offers of the Tenderers within thirty (30) days due to the complexity of the checks on the technical specifications. During evaluation process the members of the committee are checking if the Tenderer is covering the participation criteria, the medical equipment have the required technical specifications and the Economic Offer does not exceed the estimated value. The winning bidder is the Tenderer with either the best Economic Offer or the best score from a formula consisting quality and prize criteria. The evaluation committee issues the evaluation report which reaches to the decision for the Winning Bidder, and the approving authority validates the decision.

Another period set by Law 104(I) of 2010, is the period for appeals to the Tenders Review Authority. According to the Law's article 21, tenderers have the right to appeal within fifteen days starting the day after the date of the letter of acknowledgement of the decision of Contracting Authority. The period decreases to ten days when the Contracting Authority can prove that the date of receipt of the letter of acknowledgement of the decision match with the letter's date. When the time period of appeals passes, the winning bidder has twenty days to contact with the procurement manager to arrange the signing of the Contract.

The other periods of the Tender procedure have not strict deadlines. Although the procurement manager with his experience may calculate the days needed for the main tasks of each period and create the Tender's timetable.

The Tender Procedure and the sign of the contract is quite important for the whole project. First of all, the project's value is agreed by the signed contract and the Project Manager has the real values of the project's phases, not financial forecasts. Second, the technical specifications are also agreed. Third, during the whole procedure, the Tenderers with their experience and their targeted questions are helping the Project Manager to indicate miscalculations or errors and proceed with corrective actions.

The planning phase ends when the Project Team with the association of the new contractor is finalizing the plans below:

- The Project plan which includes the timetable of the activities with exact dates, the Resource Management Plan for the definition all the necessary human resources, equipment, machinery, materials for each point and Cost Program (determination of internal and external cost elements and their realization time)
- Risk Management Plan with the possible risks and how the risk may be managed.
- Quality assurance plan and Acceptance of the deliverables Plan which describe analytically the quality assurance procedure and the criteria and the processes for conducting the acceptance tests and who from the part of the public authority will check the whole process.
- Application for Changes Plan. This plan describes the process of managing changes with impact on the deliverables, cost, timetable, or quality of the Project.
- Communication Plan that refers to the methods of communication between the stakeholders and Plan for the management of Issues and Conflicts.

Moreover, during the planning process, the Project Manager sets the key performance indicators (KPIs) to be used at the next phase of the project's implementation and control or even at the last phase of the evaluation and closing of the project.

2.1.3 Implementation and Control of the Project phase

Implementation and control phase of the project is the phases where the execution of the project starts by the contractor and the deliverables are presented to the Project Manager and his team for inspection and acceptance. Project Manager controls the work of the contractor, the resources, and the cost of production during the execution phase, in order to ensure that all the agreed requirements of the planning phase are met. Analytically, the Project Manager monitors the activities according to the plans and applies:

- Schedule Management to proceed with corrective actions when the activities and tasks are delaying the project.
- Resource Management for the better allocation of the resources
- Cost Management to keep the costs within the budget.

- Change Management for necessary changes in the contract related with the cost, the timetable, the deliverables. Any change to the initial contract is subjected to the approval of the Central Committee on Changes and Claims (“CCCC”).
- Risk Management. This process starts with the risks that had been identified at the planning phase and how the risks had been managed and continues with the new risks that are identified during the project’s execution and the actions to prevent damages and mitigate each risk.
- Quality Management to ensure the quality of the deliverables and Acceptance Management process where the KPIs are applied to help with the decision of the Contracting Authority whether the deliverables will be accepted or need modifications to be accepted.
- Communication Management to ensure that all the relevant information is distributed to the interested parties and Issue and Conflict Management process which identifies, evaluates and resolves conflicts and issues related with the project.

2.1.4 Closure of the Project Phase

The main purpose of this phase is the evaluation of the results of the project. The evaluation is important and necessary for the record of any miscalculations and for the development of better practices that will be used for future similar projects. Moreover, all the documents and data of the project are archived for convenience according to the regulations. The last phase of the life of a public project includes the below management processes:

- Administrative Closure. At this process, the relevant with the project files are collected and archived. In addition, all the encumbered resources are released.
- Project Evaluation Review which appraises whether the project’s objectives were achieved, what variations occurred, the quality, the contractor’s performance, etc.).
- Post-Project Review which estimates the profits from the project after a period of operation.
- The last process (Post-Project Review) normally is not included at the framework of the Project.

2.2 Public Health System in Cyprus

The Public Health System from June of 2019 entered to a new era. The Health Insurance Organisation (“HIO”) started the implementation of the General Health System (“GHS”). GHS was inspired by Britain’s NHS and its vision is to provide lifelong quality health services to all its beneficiaries and to be a people-centred system based on social solidarity, justice, and universality (Health Insurance Organisation (HIO), n.d.). So far, the GHS provides diagnoses from personal and specialized doctors, blood and other analyses from labs, medicines and medical devices from pharmacies, Inpatient Healthcare and recently dental care and physiotherapies (General Health System, n.d.). As the implementation of GHS continues, more health services will be added at the existing list of services.

The first stage of the implementation of GHS started with the participation of Doctor of Public and private sector. The remuneration of the doctors was defined and paid by HIO. Unfortunately, public doctors could not redeem their remuneration from HIO due to their presence at the government’s payroll. To overcome this problem, the State Health Services Organisation (“SHSO”) was established to recruit doctors, nurses, and other staff of the public sector and to settle their remuneration from the GHS’s compensations. In addition, SHSO with the recruitment and (re)placement of the staff at specific positions aims to the independence of the public hospitals (State Health Services Organisation, n.d.).

Moreover, SHSO at the near future will be also responsible for the operations and the equipment of the public hospitals all over Cyprus.

With the establishment of the HIO and SHSO, the Ministry of Health (“MoH”) was distressed. The operational and administrative activities of MoH decreased and as a result the strategic plans of MoH changed. The new plans are including the:

- I. Restructuring of the Country Health System
- II. Upgrading e - health
- III. Presence in European and International Committees
- IV. Promotion of Health awareness and Disease Prevention
- V. Management, Training and Development of Human Resources of the sector

- VI. Development of Research, Technological Development, and Innovation Activities through projects (Ministry of Health, 2019)

Public Health Sector structure is attached as “Appendix A”.

2.2.1 Social Factors Affecting the Public Health Sector

The GHS is designed to be a people centered system. The beneficiaries of GHS are:

- I. Citizens of the Republic of Cyprus and ordinary residents of the areas controlled by the Republic of Cyprus or the sovereign territories of the United Kingdom of Great Britain and Northern Ireland bases in Cyprus.
- II. European Union (EU) Citizens working in the areas controlled by the Republic of Cyprus, or have a permanent residence permit, in accordance with the provisions of The Right of EU Citizens and their Family Members to Move and Reside Freely within the Territory of the Republic of Cyprus Law
- III. Non-EU Citizens who have a permanent residence permit in the areas controlled by the Republic of Cyprus or have the right of equal treatment in the social insurance sectors, in accordance with the Aliens and Immigration Law
- IV. Refugees who have been granted refugee or subsidiary protection status, in accordance with The Refugees Law
- V. Beneficiaries’ dependents of all the above categories (GHS, n.d.).

The above categories cover almost all the residents and all the ages living at the areas controlled by the Republic of Cyprus.

2.2.2 Technological Factors Affecting Public Health Sector.

The tools, the equipment, the knowledge, and expertise of these days are helping the manufacturers of medical equipment to improve the specifications of their product. Each year the quality, the design, the size, the effectiveness, the efficiency, and the user friendliness of the equipment are improved due to new materials, technologies, and software.

On the one hand the medical equipment is improved but on the other hand the complexity of the specification increases. Consequently, the project manager and the other members of

the project's team who are involved in projects related with the acquisition of medical equipment, must have the knowledge and the experience to draft the technical specification's document which is included in the tender's documents. Moreover, the knowledge and the experience are helping the project's team at the evaluation of the technical specifications of the offered equipment.

Nevertheless, the electronic platform eProcurement is a tool that is giving the opportunity to the public authorities to communicate with suppliers and contractors and discuss about the estimated value of the project, the technical specifications, and the suggested timetable. Additionally, by using electronic tendering, eProcurement supports the digital preparation and submission of offers, while providing the interested Economic Operators tools for the preparation of their offers. Moreover, eProcurement allows to the Contracting Authorities to publish easily at the government's gazette their open tenders, to upload their Tenders' documents, to inform the interested economic operators for clarifications regarding the Tender, to carry out a secure electronic offer opening, and to use electronic evaluation and assignment. With these options eProcurement offers automated operations that achieve the procedures faster and cheaper, and reduce the administrative costs for all participants (Georgiou, 2009).

2.2.3 Environmental Factors Affecting Public Health Sector.

The protection of the environment is significant goal of public hospitals and public health centers. As the major producers of medical waste in Cyprus, public hospitals and public health centers have waste management policies to ensure that their medical wastes are transferred and managed by licensed organizations in order to avoid the pollution of the environment by chemical or toxic wastes.

Moreover, project managers of the projects of replacement of old equipment at the planning phase of the project are examining how to manage the uninstalled old equipment. At his plan, the project manager examines the operating state of the old, uninstalled equipment and suggests to:

- a. Be managed as electronic waste.

- b. Be sold for spare parts.
- c. Be reinstalled in a new room.
- d. Be resold to other health organizations.
- e. Be donated to other health organizations.

2.2.4 Legal Background of Public Health Projects

Public health projects and procurements are regulated. In particular, during the planning and the implementation and control phase, the below Laws and Regulations must be followed during planning and implementation and control phase:

1. Law on the Regulation of the Procurement Procedures and Related Issues {Law 73 (I) / 2016}.
2. Law on Appeals Procedures in the Sector of the Conclusion of Public Procurement {Law 104 (I) / 2010}.
3. Regulations for the Coordination of the Procurement Procedures for Public Procurement, Projects and Services (Municipal) {KDP 243/2012}.
4. Regulations on the Management of the Execution of Public Procurement and the Procedures of Exclusion of Economic Operators from Public Procurement Procedures (KDP 138/2016).
5. Regulations on the Coordination of the Procurement Procedures for Procurement, Projects and Services (Use of Electronic Media) (KDP249 / 2009).

The above laws and regulations with their modifications and additions are in alignment with the European Union's law and regulations for procurements, projects, and services, according to the request for identification of the procedures from European Organizations who fund the public projects.

The main goals when these laws and regulations were voted by the parliament were the reduction of the corruption, increase of the transparency of the procedures and avoidance of discriminations.

In addition, taking into consideration the high value of the public projects, the hiring of a small group of companies for their execution is increasing the risk of the creation of

oligopolies and cartels. The laws and regulations aim to promote the competition between the companies of the same field (Competent Authority for Public Procurement, n.d.).

The application of the laws and regulations is increasing the transparency of the procedures. Every step, every decision and every approval are available for all the stakeholders. The Offering Companies have also the right to appeal at the Tender Review Authority when they believe that the procedure was not conducted legally.

On the other hand, private sector has more simplified and rapid procedures and the Project Manager must be very careful to reduce the legal risk. Nevertheless, either the legal department of the company or experienced legal advisors consult Project Manager to decrease the legal risk. With the right coordination, the contracts are signed without delays.

Nevertheless, the law on appeals is giving the right to the Tenderers to dispute the decisions of the public organization through the Tendering procedure. The Tender Review Authority is the responsible authority to examine the procedure and decide if the appeal is approved or rejected. Meanwhile, during the examination the Tender Review Authority freeze the Tender procedure before the signing of the contracts until the authority's final decision.

2.3 Case Study

2.3.1 Scope

The new General Hospital of Nicosia was the last major construction project of the health sector of the Government. The majority of the projects are based on acquisition and installation of medical equipment either for new departments or for replacement of old equipment and the research is based on this category of projects. As it was mentioned earlier, medical equipment is important for diagnostic purposes and for the early treatment of cancer, heart, neurological and other deceases. Furthermore, some stages of the projects' procedures related with medical equipment, such as the Tendering procedure, are published in the Government's gazette for transparency reasons and thus data are available from Tenders' documents. The Tenders' documents usually include important information

for the project, such as the timetable, the estimated cost and special conditions regarding the implementation of the project. The table below contains the information of projects of the public health sector and the information was retrieved from the published Tenders' documents:

ORGANIZATION NAME	Title	Ref. No.	Estimated Value / Budget (€)
Bank of Cyprus Oncology Centre	Προσφορά για την Προμήθεια, Εγκατάσταση, δοκιμαστική λειτουργία, εκπαίδευση στη χρήση τριών (3) γραμμικών επιταγχντών για τις ανάγκες του ακτινοθεραπευτικού τμήματος του Ογκολογικού Κέντρου Τράπεζας Κύπρου.	Π08/2018	9.160.000
Ministry of Health	Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση Ψηφιακών Ακτινογραφικών Συστημάτων για τις Ανάγκες των Κρατικών Νοσηλευτηρίων.	Σ.Υ.26/2017	5.390.000
Department of Electrical and Mechanical Services	Προμήθεια και συντήρηση ασθενοφόρων	13.25.20.15.005.ΕΠ.ΗΜΥ	4.260.000
Ministry of Health	Προσφορά για την Προμήθεια Εγκατάσταση, Εκπαίδευση και Συντήρηση Μαγνητικών Τομογράφων για τις Ανάγκες των Γενικών Νοσοκομείων Λευκωσίας και Λεμεσού (Δικαίωμα Προαίρεσης)	Σ.Υ.79/15	4.100.000
Ministry of Health	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση Συστημάτων SPECT – CT για τα Τμήματα Πυρηνικής Ιατρικής των Γενικών Νοσοκομείων Λευκωσίας και Λεμεσού.	Σ.Υ.61/18	2.000.000

Table 4. Details of the five biggest projects of the health sector the last six years.

Chapter 3

Risk Assessment

Risk Assessment according to the International Standard ISO 31000: 2018 is the overall process of risk identification, risk analysis and risk evaluation.

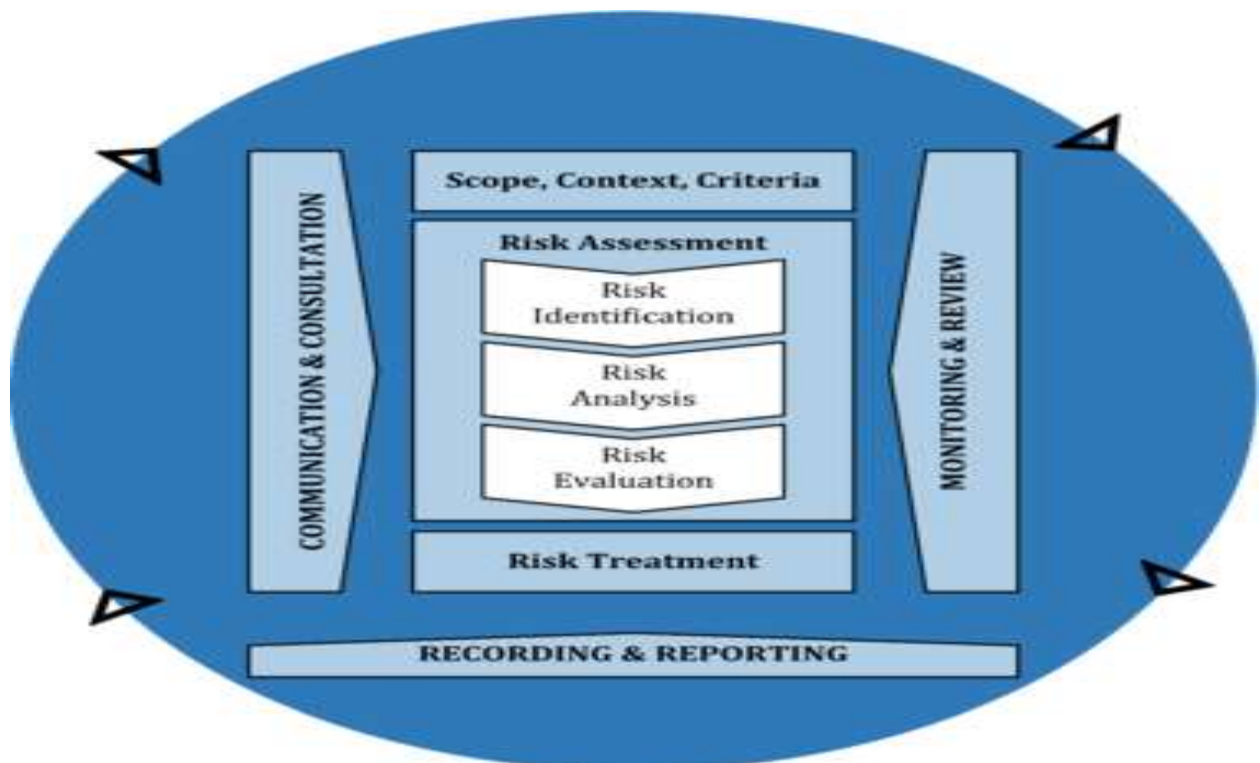


Figure 1. Risk Assessment according to the International Standard ISO 31000:2018 (Online Browsing Platform (OBP), 2021)

3.1 Risk Identification

The idea of the risk identification is the recognition and description of the risks that may prevent the public authority to achieve its goals and plans. For the purposes of the research, the identification of the risks is based on SWOT analysis (Baumann, Erber, & Gattringer, 2016).

This tool is a frequently used strategic analysis method, which divides the environment of an entity into internal and external sections, the former includes strengths and weaknesses and the later consists of opportunities and threats (Zhou & Yang, August 2011).

The overall analysis of the internal and external factors that affecting the public health organizations is based on data retrieved from the published Tenders' documents of the projects, official websites of the public health organizations, newspaper articles, literature and my personal experience as Procurement Officer at Bank of Cyprus Oncology Center.

The public health organizations depend greatly on Government's decisions and the external factors are affecting more the organizations than the internal factors. The analysis of the external factors is based on the Political, Economic, Social, Technology, Legal and Environmental factors that were analyzed previously in Chapter 2. Additionally, strengths and weaknesses of internal factors that affecting the public health projects, such as the personnel and the reputation of the public health organizations, are analyzed at the table below:

	Strengths	Weaknesses
Personnel	<ul style="list-style-type: none"> ➤ Experience at the projects of acquisition of medical equipment ➤ Personnel with a variety of specialties (medical physics, medical engineering, radiology, radiotherapy, oncology, and others). ➤ Experience and the expertise of the personnel are important for the understanding and the evaluation of the technical specifications of equipment. 	<ul style="list-style-type: none"> ➤ Lack of legal department for consultation on legal matters. Ministry of health structure is attached as “Appendix A”.
Reputation	<ul style="list-style-type: none"> ➤ Provision of free (or almost free) health care services to individuals, families, and elders with low income and ➤ Provision of health care services to people with illnesses that need special and periodical treatment (Ministry of Health, n.d.). ➤ Unique Medical equipment in Cyprus and provision of special treatment to all the residents of the island. 	<ul style="list-style-type: none"> ➤ Big waiting lists and the delays for MRIs, ultrasounds and other treatments or diagnostic methods. (Cyprus News Agency, 2015).

Table 5. Strengths and Weaknesses Related with the personnel and the reputation of the public health organizations

Taking into consideration the public project procedure, the environment of the public health projects and the weaknesses of the public health organizations, the below risks are identified during for public health projects’ procedure:

- Political Risk
- Advanced Technology Risk

- Environmental Risk
- Budget Risk
- Compatibility Risk
- Legal Risk
- Schedule Risk
- Communication Risk
- Resources Risk
- Quality Risk.

Chapter 4

Research Questions and Research Methodology

Risk identification is the first stage of risk assessment process. The other two stages are risk analysis and risk evaluation. The purpose of risk analysis is to comprehend the nature of risk and its characteristics including the level of risk. During risk analysis, the uncertainties, the consequences, the likelihood, the events, the scenarios and the controls are considered. Moreover, events have a variety of causes and consequences and can affect in multiple ways the project.

Analysis techniques are qualitative, quantitative or a combination of these and depend on the circumstances. Moreover, risk analysis is usually based on the perception of risk and judgement. Information and their quality, assumptions and limitations are considered, documented and communicated.

The results of risk analysis are providing the information for the risk evaluation where the decisions for the risks are taken. The evaluation of the risk includes decisions such as:

- do nothing;
- study the choices for the treatment of the risks;
- proceed with further analysis for better understanding of the risks;

- apply the existing controls;

Risk evaluation's outcome must be communicated and then validated at appropriate levels of the organization.

In the following subchapters are described the research questions and the research methodology for the risk analysis.

4.1 Research Questions

For the research purposes, the following questions are examined for each risk:

- Where historical data or other data can be found for the risk analysis?
- Are the data reliable?
- Do any uncertainties appear during the data collection?
- Is there any additional quality of quantity data?
- What are the available risk assessment techniques?
- What is the likelihood of a risk to occur and what are the consequences?
- What triggers the risk?
- How are risks managed by the project managers?
- How risks can be evaluated?

4.2 Research Methodology

4.2.1 Data Collection

Data collection is important for the results of the research. Data from unreliable sources increase the risk of deviations from the real picture. The data are retrieved from official, reliable sources, in order to decrease the risk.

The quantification of the risk factors and the assessment of the risks are achieved with secondary data retrieved from the database of the Treasury Department of the Government and from the platform eProcurement which is collecting statistics data for the Government's projects and procurements since 2015.

In 2009 a new regulation was approved by the Parliament of Cyprus. The new regulation allowed the Public Organizations to use digital methods during the Tender procedure and supported the operations of the newly presented eProcurement platform. Government with the development of the new electronic public procurement system (eProcurement) aimed to carry out transparent and reliable procedures. EProcurement platform is a reliable source for data regarding the projects of acquisition of medical equipment.

Nevertheless, the digital platform is collecting information and provides complete statistical results regarding the public procurement in Cyprus at any time. The operation fulfills the obligation of Cyprus as an EU Member to send timely and valid data to the European Commission every year, while eProcurement is the certified electronic sender to the Official Journal of the European Union (Georgiou, 2009). Historical data are used for the investigation for trends and for future predictions.

The data retrieved from eProcurement statistics are available in Appendix B, subsection B.1.

4.2.2 Quality data

In addition to the quantitative data, the assessment of some risks is achieved with quality data.

The data related with the legal obligations of the projects are retrieved with advance search in the electronic databases of the Cyprus Bar Association (www.cylaw.org) and the Tender Review Authority official sites. The Cyprus Bar Association database includes all the court decisions for lawsuits against the public health organizations and the database of the Tender Review Authority includes all the appeals and the decisions of the Authority.

Furthermore, another operation of the eProcurement platform is to store the Tenders' documents and to maintain them available until the documents moved to archive. Tenders' documents include useful information for the projects.

Nevertheless, when no quantitative or quality data are available, information regarding the risks is found in literature or newspapers' articles. Furthermore, my personal experiences

as the Procurement Officer at Bank of Cyprus Oncology Center are used. The responsibilities of the position are the participation as a member in Project Teams, the coordination of Tendering procedures, the preparation of Tenders' documents, the participation in Evaluation Committees, the preparation of the contracts and full responsibility of small projects related with hospital or office equipment.

4.2.3 Scenarios and assumptions

In Chapter 2, sub charter 2.1, are explained the minimum deadlines of the regulated procedures of public projects. The minimum deadlines are not used by the project managers for all the projects. The comparison of these cases with the scenario of the project manager applying the minimum deadlines is showing how the project managers are dealing around risks.

4.2.4 Uncertainties

In general, historical data are looking back at observed outcomes but it can be very misleading if future developments do not correspond with past experience.

During data collection the following difficulties were emerged. EProcurement platform when a Tender is archived, the documents of the Tender are no longer available. Instead, the platform is showing only the main information of the Tender. As a result, the quality data retrieved from the Tenders' documents in some cases are not available.

Moreover, according to the regulations, the public organizations have the obligation to complete the process in the platform and inform about the details of the contract for statistical reasons. However, upon the approval of the evaluation report and the signing of the contract, project managers are focusing on the coordination of the implementation phase and the control of the project and omit to enter the information of the contract to the platform. As a consequence of this omission the less statistical results related with the results of the Tender are available.

Furthermore, the Cyprus Bar Association database includes only the court decisions. Active lawsuits are not available in the database. The Administrative Court's decisions are

announced 2 years after the filing of the lawsuit. Consequently, for the last two years' projects there is uncertainty about the filing of lawsuits against the public health organizations.

Nevertheless, my personal opinion and experience could be enforced with interviews from project managers from other public health organizations.

4.2.5 Risk Assessment Techniques

“Risk management - Risk assessment techniques” (IEC 31010:2019) standard techniques are used for the assessment of the risks. The calculation of the risk level is based on the 5*5 consequences / likelihood matrix.

Examples of consequences and likelihood scales are following below. The tables are retrieved from the risk management standard IEC 31010:2019.

Rating	Financial	Health and safety	Environment and community	Etc.
a	Max credible loss (\$)	Multiple fatalities	Irreversible significant harm; community outrage	
b	⋮	⋮	⋮	⋮
c	⋮	⋮	⋮	⋮
d	⋮	⋮	⋮	⋮
e	Minimum of interest (\$)	First aid only required	Minor temporary damage	

IEC

Table 6. Example of table defining consequence scales (IEC 31010:2019)

Rating	Descriptor	Descriptor meaning
5	Likely	Expected to occur within weeks
4		
3		
2		
1	Remotely possible	Theoretically possible but extremely unlikely

IEC

Table 7 . Example of table defining likelihood scales (IEC 31010:2019)

The ratings of consequences and likelihood are based mainly on quantity and quality data retrieved from the projects' Tender documents, as well as on research in articles, literature and opinions. In the most uncertain cases my personal perspective is used.

In the cases where the magnitude of the consequences vary, the diagram of the probability distribution of the consequences, is expressing the magnitude of consequences and the likelihood of each consequence.

The crossing of the ratings of consequences and likelihood according to the below 5*5 risk matrix is calculating the risk level.

Consequence Rating	a	III	III	II	I	I
	b	IV	III	III	II	I
	c	V	IV	III	II	I
	d	V	V	IV	III	II
	e	V	V	IV	III	II
		1	2	3	4	5
Likelihood Rating						

Table 8. Consequence/likelihood risk matrix 5*5 (IEC 31010:2019)

The crossed rates of the risk matrix are defining the risk level as below:

- I. Very High Risk
- II. High Risk
- III. Medium Risk
- IV. Low Risk
- V. Very Low Risk

Chapter 5

Results

The following chapter contains the assessment of each identified risk and at the end a table with the calculation of the risk level of risks for prioritization purposes.

5.1 Political Risk

Political Risk (“PR”) is the risk a project may be affected as a result of political changes or instability in a country. The budgets of all ministries, public departments, demi-public organizations and non-profitable organizations funded by the Government, are approved by the parliament.

Political decisions may affect public projects in two cases. The first case is when the Government’s budget is rejected by the parliament (Case A). The other case is when the parliament is freezing a project’s budget either to reduce the total budget of the organization in a post – crisis period (Case B).

5.1.1 Likelihood

Case A:

Every year the Government’s budget is approved by the parliament. In Cyprus, the Government does not have the majority in the parliament and the approval of the budget is with the votes of other political parties.

Recently, in December 2020, the budget of 2021 was rejected by the parliament. According to ABC News “Cypriot lawmakers reject state budget for first time ever, since the country’s founding in 1960”. (The Associated Press, 2020)

Based on Figure 3, the likelihood of this event is rated “1” due to how unlikely is to happen.

Case B:

According to the statistical data from eProcurement, in Appendix B, the projects per year are shown in the graph below.

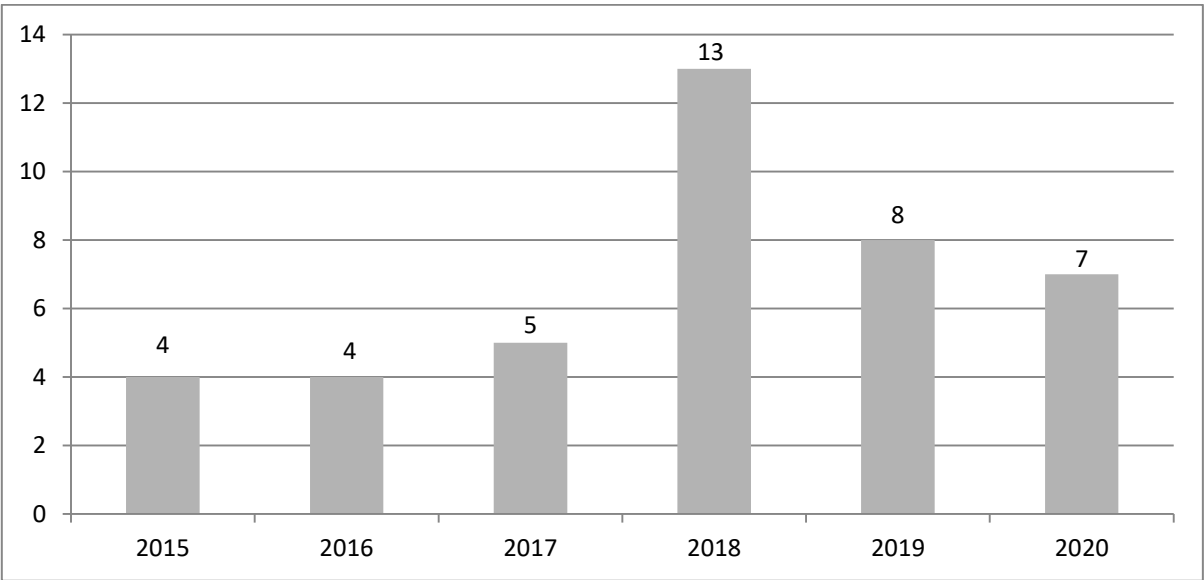


Chart 1. Bar Chart showing Projects per year

Thirteen (32 %) Tenders were published in 2018 while 2019 follows with 8 tenders (19 %). Mentionable is that in two years, 2018 – 2019, the public health organizations published 21 Tenders (51 %). The published Tenders increase to 28 (68 %) with the addition of 2020 and this lead to the conclusion that the last three years from 2018 to 2020, the published Tenders were doubled in comparison with the previous three years period from 2015 to 2017.

The increase of the quantity of the public health projects came as a result of the exit of Cyprus from the bailout support programme in March of 2016 (Brundsen, 2016).

Financial crises occur about once every decade (Pollock, 2015) and the damages of a crisis are affecting the Governments' decisions for years. The last 20 years Cyprus faced 3 crises, the stock exchange crisis in 2000, the financial crisis in 2012 and corona virus crisis in 2020. In this case the likelihood of the event is rated with 2.

5.1.2 Consequences

Case A.

In the extremely unlikely event of the rejection of the Government's budget by the parliament, the public organizations are dividing the last approved budget in twelve equal parts (monthly budget) to proceed with operational expenses until the approval of the new budget by the parliament.

The budget of 2021 was finally voted in February and as a consequence all the public projects were frozen for two months.

The consequence at the plan of the project can be characterized as:

- a. Severe- Delays more than 3 months
- b. Significant – Delays 2 to 3 months
- c. Moderate – Delays 1 to 2 months
- d. Minor – Delays up to 1 month
- e. Minimal – Delays 0-7 days

Hence the consequence is rated with “c”.

Case B:

During the financial crisis the important projects related with the acquisition of medical equipment were implemented. The graph below is showing the budget of the published Tenders each year.

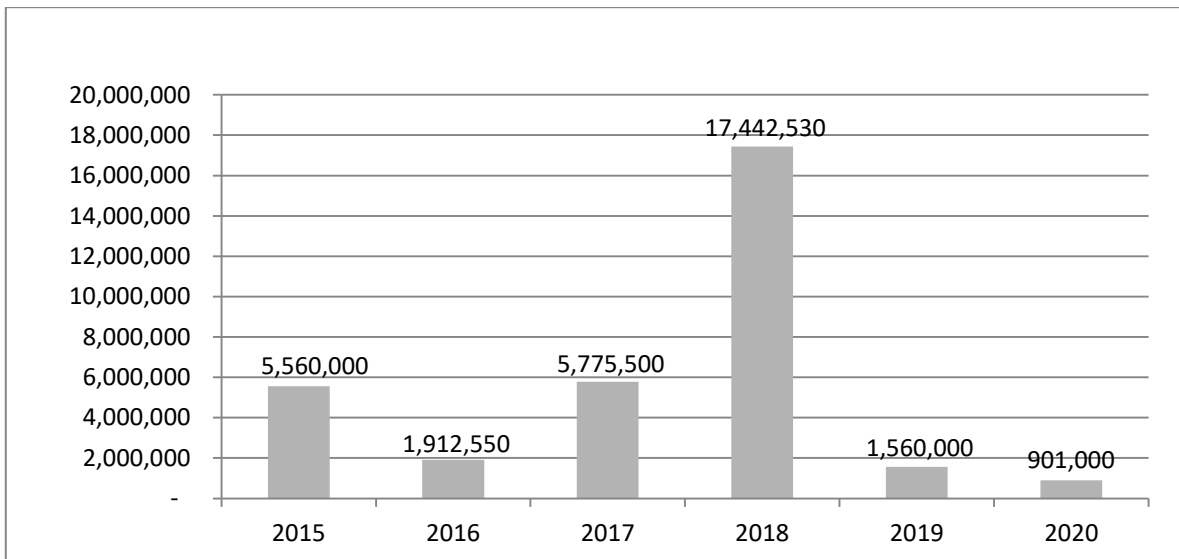


Chart 2 . Bar chart showing Total Budget per year

In 2015 the total budget of the Ministry of Health for acquisition of medical equipment was €5.560.000 and in 2019 when the financial crisis did not affect the Government’s budget, the total budget was €1.560.000.

The Minister of Health in 2016, during a press conference for the budget of the Ministry of Health said that during crisis the cuts in the Health Ministry’s budget in the last years are due to measures taken, namely payroll cutbacks and savings and the savings achieved were not at the expense of services, as they are the product of better and more rational management of public funds (Cyprus Mail, 2016).

The consequences of the crisis on the public health project can be rated as minor “d”.

5.2 Advanced Technology Risk

Advances Technology Risks are the risks may affect a project as a result of the advanced technologies applied at medical equipment and the unfamiliarity of the personnel with them. The risk may affect the planning period of the project (Case A) and the maintenance and the proper use of the medical equipment (Case B).

Advanced Technologies are increasing the complexity of the specifications. The complexity of the specifications of the medical equipment is usually one of the main reasons used by

the suppliers to suggest extension on the Tender submission period. Moreover, the project team may identify miscalculations on the specifications and correct them. The law in that case provides for the Tenderers four extra days for projects with estimated value below the lowest thresholds of the European Committee and six extra days for projects with estimated value above the lowest thresholds of the European Committee, to correct and resubmit their offers according to the corrected specifications. The extensions are not estimated by the Project Managers at the planning of the project and these unexpected changes may have severe consequences.

Additionally, advanced technologies are making the equipment hard to be fixed. Public health organizations have not the personnel with the expertise for the preventive and corrective maintenance of the medical equipment. Moreover, training of the staff in the usage of the medical equipment is also important for the proper use of the medical equipment and for the reduction of the risk of injuries of the patients.

5.2.1 Likelihood

Case A:

Data were retrieved from eProcurement statistics and the basic information of the Tenders in the platform regarding the published date, the initial submission date and the revised submission date. The data are available in Appendix B, sub section B.2. The column “Extension” is the difference between the date in the column “Revised Date for Tender Submission” and the date of column “initial date for tender submission”. The extensions were given as a result of the complexity of the specifications.

Statistical details for the Extension can be found in the table below:

<i>Extension Period</i>	
Minimum	0
1st Quartile	0
Median	0
3rd Quartile	7
Maximum	140

Table 9 , Statistical details of Extension

The median is 0 days and hence the 50% of the Tenders haven't extensions and no unexpected delays. The 3rd quartile is calculated 7 days, with the Excel formula and thus the 25% of the projects are having unexpected delays at least 7 days at the period of the submission of the offers. Moreover, during the 29 of the 41 Tenders (70 %) no Extensions were given. In addition, the maximum extension is 140 days.

Case B:

Bank of Cyprus Oncology Center is a specialized public Health Care Center and provides diagnoses and treatments for cancer. The medical equipment of the Center contains linear accelerators, CTs, Ultrasounds, Brachytherapy Equipment and other specialized medical equipment. As a Procurement Officer at Bank of Cyprus Oncology Center, according to the statistics records of the Center, the downtime of the equipment does not exceed 2% per year. The term "downtime" is used when the medical equipment is not operating and the calculation of downtime is based on the working days of the year which are approximately 300 days. The maximum downtime of the medical equipment of the Centre does not exceed 6 working days per year.

All users of the medical equipment of the Center are trained and have the certification of the manufacturer as users of the equipment. Moreover, engineers and technicians of the supplier are also certified maintenance engineers from the manufacturer.

The likelihood in this case is ranked with "1".

5.2.2 Consequences

Case A:

The statistical data are showing that the magnitude of the consequences varies. Probability distribution of the consequences is showing for every scale of the consequences the likelihood according to the tendency of the data.

The consequence scale is described in the paragraph 5.1.2. The probability distribution of the consequences is shown below:

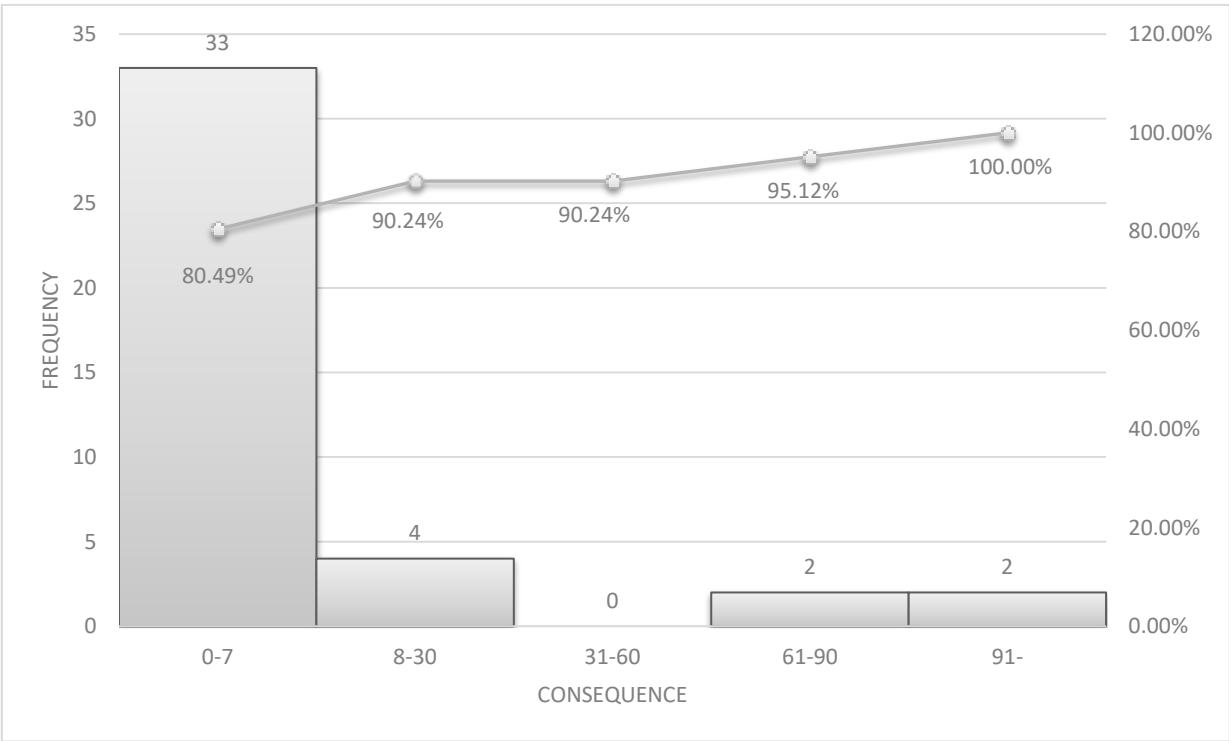


Chart 3. Histogram of Extensions and Cumulative frequency graph

Approximately, the 80% of the projects have minimal consequences, the 10% minor consequences, the 5% significant and the last 5% severe consequences from the complexity of the specifications. The likelihood of the case is rated with “2” and the consequences are on average significant (“b”).

Case B:

Medical Equipment is dangerous when is not operated by professionals and the equipment is not maintained periodically with the instructions of the manufacturer by trained engineers. In USA, the governmental organization for Food and Drug Administration (“FDA”) collected 1.7 million injuries and nearly 83.000 deaths reports over the last decade all caused by the wrong use of medical devices (F.D.A., 2020). In Cyprus, every organization is keeping a record of incidents caused by medical equipment. Fortunately, no death was recorded.

The consequences are rated with “b”.

5.2.3 Actions

Case A:

During an open tender procedure, when the Tender is published in eProcurement and the documents are free and easy to access, the minimum period for the submission of the offers is 30 days for the Tenders with estimated value over the lowest thresholds and 14 days for the Tenders that are not exceeding the lowest thresholds, according to the law. The public organizations in order to create the optimal scenario for their Tender and decrease delays, they have the right to add the minimum days to the date of publishing, and the interested Economic Operators must comply and submit their offer on time. The column “Minimum Submission Date” in Appendix B, subsection B2, is calculated with the addition of the minimum days on the date published. Moreover, the column “Difference from Minimum Submission date” is the difference between the “Initial date for Tender Submission” and “Minimum Submission Date”. The difference is showing the extra days that initially the public health organizations have given to the Economic Operators in order to manage the complexity of the specifications of medical equipment, and to avoid extensions.

The statistical results of the extra days are shown in the below table:

Difference from Minimum Submission Date	
Average	15
Min	0
1st Quartile	7
Median	12
3rd Quartile	18
Max	56

Table 10. Statistical results of extra days

The public health organizations are extending on average 15 days the minimum submission period which is referred in the law. The 50% of the Tenders have Submission Date at least 12 days later than the minimum submission date according to the law. The maximum extra days were 56 days. In only two cases, the public health organizations were followed the minimum submission date.

Case B:

The Public Health Organizations with their experience know the importance of the proper use and maintenance of the medical equipment.

The examination of the management of the risk is based on the Tenders' documents uploaded in eProcurement. From the research in the Tenders' documents all the Organizations are including in "Annex B - Special Conditions" of their documents, details related with the maintenance (sequence of preventive maintenance, spare parts, response time and reports) of the medical equipment and the training (Number of participants, duration of training and fields of training). Additionally the supplier of the medical equipment provides a good performance guarantee from the bank. The supervision of the maintenance is a responsibility of the Department of Electrical and Mechanical Services (D.EMS) of the Government. D.EMS is also responsible to keep record for the maintenance history of all the medical equipment (D.EMS, 2021).

Research results are shown in Appendix B, subsection B.3. The columns “good performance (Y/N)” and “Training (Y/N)” are filled with “Y” when the project manager analyzes with details the whole procedure of maintenance and training and with “N” when project manager does not consider the maintenance and training or does not provide details.

5.3 Environmental Risk

Medical Equipment when they are disposed, they are categorized as electronic wastes. The environmental risk is the risk of the medical equipment to pollute the environment.

5.3.1 Likelihood

Public health organizations are producing medical wastes thus they are informed of the relevant with the waste disposal law and have in mind that old medical equipment when new equipment is purchased cannot be thrown away as general waste.

The likelihood of medical equipment to be thrown away as general waste and pollute the environment is minimal (1).

5.3.2 Consequences

The consequences of the electronic waste and dumping of processed materials due to their incomplete combustion in open air are the major sources of various toxic chemicals and environmental pollution (Wong, et al., September 2007).

Moreover, the wastes of Cyprus are far above the average waste of the European Union. The government is with the government facing fines of up to €30.000 a day, only to be given another short grace period (Kassandra, 2019).

Taking into consideration the above, the consequences are severe (d).

5.3.3 Actions

Public health organizations are transferring this risk to the D.EMS which is responsible for the decisions of the disposal of the medical equipment.

5.4 Budget Risk

The demand of medical equipment in Cyprus is not enough and it is covered by few suppliers. During the public project's procedure, suppliers' offers are likely to increase due to lack of competitors or due to oligopolies (Case A). Moreover, the budget of a project may be affected by unexpected, unmeasured or unspecified factors that may increase the cost of the project (Case B).

5.4.1 Likelihood

Case A

The likelihood of the cost risk during the Tendering procedure is evaluated with the eProcurement statistical data. The data are available in Appendix B, subsection B.4.

According to the historical data in 4 cases (18 %) the Awarded Value exceeded the Estimated Value and in the rest 18 cases (82 %) the Awarded Value did not exceed the Estimated Value.

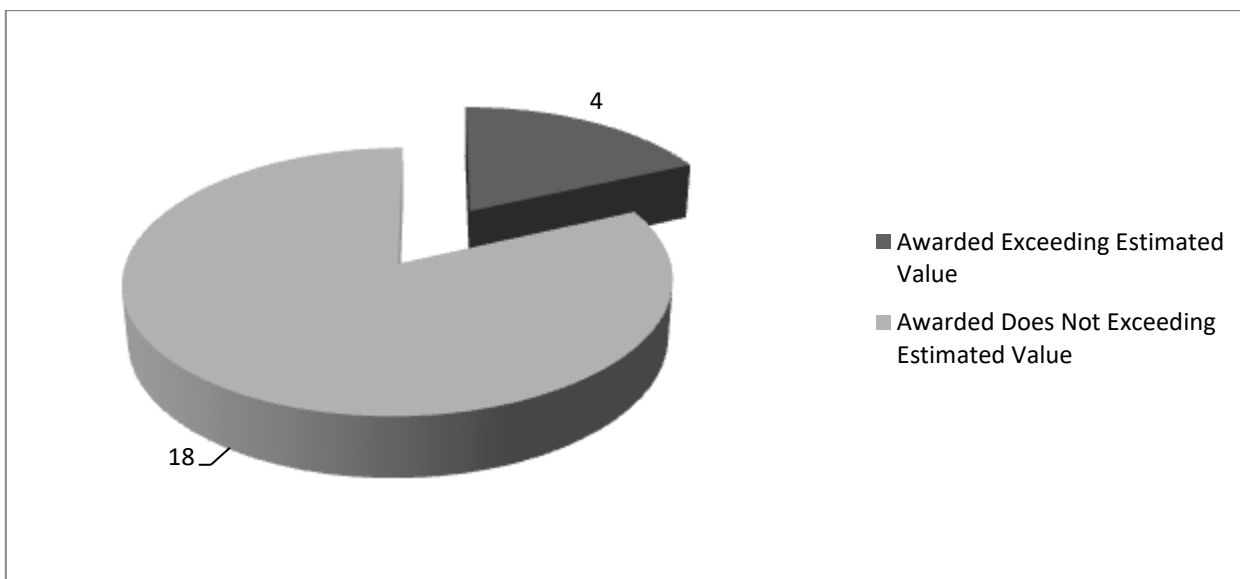


Chart 4 . Bar chart - Comparison of Awarded and Estimated Value of the projects.

The event is unlikely to occur thus the likelihood is rated "2".

Case B:

The installation of the medical equipment is likewise a complicated procedure. Medical Equipment must be compatible with the existing building infrastructure and all the essential cables must be supplied. From my experience in drafting Tenders' documents, it is unlikely but not impossible for a public health organization to omit the including of the cables and specifications of compatibility in the Tenders' documents. Thus likelihood is rated with "2".

5.4.2 Consequences

Case A:

The table below contains the cases where the Awarding Values are exceeding the Estimated Values of the Project.

A/A	Estimated Value	AWARDED CONTR. VALUE	Difference (€)	Difference (%)
4	4.100.000	4.810.000	-710.000	17%
16	219.000	310.000	-91.000	42%
20	135.000	171.740	-36.740	27%
18	182.000	194.082	-12.082	7%

Table 11. Projects with Awarding Values greater than the Estimated Values

The Awarding Values are exceeding the Estimated Values on average 23 % and the total extra cost is €849.822.

The consequences according to the historical data are severe ("a").

Case B:

The offers are more likely not to exceed the budget of the project. In these cases the offers are 19 % below the budget of the project. The saved amount is enough to cover any unexpected cost from the installation of the medical equipment. Therefore, consequence is rated with “e”.

5.4.3 Management of the Risk

Case A:

The public health organizations estimate the cost of the project based on the market assessment. A common method used for the market assessment is market sounding where the public health organizations are conducting dialog with market’s suppliers regarding the scope, the timetable, the estimated value and the main specifications of the medical equipment.

Case B:

Public Health Organizations are transferring the risk to D.EMS.

5.5 Legal Risk

The public projects’ procedures are regulated by laws. The public health organizations are venerable to lawsuits and appeals at Tender Review Authority. The possible outcomes are financial damages as well as unexpected delays on the project’s plan. Economic Operators have the right to file a lawsuit at the Administrative Court (Case A) or if the estimated value of the project exceeds the lowest thresholds of European Committee (E.C.) (Section 2.1.2) have the right to appeal at Tender Review Authority (Case B).

The data for the risk analysis are available in Appendix B, Subsection B5 and the collection of data is described in subsection 4.2.2.

5.5.1 Likelihood

Case A:

Historical data are showing that no lawsuit had been filed against the public health organizations. The main reason of the Economic Operators to avoid filing lawsuit is the duration of the whole procedure which may last years.

The likelihood of the event is rated “1”.

Case B:

The image in the health projects with estimated value above the lowest thresholds of the E.C. is different. The data are showing that for 7 projects (37 %), an Economic Operator who was rejected at the evaluation of the Offers, appeal at the Tender Review Authority (TRA). The different image is based on the authority of the TRA to decide for an Interim Order and freeze the procedure before the signing of the Contract (TRA, 2021).

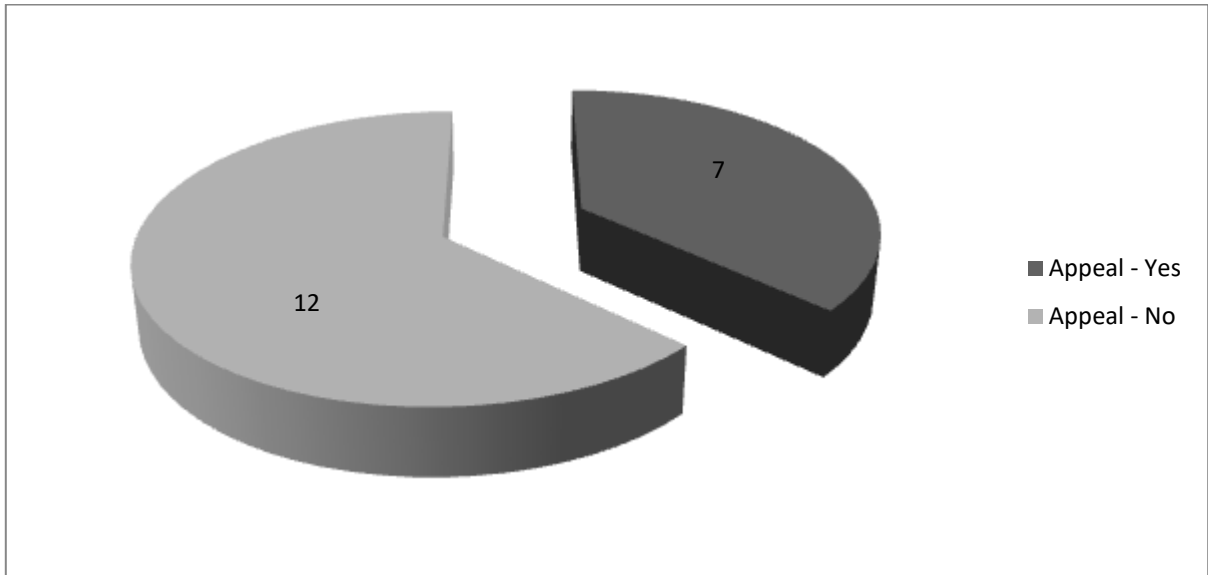


Chart 5. Pie chart showing the Economic Operators that appealed at TRA

The likelihood in this case is rated with “3”.

5.5.2 Consequences

Case A:

Court decision does not reverse the of the public health organization, therefore the signed contract with the winning tenderer is secured. However, court decides for penalties, compensations for the time of the Tenderer to fill and submit the offer and legal fees. The consequences are minor and rated with “d”.

Case B:

The consequences in case of appeal at TRA are economic due to legal fees and unexpected delays at the projects’ plan due to the Interim Order.

Legal fees as a consequence are rated with “d” as in the previous Case.

The table below is showing the 7 projects where Economic Operators appealed and the decision of TRA. The “Expected date” column is the expected date of the signings of contracts based on the regulations and circulars and the column “Award Date” is the actual date of the signing of the contracts. The difference column is showing the delays on the projects’ plan.

A/A	Appeal Result	Expected Date	Award Date	Difference
1	Approved	18/10/2018	23/10/2018	5
3	Rejected	31/07/2016	03/04/2017	246
4	Rejected	12/05/2019	20/01/2020	253
6	Rejected	21/02/2016	27/07/2016	157
8	Rejected	28/08/2016	N/A	N/A
11	Approved	02/07/2016	03/07/2017	366
15	Rejected	30/01/2019	28/08/2019	210

Table 12. Table with the results of the Appeals, the Expected Date of the signings of the contracts, the Award Date and the Difference between the Award Date and the Expected Date.

The average delays are calculated 206 days. The consequence of such a delay is severe and is rated with “a”.

5.6 Schedule Risk

Delays may occur in any phase of the project. Once the final timetable is agreed with the supplier of the medical equipment, there is a risk of further delays. The delays may occur due to delays of the transportation of the product (Case A) or delays of the supplier’s engineers to install and customize the medical equipment (Case B).

5.6.1 Likelihood

Case A:

The manufacturers of the medical equipment are across Europe and Cyprus is an island. Medical equipment in order to reach Cyprus is transported by ship.

Recent events such as the closing of the Suez Canal in 2021, the measures for the avoidance of the spread of corona virus in 2020 and the change of Cyprus Ports’ operator in 2016 were some events which affected the transportations by ship. Moreover, the lockdown affected the operations of the factories.

According to the Tenders’ documents, the public health organizations are expecting the medical equipment to be installed in three months period from the date of the signing of the contracts. In the three months period are included all the final acceptance checks.

From my recent personal experience in the planning of a project of Bank of Cyprus Oncology Centre for acquisition of bronchoscopes for lung cancer diagnoses, the suppliers are expecting the equipment to arrive in Cyprus on average in two months.

The transportation from the port to the hospital, the installation and the final acceptance tests of the medical equipment is possible not to be realized in one month. The likelihood of delays in the timetable of the project is rated with “3”

Case B:

Tenders' documents, further from the technical specifications, are including participation conditions. The participation conditions are related with the experience of the supplier in similar projects and the experience of supplier's engineers.

Although the participation conditions are excluding inexperienced suppliers from participating at the Tendering procedure, the supplier may delay the implementation of the project due to his operations. The likelihood of the case is rated with "2".

5.6.2 Consequences

Case A:

The deviations of the timetable of the projects depend mostly on the arrival of the medical equipment. According to the estimations of Sea Intelligence Consulting as a consequence of the block of the Suez Canal, two out of three container vessels arrived late, and with the term late, they are on average five days late and a two-day delay isn't a major problem (CNBC, 2021).

Moreover, European Commission in order to reduce the delays caused from covid - 19 took a package measures in April of 2020 (European Commission, 2020). The measures targeted the health risks due to corona virus and the financial risks due to the delays of the transportation of goods.

The delays are not exceeding on average the one month and thus the consequences are rated with "d" according to the relevant consequences scale.

Case B:

Public contracts contain penalties for delays. Suppliers when they are prioritizing their operations, they are giving priority to the public hospitals in order to avoid penalties. The delays on behalf of the supplier do not exceed one month and the consequence is rated with "d".

5.6.3 Management of the Risk

According to Tenders' documents, project managers in order to avoid delays at the implementation phase of the project are including to the public contracts:

- Penalties for delays
- Bank Guarantee for execution

Moreover, in some cases project managers inform the Economic Operators during the Tendering procedure about the analyzed timetable. The timetable is splitted into phases and the tasks of each phase are analyzed for the Economic Operators. Economic Operators have the opportunity to discuss the timetable with the project team and inform them for miscalculations. The timetable as published in the Tenders' documents is binding for the winning bidder.

5.7 Quality Risk

Quality of the medical equipment is important. Low quality medical equipment is increasing the risk of incidents that may harm the patients.

5.7.1 Likelihood

The expertise of the public health organizations to draft technical specifications surely is reducing the possibility of the acquisition of low quality medical equipment.

Nonetheless, according to the law, the winning bidder is the Tenderer with either the best Economic Offer or the best score from a formula consisting quality and prize criteria. Tenders' documents are referring the selection criterion. The pie chart below is showing the percentage of Tenders by criterion of selection.

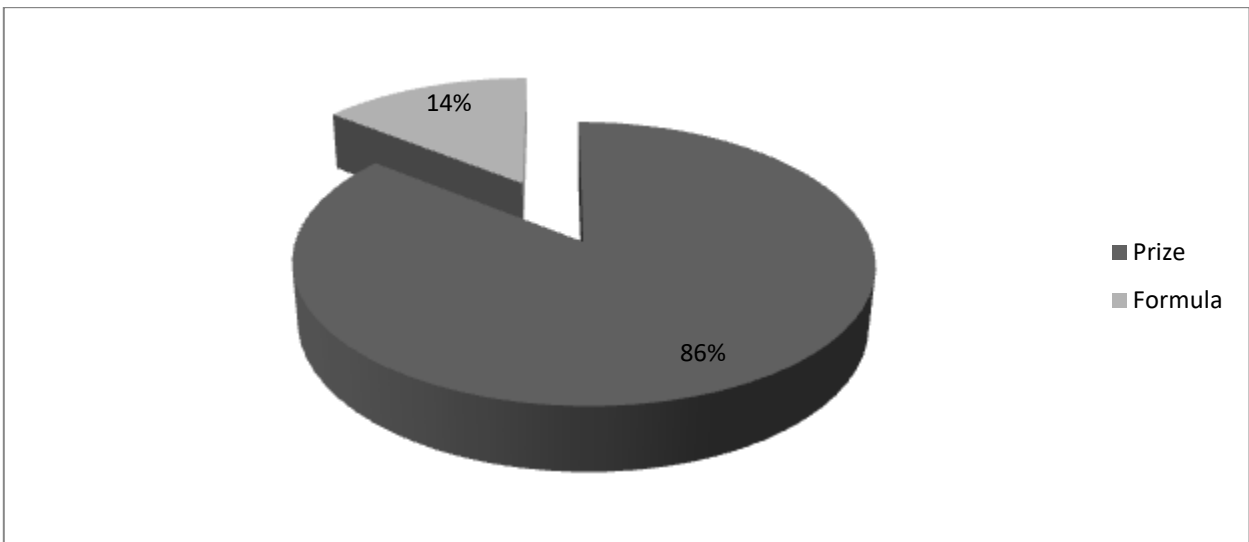


Chart 6 . Percentage of Tenders by criterion of selection

The project managers are selecting in 86% of the Tenders as a criterion of selection the best prize. It is a common belief that quality products are expensive and visa-versa and thus the best (cheaper) offer of the winning bidder leads to the acquisition of a low quality product. On the other hand, careful selection of specifications by the experienced personnel of public health organizations is reducing but not eliminating the risk of acquisition of low quality medical equipment. Thus the likelihood is rated with “2”.

5.7.2 Consequences

The consequences in this event are related with the consequences of the advanced technology risk. Low quality medical equipment may harm the patients and thus the consequences are significant (“b”).

5.7.3 Actions

The selection of the technical specifications of the medical equipment is a very careful procedure. Project managers and project teams are consuming a lot of time during the planning phase of the project in order to reduce the quality risk. Moreover, final acceptance tests are conducted by experienced engineers in order to be ensured that the medical equipment comply with all the health and safety standards and protocols.

5.8 Resources Risk

Resources risk is the possibility of failing to meet the project's goal due to a lack of resources. In the case of public health organizations, the State is providing the financial support, the supplier is providing the equipment and thus the organizations have to provide the human resources for the coordination and the control of the project.

Human resources of public health organizations have the experience to execute projects of acquisition of medical equipment. Are they enough?

5.8.1 Likelihood

Ministry of Health has the responsibility of the execution of 71% of the public health projects related with the acquisition of the medical equipment.

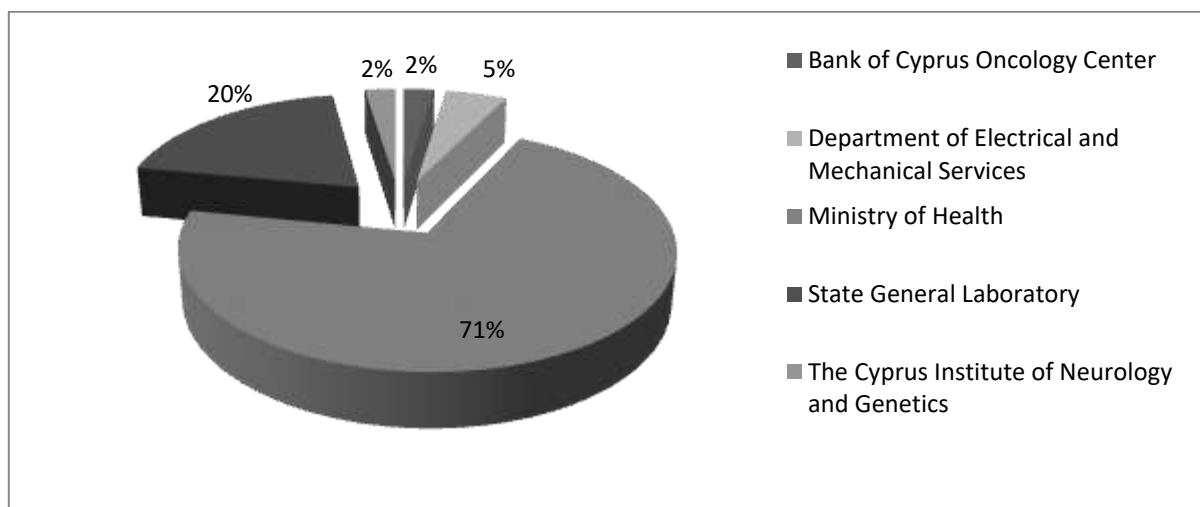


Chart 7. Pie chart showing the allocation of the projects to the public health organizations

The department of supplies and procurements, according to the official website of the Ministry of Health has 40 people as human resources. EProcurement statistics are showing that in 2020 the published Tenders (equipment, consumables and services) of the Ministry were 464 and in 2019 were 491. Every employee of the department is responsible for the full supervision of at least 12 Tenders per year. Tender's procedure is quite demanding work according to earlier reference. On the other hand 12 Tenders per year can be managed from an experienced officer. Thus the likelihood is rated with "2".

5.8.2 Consequences

The consequences of lack of human resources for the project management are delays. The lack of human resources is affecting the planning phase of the project as well as the implementation phase of the project and the consequences may be significant (“b”).

5.8.3 Actions

The employment of personnel at public health organizations is a time consuming work. Public health organizations are always based on the existing human resources for the planning and execution of the projects. Organizations for the reduction of the resources risk are applying a matrix structure which combines functional and divisional models. The involved personnel with the tendering procedures is grouped under the procurement department of the organization. Further division of the department is based on the specialization of the personnel. Pharmacists are participating in the Tenders for drugs and consumables, medical physicists are involved in Tenders and projects regarding the acquisition of radiology equipment, etc.

5.9 Findings

No	Description	Reason/ Cause	Effect	L	C	Risk Level	Actions
Political Risk							
1	Reject of Government's budget	Issues between political parties	Freeze of the project's budget and delays of the planning.	1	c	Very Low	Accept risk
2	Freeze a specific project's budget	Austerity measures for crisis	Delays on the planning of the project	2	d	Very Low	Accept risk

No	Description	Reason/ Cause	Effect	L	C	Risk Level	Actions
Advanced Technology Risk							
3	Complex technical specifications	Advanced Technologies	Delays on the planning of the project	2	b	Medium	Extra days for submission of the offers
4	Proper use of the Medical Equipment	Advanced Technologies and special knowledge.	Injuries to patients	1	b	Low	Maintenance and staff training mandatory in Tenders' documents.
Environmental Risk							
5	Electronic Waste	Replacement of old equipment	Pollution of the environment	1	d	Very Low	Transfer risk to D.EMS
Budget Risk							
6	Submitted offers exceed the projects estimated value	Miscalculation of estimated value	Extra unexpected cost	2	a	Medium	Market Sounding
7	Extra cost during the implementation phase	Compatibility with current infrastructure	Extra unexpected cost	2	e	Very Low	Transfer risk to D.EMS

No	Description	Reason/ Cause	Effect	L	C	Risk Level	Actions
Legal Risk							
8	File lawsuit at Administrative Court	Tenderer's disagreement with the Contracting Authority's decision	Legal expenses	1	d	Very Low	Accept risk
9	Appeal at Tender Review Authority	Tenderer's disagreement with the Contracting Authority's decision	Legal expenses	3	d	Low	Accept risk
10	Appeal at Tender Review Authority	Tenderer's disagreement with the Contracting Authority's decision	Delays on the planning phase of the project	3	a	High	Accept risk
Schedule Risk							
11	Delays of medical equipment shipping	Covid-19, Suez canal block, etc.	Deviations from project's timetable	3	d	Low	Penalties for delays / Bank guarantee
12	Delays of the installation of the equipment	Supplier's operations	Deviations from project's timetable	2	d	Very Low	Penalties for delays / Bank guarantee

No	Description	Reason/ Cause	Effect	L	C	Risk Level	Actions
Quality Risk							
13	Acquisition of low quality medical equipment	Criterion of selection based on best prize	Injuries to patients	2	b	Medium	Careful selection of technical specifications / Strict acceptance tests
Resources Risk							
14	Human Resources allocation during the project planning and execution	Not enough Human resources	Delays on all phases	2	b	Medium	Effective Structure

Table 13. Findings

Chapter 6

Conclusion

During the introduction was emphasized the importance of the implementation of a health project without unexpected delays. Unexpected delays are presented in almost every phase of the project's life. Mentionable for their significance and severeness are the delays in planning phase due to the Appeals at Tenders Review Authority and to the complex specifications of the advanced technology of medical equipment. In addition, delays may occur as a result of political decisions, shipping delays and supplier's delays and due to inadequacy of human resources. Furthermore, public health organizations cannot reduce the impact of risk, in the cases where political decisions or decisions for Interim Orders by Tenders Review Authority are freezing the project's procedures.

Moreover, the market of medical equipment is not competitive. The offers for the acquisition of medical equipment may exceed the budget. Unfortunately, when no competition exists in the market, the public health organizations are forced to accept the offer and seek for funding to cover the difference.

Further, patient's safety is the main priority for the public health organizations. Considering the risk of injuries incidents by the medical equipment, public health organizations are planning their projects based on the protection and safety of patients from injuries due to the poor condition of the equipment or to the use of the equipment from untrained personnel.

Public health organizations prefer the Tendering procedures with selection criterion the best price. The risk of acquisition lower quality medical equipment is increased. Public health organizations in such a matter apply strict acceptance tests to ensure the right performance of the medical equipment. Nevertheless, Tendering procedures with selection criterion the formula based on price and quality, are reducing the risk, and public health organizations may consider more this option.

The main goal of the thesis was the identification of internal and external risk factors that affect the planning, the schedule, the quality and the cost of the project as well as the environment and assess their impact. The results are showing the impact of the each risk and the actions of the public health organizations. Moreover, the calculation of the risk level is helpful for project managers, procurement managers and officers, decision-making committees and other involved parties to prioritize the risk and decide if the extra actions must be considered.

6.1 International Health Sector Researches

Crowe LLP, member of Crowe Global which is ranked within the biggest accounting and consulting networks in the world, conducted a research for the “Top risks for healthcare organizations in 2020” with collection of data from over 250 Hospitals in the US.

According to the consultants of Crowe, the approach was risk based to the most critical areas for achieving organizations’ strategic goals and business objectives and maintaining compliance with critical regulatory and other requirements.

From the list of the top risks for 2020, the risks related with projects and their impacts are:

1. Clinical quality - Affects patient outcomes, cost of care, reputation, and financial performance through pay-for-performance penalties.
2. Patient safety - Failures in patient safety might lead to preventable injuries or illnesses and death, litigation costs and reputational impact.
3. Legal and regulatory compliance - fines, reputational loss, and costly corporate integrity agreements.

4. Workforce - Reputational impact.
5. Advanced technologies - Risks to data quality, data security and user access, confidence in results, return on investment, and human oversight, among others.
6. Interoperability and future technologies - risks to data exposure and breach.

The risks above are not ranked and their position is random (Gerard, Jolly, & Welker, 2020).

Although Crowe's research was based on risks in private health sector, the identification of the risks and their impact are similar with the risks identified and analyzed in the thesis. Moreover, Crowe research extent to loss of medical data and loss of patients' data which are not included in the thesis.

6.2 Significance of Results

Public health organizations are not acting with a risk-based approaching during the project management procedure. Experience helped the organizations to identify the majority of the risks and developed management techniques. The actions of the public health organizations are also based on their experience. Moreover, during the project management procedure, a lot of people are involved and everyone has his own perception, his own experience and consequently makes his own decisions.

The significance of the results lies on the fact that the people involved with the public health projects have the opportunity to preserve the projects from the risk - angle. The results of the thesis are based on reliable data and they are considered as a good base for further and deeper analysis and for considering of risk strategies.

6.3 Limitations

Current year was unique. Pandemic, Government's measures and the workload of the public hospitals made difficult the conduction of interviews from project managers in order to enforce the results of the thesis with their perspective about the likelihood and the consequences of the identified risks.

Moreover, although the data were reliable, in some cases data weren't available and the volume of the data in different cases weren't the same for the risk assessment.

6.4 Future Research

The case study is based on the projects related with the acquisition of medical equipment and the data were retrieved from the planning phase of the projects. Future research could be based on data from all the phases of the project's life.

Furthermore, future research can be conducted with more projects in different fields, such as cybersecurity and protection of patients' data. The risk of loss of data was identified in Crowe's research and the expansion of the results to other fields would be helpful for the personnel of the public health organizations to receive a bigger picture of the impacts of the risks in project management.

Appendix A

Public Health Sector Structure

ΟΡΓΑΝΟΓΡΑΜΜΑ ΥΠΟΥΡΓΕΙΟΥ ΥΓΕΙΑΣ



Appendix B

Data

B.1 Statistical Data Retrieved from EProcurement

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
1	ΠΡΟΣΦΟΡΑ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ, ΕΓΚΑΤΑΣΤΑΣΗ, ΔΟΚΙΜΑΣΤΙΚΗ ΛΕΙΤΟΥΡΓΙΑ ΕΚΠΑΙΔΕΥΣΗ ΣΤΗ ΧΡΗΣΗ ΤΡΙΩΝ (3) ΓΡΑΜΜΙΚΩΝ ΕΠΙΤΑΧΥΝΤΩΝ ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΟΥ ΑΚΤΙΝΟΘΕΡΑΠΕΥΤΙΚΟΥ ΤΜΗΜΑΤΟΣ ΤΟΥ ΟΓΚΟΛΟΓΙΚΟΥ ΚΕΝΤΡΟΥ ΤΡΑΠΕΖΑΣ	Π08/2018	Bank of Cyprus Oncology Center	27/06/2018	9160000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
2	Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση Ψηφιακών Ακτινογραφικών Συστημάτων για τις Ανάγκες των Κρατικών Νοσηλευτηρίων.	Σ.Υ. 26/2017	Ministry of Health	28/11/2017	5390000
3	Προμήθεια και συντήρηση ασθενοφόρων	13.25.20.1 5.005.ΕΠ.Η ΜΥ	Department of Electrical and Mechanical Services	27/11/2015	4260000
4	Προσφορά για την Προμήθεια Εγκατάσταση, Εκπαίδευση και Συντήρηση Μαγνητικών Τομογράφων για τις Ανάγκες των Γενικών Νοσοκομείων Λευκωσίας και Λεμεσού (Δικαίωμα Προαίρεσης)	Σ.Υ.79/15	Ministry of Health	30/11/2018	4100000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
5	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση Συστημάτων SPECT – CT για τα Τμήματα Πυρηνικής Ιατρικής των Γενικών Νοσοκομείων Λευκωσίας και Λεμεσού.	Σ.Υ.61/18	Ministry of Health	30/12/2018	2000000
6	ΠΡΟΜΗΘΕΙΑ, ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΥΠΟΛΟΓΙΣΤΙΚΩΝ ΤΟΜΟΓΡΑΦΩΝ (C.T) ΓΙΑ ΤΑ ΝΟΣΟΚΟΜΕΙΑ ΛΕΜΕΣΟΥ ΚΑΙ ΛΕΥΚΩΣΙΑΣ.	Σ.Υ. 21/2015	Ministry of Health	27/07/2015	1200000
7	Διαγωνισμός για την προμήθεια και συντήρηση φορητών Αναπνευστήρων για τις ανάγκες των κατ οίκον ασθενών	ΣΥ 43/19	Ministry of Health	28/08/2019	804000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
8	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση δύο μηχανημάτων UPLC-MS/MS για το Γενικό Χημείο του Κράτους	13.25.05.2 016.16	State General Laboratory	11/05/2016	720000
9	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση Υπερήχων για τις Ανάγκες των Κρατικών Νοσηλευτηρίων.	Σ.Υ.25/16	Ministry of Health	02/09/2016	621000
10	Διαγωνισμός για την προμήθεια φορητών Αναπνευστήρων για τις ανάγκες των Δημόσιων Νοσηλευτηρίων	ΣΥ 73 /18	Ministry of Health	19/10/2018	600165
11	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση C-ARM για τις Ανάγκες των Κρατικών Νοσηλευτηρίων.	Σ.Υ. 10/16	Ministry of Health	07/03/2016	480000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
12	Προμήθεια, Εγκατάσταση και Συντήρηση ενός μηχανήματος LC/MS-MS	13.25.05.2 018.16	State General Laboratory	25/06/2018	365000
13	Προμήθεια, Εγκατάσταση και Συντήρηση ενός Υγρού Χρωματογράφου Ψηλής Απόδοσης με Ανιχνευτή διπλού φασματογράφου Μάζας	13.25.05.2 020.12	State General Laboratory	29/05/2020	310000
14	Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση Μικροσκοπίου για τις Ανάγκες της Νευροχειρουργικής Κλινικής του Γενικού Νοσοκομείου Λευκωσίας	Σ.Υ.60/17	Ministry of Health	07/05/2018	297000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
15	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΑΝΑΙΣΘΗΣΙΟΛΟΓΙΚΩΝ ΣΥΣΤΗΜΑΤΩΝ ΓΙΑ ΤΟ Γ.Ν.ΛΕΥΚΩΣΙΑΣ ΚΑΙ ΤΟ Γ.Ν.ΛΑΡΝΑΚΑΣ	Σ.Υ.70 /18	Ministry of Health	19/10/2018	253220
16	Προμήθεια, Εγκατάσταση και Συντήρηση Ηλεκτρονικού Μικροσκοπίου σάρωσης με ανιχνευτή EDS	13.25.05.2 018.13	State General Laboratory	26/04/2018	219000
17	Προσφορά για την Προμήθεια , Εγκατάσταση και Συντήρηση ενός Super Low Level Liquid Scintillation Analyzer	13.25.05.2 019.20	State General Laboratory	11/07/2019	185000
18	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση Τραπεζών Ανάνηψης Νεογνών για τις Ανάγκες των Κρατικών Νοσηλευτηρίων.	Σ.Υ.65/16	Ministry of Health	02/02/2017	182000

A/A	CFTTITILE	Ref No	ORGANIZAT ION NAME	Date Published	Estimate d Value
19	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση ενός Αέριου Χρωματογράφου Υψηλής Απόδοσης συνδεδεμένο με διπλό φασματογράφο μάζας	13.25.05.2 019.17	State General Laboratory	07/06/2019	180000
20	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση ενός Φασματομέτρου μάζας τριπλού τετράπολου επαγωγικά συνεζευγμένου πλάσματος	13.25.05.2 020.15	State General Laboratory	16/09/2020	135000
21	Προσφορά για την Προμήθεια, Εγκατάσταση, Εκπαίδευσης στη Χρήση και Εγγύηση Καλής Λειτουργίας Συστημάτων Έκδοσης Ακτινοδιαγνωστικών Εξετάσεων, σε Ψηφιακούς Δίσκους.	Γ.Τ. 46/19	Ministry of Health	20/05/2019	134000

A/A	CFTTITILE	Ref No	ORGANIZAT ION NAME	Date Published	Estimate d Value
22	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ ΕΞΟΠΛΙΣΜΟΥ ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΩΝ ΤΜΗΜΑΤΩΝ ΤΗΣ ΠΥΡΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ ΤΟΥ ΓΕΝΙΚΟΥ ΝΟΣΟΚΟΜΕΙΟΥ ΛΕΥΚΩΣΙΑΣ ΚΑΙ ΓΕΝΙΚΟΥ ΝΟΣΟΚΟΜΕΙΟΥ ΛΕΜΕΣΟΥ	Γ.Τ.206/18	Ministry of Health	04/10/2018	133185
23	ΠΡΟΣΦΟΡΑ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ, ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΣΥΣΤΗΜΑΤΟΣ ΟΠΤΙΚΗΣ ΤΟΜΟΓΡΑΦΙΑΣ ΣΥΝΟΧΗΣ ΜΕ ΑΓΓΕΙΟΓΡΑΦΕΙΑ (OCT Angio)ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΗΣ ΟΦΘΑΛΜΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ ΤΟΥ ΝΑΜ ΙΙΙ	Γ.Τ.44 /20	Ministry of Health	08/05/2020	124000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
24	Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση Χειρουργικού Μικροσκοπίου για τις Ανάγκες των Κλινικών Πλαστικής Χειρουργικής και ΩΡΛ του Νοσοκομείου Λευκωσίας	Σ.Υ.67/20	Ministry of Health	04/08/2020	120000
25	Προσφορά για Αγορά Ενδοσκοπικών Πύργων για τις Ανάγκες της Ωτορινολαρυγγολογικής και Νευροχειρουργικής Κλινικής του Γ. Ν. Λευκωσίας και της Ουρολογικής Κλινικής του Γ. Ν. Λάρνακας	Γ.Τ. 253/18	Ministry of Health	09/11/2018	104600

A/A	CFTTITILE	Ref No	ORGANIZAT ION NAME	Date Published	Estimate d Value
26	<p>Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση υπερήχου αφαίρεσης μαλακών ιστών, κατάλληλο για αφαίρεση όγκων εγκεφάλου, σπονδυλικής στήλης και ηπατεκτομής με αναλώσιμα για τις ανάγκες των Τμημάτων Νευροχειρουργικής Κλινικής και Χειρουργικής Κλινικής (χειρουργείο) Γενικού Νοσοκομείου Λευκωσίας</p>	Σ.Υ.36/19	Ministry of Health	21/06/2019	100000
27	<p>Προσφορά για την Προμήθεια Εγκατάσταση και Συντήρηση Φορητού Ψηφιακού Ακτινολογικού Συστήματος για τις Ανάγκες του Κέντρου Πρώτης Υποδοχής στο «Πουρνάρα».</p>	Γ.Τ. 12/20	Ministry of Health	28/01/2020	100000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
28	Προμήθεια, Εγκατάσταση, Εκπαίδευσης στη Χρήση και Εγγύηση Καλής Λειτουργίας Πανοραμικού Συστήματος για τις Ανάγκες του Νοσοκομείου Κυπερούντας.	Γ.Τ. 320/19	Ministry of Health	07/05/2020	92000
29	Προσφορά για την Αγορά Ενδοσκοπικού Πύργου και Βρογχοσκοπίων για τις Ανάγκες του Νοσοκομείου Κυπερούντας	Γ.Τ.116/16	Ministry of Health	08/08/2016	91550
30	Προμήθεια, Εγκατάσταση και Συντήρηση Υπερήχων για τις Ανάγκες του Γενικού Νοσοκομείου Λευκωσίας.	Γ.Τ.238/16	Ministry of Health	24/01/2017	90700

A/A	CFTTITILE	Ref No	ORGANIZAT ION NAME	Date Published	Estimate d Value
31	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗ ΠΡΟΜΗΘΕΙΑ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΤΡΙΩΝ ΑΝΑΠΝΕΥΣΤΗΡΩΝ ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΗΣ ΜΟΝΑΔΑΣ ΕΝΤΑΤΙΚΗΣ ΝΟΣΗΛΕΙΑΣ ΝΕΟΓΝΩΝ ΤΟΥ Γ.Ν. ΛΕΜΕΣΟΥ	Γ.Τ.234/16	Ministry of Health	05/01/2017	88800
32	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ, ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΣΥΣΤΗΜΑΤΟΣ ΟΠΤΙΚΗΣ ΤΟΜΟΓΡΑΦΙΑΣ ΣΥΝΟΧΗΣ ΜΕ ΑΓΓΕΙΟΓΡΑΦΕΙΑ (OCT Angio) ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΟΥ ΓΕΝΙΚΟΥ ΝΟΣΟΚΟΜΕΙΟΥ ΛΕΜΕΣΟΥ	Γ.Τ.22/18	Ministry of Health	01/03/2018	88000
33	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση ενός Bench NMR	13.25.05.2 019.24	State General Laboratory	25/09/2019	88000

A/A	CFTTITILE	Ref No	ORGANIZAT ION NAME	Date Published	Estimate d Value
34	Προμήθεια, Εγκατάσταση και Συντήρηση Ω.Ρ.Λ. Μονάδας για τις Ανάγκες του Γενικού Νοσοκομείου Λευκωσίας και Λεμεσού.	Γ.Τ. 79/15	Ministry of Health	19/05/2015	75000
35	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΠΡΟΜΗΘΕΙΑ ΔΙΦΑΣΙΚΩΝ ΑΠΙΝΙΔΩΤΩΝ ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΩΝ ΚΡΑΤΙΚΩΝ ΝΟΣΗΛΕΥΤΗΡΙΩΝ	Γ.Τ. 103/18	Ministry of Health	13/06/2018	72000
36	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗ ΠΡΟΜΗΘΕΙΑ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΣΥΣΤΗΜΑΤΟΣ ΕΝΔΟΣΩΜΑΤΙΚΗΣ ΛΙΘΟΤΡΙΨΙΑΣ ΚΑΙ ΝΕΦΡΟΣΚΟΠΙΩΝ ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΗΣ ΟΥΡΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ ΤΟΥ Γ.Ν. ΛΕΥΚΩΣΙΑΣ ΚΑΙ ΛΕΜΕΣΟΥ	Γ.Τ.142/18	Ministry of Health	25/10/2018	50360

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
37	ένα (1) μηχάνημα νευρογραφήματος/ ηλεκτρομυογραφήματος/ προκλητών δυναμικών	25/2018(Σ)	The Cyprus Institute of Neurology and Genetics	25/01/2019	45000
38	Προσφορά για την Προμήθεια, Εγκατάσταση και Συντήρηση Καταψυκτών για τις ανάγκες των Τραπεζών Αίματος των Κρατικών Νοσηλευτηρίων	Γ.Τ.214/14	Ministry of Health	31/10/2014	25000
39	Διαγωνισμός αρ. 19.009 για την προμήθεια και εγκατάσταση δύο στηλών οροφής για χειρουργικές αίθουσες	19.009	Department of Electrical and Mechanical Services	29/01/2019	24000

A/A	CFTTITLE	Ref No	ORGANIZATION NAME	Date Published	Estimated Value
40	ΔΙΑΓΩΝΙΣΜΟΣ ΓΙΑ ΤΗ ΠΡΟΜΗΘΕΙΑ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΣΥΝΤΗΡΗΣΗ ΣΥΣΤΗΜΑΤΟΣ ΛΙΘΟΘΡΥΨΙΑΣ ΜΕ LASER ΓΙΑ ΤΙΣ ΑΝΑΓΚΕΣ ΤΗΣ ΟΥΡΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ ΤΟΥ Γ.Ν. ΛΕΜΕΣΟΥ	Γ.Τ.246/17	Ministry of Health	30/11/2017	24000
41	Διαγωνισμός για την Αγορά και Συντήρηση Ωτορινολαρυγγολογικού Εξεταστικού Μικροσκοπίου για τις Ανάγκες της ΩΡΛ Κλινικής του Γ. Ν. Λευκωσίας	Γ.Τ 107.20	Ministry of Health	08/05/2020	20000

B.2 Tenders' Dates

A/A	Date Published	Initial date for Tender Submission	Revised Dated for Tender Submission	Extension	Minimum Submission Date	Difference from Minimum Submission Date
1	27/06/2018	31/07/2018	14/08/2018	14	27/07/2018	4
2	28/11/2017	22/02/2018	24/05/2018	91	28/12/2017	56
3	27/11/2015	08/01/2016	27/05/2016	140	27/12/2015	12
4	30/11/2018	15/02/2019	08/03/2019	21	30/12/2018	47
5	30/12/2018	15/03/2019	17/05/2019	63	29/01/2019	45
6	27/07/2015	02/10/2015	18/12/2015	77	26/08/2015	37
7	28/08/2019	03/10/2019	15/10/2019	12	27/09/2019	6
8	11/05/2016	24/06/2016	24/06/2016	0	10/06/2016	14
9	02/09/2016	20/10/2016	20/10/2016	0	02/10/2016	18
10	19/10/2018	20/11/2018	20/11/2018	0	18/11/2018	2
11	07/03/2016	28/04/2016	28/04/2016	0	06/04/2016	22
12	25/06/2018	06/08/2018	06/08/2018	0	25/07/2018	12
13	29/05/2020	10/07/2020	10/07/2020	0	28/06/2020	12
14	07/05/2018	14/06/2018	05/07/2018	21	06/06/2018	8
15	19/10/2018	26/11/2018	26/11/2018	0	18/11/2018	8

A/A	Date Published	Initial date for Tender Submission	Revised Dated for Tender Submission	Extension	Minimum Submission Date	Difference from Minimum Submission Date
16	26/04/2018	08/06/2018	08/06/2018	0	26/05/2018	13
17	11/07/2019	04/09/2019	04/09/2019	0	10/08/2019	25
18	02/02/2017	16/03/2017	23/03/2017	7	04/03/2017	12
19	07/06/2019	19/07/2019	19/07/2019	0	07/07/2019	12
20	16/09/2020	30/09/2020	30/09/2020	0	30/09/2020	0
21	20/05/2019	14/06/2019	14/06/2019	0	03/06/2019	11
22	04/10/2018	25/10/2018	25/10/2018	0	18/10/2018	7
23	08/05/2020	29/05/2020	29/05/2020	0	22/05/2020	7
24	04/08/2020	16/09/2020	16/09/2020	0	18/08/2020	29
25	09/11/2018	29/11/2018	30/11/2018	1	23/11/2018	6
26	21/06/2019	31/07/2019	31/07/2019	0	05/07/2019	26
27	28/01/2020	28/02/2020	28/02/2020	0	11/02/2020	17
28	07/05/2020	05/06/2020	05/06/2020	0	21/05/2020	15
29	08/08/2016	22/09/2016	29/09/2016	7	22/08/2016	31
30	24/01/2017	16/02/2017	16/02/2017	0	07/02/2017	9
31	05/01/2017	26/01/2017	26/01/2017	0	19/01/2017	7
32	01/03/2018	29/03/2018	29/03/2018	0	15/03/2018	14
33	25/09/2019	10/10/2019	10/10/2019	0	09/10/2019	1

A/A	Date Published	Initial date for Tender Submission	Revised Dated for Tender Submission	Extension	Minimum Submission Date	Difference from Minimum Submission Date
34	19/05/2015	12/06/2015	12/06/2015	0	02/06/2015	10
35	13/06/2018	04/07/2018	04/07/2018	0	27/06/2018	7
36	25/10/2018	08/11/2018	08/11/2018	0	08/11/2018	0
37	25/01/2019	19/02/2019	19/02/2019	0	08/02/2019	11
38	31/10/2014	14/11/2014	14/11/2014	0	14/11/2014	0
39	29/01/2019	08/03/2019	08/03/2019	0	12/02/2019	24
40	30/11/2017	14/12/2017	14/12/2017	0	14/12/2017	0
41	08/05/2020	05/06/2020	12/06/2020	7	22/05/2020	14

B.3 Medical Equipment Maintenance and Training of the staff

A/A	Maintenance (Y/N)	Training (Y/N)
1	Y	Y
2	Y	Y
3	Y	Y
4	Y	Y
5	Y	Y
6	N/A	N/A
7	Y	Y
8	Y	Y
9	Y	Y
10	Y	Y
11	Y	Y
12	Y	Y
13	Y	Y
14	Y	Y
15	Y	Y
16	Y	Y
17	Y	Y
18	Y	Y
19	Y	Y

A/A	Maintenance (Y/N)	Training (Y/N)
20	Y	Y
21	N	Y
22	Y	Y
23	Y	Y
24	Y	Y
25	Y	Y
26	Y	Y
27	Y	Y
28	Y	Y
29	Y	Y
30	N/A	N/A
31	Y	Y
32	Y	Y
33	Y	Y
34	N/A	N/A
35	Y	Y
36	Y	Y
37	Y	Y
38	Y	Y
39	N/A	N/A
40	Y	Y
41	Y	Y

B.4 Estimated Values and Awarded Values of Projects

A/A	Estimated Value	AWARDED CONTR. VALUE	Difference Estimated Vs Awarded
1	9.160.000	7.950.000	1.210.000
2	5.390.000	4.240.937	114.9063
3	4260000	N/A	N/A
4	4.100.000	4.810.000	-710.000
5	2000000	1728299	271701
6	1200000	1107070	92930
7	804000	N/A	N/A
8	720000	N/A	N/A
9	621000	208890	412110
10	600165	N/A	N/A
11	480.000	187.988,50	292.011,50
12	365000	248000	117000

A/A	Estimated Value	AWARDED CONTR. VALUE	Difference Estimated Vs Awarded
13	310000	250700	59300
14	297000	N/A	N/A
15	253220	N/A	N/A
16	219000	310000	-91000
17	185000	168000	17000
18	182000	194082.2	-12.082.2
19	180000	159182	20818
20	135000	171740	-36740
21	134000	N/A	N/A
22	133185	N/A	N/A
23	124000	N/A	N/A
24	120000	N/A	N/A
25	104600	N/A	N/A

A/A	Estimated Value	AWARDED CONTR. VALUE	Difference Estimated Vs Awarded
26	100000	N/A	N/A
27	100000	N/A	N/A
28	92000	N/A	N/A
29	91550	89760	1790
30	90700	79950	10750
31	88800	82019	6781
32	88000	N/A	N/A
33	88000	79000	9000
34	75000	75000	0
35	72000	N/A	N/A
36	50360	N/A	N/A
37	45000	37247	7753
38	25000	19638	5362

A/A	Estimated Value	AWARDED CONTR. VALUE	Difference Estimated Vs Awarded
39	24.000	19.000	5.000
40	24.000	N/A	N/A
41	20.000	N/A	N/A

B.5 Filed Lawsuits and Appeals at Tender Review Authority

A/A	Appeal (Y/N)	Appeal Result	Lawsuit
1	Y	Approved	N
2	N	N/A	N
3	Y	Rejected	N
4	Y	Rejected	N
5	N	N/A	N
6	Y	Rejected	N
7	N	N/A	N
8	Y	Rejected	N
9	N	N/A	N
10	N	N/A	N
11	Y	Approved	N
12	N	N/A	N

A/A	Appeal (Y/N)	Appeal Result	Lawsuit
13	N	N/A	N
14	N	N/A	N
15	Y	Rejected	N
16	N	N/A	N
17	N	N/A	N
18	N	N/A	N
19	N	N/A	N
20	N	N/A	N
21	N/A	N/A	N
22	N/A	N/A	N
23	N/A	N/A	N
24	N/A	N/A	N
25	N/A	N/A	N
26	N/A	N/A	N

A/A	Appeal (Y/N)	Appeal Result	Lawsuit
27	N/A	N/A	N
28	N/A	N/A	N
29	N/A	N/A	N
30	N/A	N/A	N
31	N/A	N/A	N
32	N/A	N/A	N
33	N/A	N/A	N
34	N/A	N/A	N
35	N/A	N/A	N
36	N/A	N/A	N
37	N/A	N/A	N
38	N/A	N/A	N
39	N/A	N/A	N
40	N/A	N/A	N

A/A	Appeal (Y/N)	Appeal Result	Lawsuit
41	N/A	N/A	N

B.6 Table with Expected Date and Award Date

A/A	Expected Date	AWARD DATE	Difference
1	30/09/2018	23/10/2018	23
2	03/03/2018	02/08/2018	152
3	01/03/2016	03/04/2017	398
4	05/03/2019	20/01/2020	321
5	04/04/2019	16/10/2019	195
6	30/10/2015	27/07/2016	271
9	06/12/2016	13/12/2016	7
11	10/06/2016	03/07/2017	388
12	28/09/2018	05/12/2018	68
13	01/09/2020	11/09/2020	10
15	22/01/2019	28/08/2019	218
16	30/07/2018	27/06/2018	-33

A/A	Expected Date	AWARD DATE	Difference
17	14/10/2019	31/08/2020	322
18	08/05/2017	13/06/2017	36
19	10/09/2019	19/11/2019	70
20	19/11/2020	12/11/2020	-7
29	11/10/2016	24/01/2017	105
30	29/03/2017	17/05/2017	49
31	10/03/2017	17/05/2017	68
33	28/11/2019	13/11/2019	-15
37	30/03/2019	07/08/2019	130
38	03/01/2015	26/01/2017	754
39	03/04/2019	29/03/2019	-5

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