Executive Agency for Competitiveness and Innovation (EACI)

LCC-DATA

Life-Cycle-Costs in the Planning Process. Constructing Energy Efficient Buildings taking running costs into account

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WP3 - Deliverable D 14

Common Evaluation Report

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Definitions and Abbreviations

Definitions

None

Abbreviations

D	deliverable
EPBD	Energy Performance of Buildings Directive 2002/91/EC
KED	Hellenic Public Real Estate Corporation
LCCA	Life Cycle Cost Analysis
WP	work package

1 Executive Summary

LCC is an important decision making tool in the construction sector which aims to give economic sustainability and investment perspective in a building's lifetime. For efficient and expanded use of LCC in buildings, it is important to encourage national codes for cost categorisation and cost benchmarking. Therefore, building owners, facility managers, developers and users, need to be approached and supported in order to follow a common cost classification system and integrate cost collection and storage process in their common working practice.

In the framework of the EU LCC DATA project, a common cost classification system (WP2/D9) and a database for data storage and analysis have been developed. The aim is to commence inserting cost information at this stage and ensure a future plan for development beyond the project duration. The interest from potential users of the database is a tool to assist in both setting budgets for future projects (i.e., at an early stage of design), and in estimating costs for existing projects / portfolios of properties with the aim of improving performance.

Various meetings at national level took place in all participating countries and valuable feedback on the cost database and collection process has been gathered and assessed. National evaluation reports have been produced (WP3/D13) and a compilation as a common evaluation report is presented in this document.

D14	3	Common evaluation report	Report	15 pages	English	Building owners, ICT consultants	CRES	PU	27

2 Introduction

2.1 Aims of this work

This report aims at raising issues of consideration, regarding the cost collection and input process as well as the database development. Information derived from meetings at national and local level with key actors of the construction sector (owners, users, facility managers, developers) is compiled and presented below.

For specific project country partners, a national cost classification system existed at the time of the project duration (such as Germany, Austria, Norway, Slovenia), while for other countries (Greece, Czech Republic) the ground study was rather new. However, as shown in the following document, several points of discussions and recommendations are common to most of the cases.

2.2 Process followed

Feedback on this report derived from discussion at national level, through national workshops organised in the framework of LCC-DATA project and other dissemination activities and presentation related to this field.

From the beginning of the project, great effort has been placed to the contact with key market actors, encouraging them to participate in the development of the final outputs. Broad dissemination activities to wide audience (presentations, papers) promoted LCC aims and use; while structured workshops with limited number of participants aimed to collect direct feedback on the project deliverables.

The first stage of the work included the approach to potential market actors in order to promote widely the aims of LCC in the construction sector and the need of a cost database development. As soon as cooperation with specific national groups was established, data collection has started and this process provided valuable feedback to the database development.

From all partners has to be pointed out that the actual data collection process required much greater time compared to the predicted schedules, due to various reasons for each national group. Such reasons include the lack of knowledge and experience of the market (not mature enough to be involved on this process), the time required from the building providers to collect and assess their cost data, the lack of legislative incentives to encourage this method, the difficulty to develop a common cost categorisation and database framework in order to satisfy all participating groups, etc. Significant delay on data collection process was also due to the fact that the actual interactive database was not completed until the end of the project, therefore the potential data providers didn't have the opportunity to 'test' the database and assess its efficiency and benefits.

A variety of building uses have been covered in terms of data collection from different national groups. For example, Norway focused of college/university buildings, Slovenia on schools and residential buildings, Czech Republic on schools and hospitals, Austria and Greece on office buildings. This variety of approaches provided interesting feedback information.

3 National evaluation reporting

A principle task of this project is the cost data collection and input process, aiming to register all costs affiliated with a building's lifetime. Through that process, national reports have been produced (WP3/D13) and the main points are summarised below.

3.1 Austria – project partner AEA

Experience gained from this process is described in detail at the National Evaluation Report (WP3/D13) for Austria.

3.1.1 Background information

In Austria, there has been a decision making regarding the development of a new LCC-DATA database or the integration and cooperation with the existing national IBI database of Kufstein University. Up to now (April 2009) there are about 40 Austrian buildings listed in the IBI database, of which 18 are Office buildings.

After several national workshops and meetings, it was decided to cooperate with Kufstein University and IBI database, forwarding all feedback and suggestions collected on the building and cost information sheets during LCC-DATA project. Therefore, the Austrian database will not have an interface utilised by the common project database. However, the Austrian Energy Agency believes that implementing the suggested improvements – as described on the WP3/D13 National Evaluation Report – would be beneficial.

The main and sub categories of the data sheet are very useful for the Austrian users of the database (particularly facility managers) because it is structured according to the OENORM 1801-1 and 1801-2.

3.1.2 Cost collection process

Due to the decision taken in Austria not to use the common database, but instead use the existing IBI-benchmark tool, it was not possible to collect experiences regarding the handling of the interface itself, as was originally intended. However, experiences with the IBI-tool are described in the D 18 AEA-4 national workshop experiences.

3.1.3 Points of interest

For Austria, the use of LCCA is very interesting for the key actors concerned, but the main focus is to establish a tool which can be integrated into daily use without being unnecessarily time consuming.

Based on the project database structure, the main critical comments were:

- The data sheet does not include sufficient input data to calculate satisfactorily the key output figures being used in the planning phase (e. g. architectural competitions). In particular, this regards the building shell, as more detailed information is necessary.
- The structure of input data is not clearly defined. The users´ suggestion is to modify the structure towards being more objective (e. g. through the categorisation of maintenance levels “high-medium-low” listed in the database).

Comments on specific fields of the LCC-DATA database, such as BMS detailed description, fixed and variable energy costs, percentage of occupancy in office buildings, etc, are presented at WP3/D13 and national workshops WP5/D18 reporting.

3.1.4 Consideration issues

Overall, there is sufficient interest to justify the use of LCCA in Austria. However, if the database input stage is unnecessarily time-consuming due to poor database design, the willingness to feed and maintain the database decreases. Feedback from LCC-DATA project and valuable experiences of the Kufstein University during the implementation of IBI tool have been composed in order to develop an efficient database that meets users' expectations and needs.

More specifically, main issues for consideration are the following:

- Data privacy: Many agencies and companies are not fully confident that a web-based database ensures their data privacy. The data privacy concerns could be discounted, because, due to satisfactory use of the database since November 2008, potential users can see that there is no possibility of data entering the public sphere, other than that corresponding to their own buildings.
- Ownership: the building owner is often not the user and therefore different people are responsible for building data and cost data. It is often the case that the building owner does not have an overview of the costs related to consumption. This results in the need for communication between the building owner and user, with related expenditure of time. This acts as a barrier against the use of the database as a LCCA instrument. However, the interest from the owner to benchmark their building stock increases, and so the building owners are more and more interested in finding solutions for this, e. g. by including the data input of costs into FM contracts.
- Quality assurance: In order for the project to be effective, it is important to ensure the quality of the data collected. The comparability of the data shall be improved in a way so that the database can facilitate effective future decision making

Concluding, to facilitate simple data access as well as storage possibilities for LCCA data, the Austrian market seems not fully prepared. As a consequence, companies making use of the database will need more support during the next few years, in order to ensure the quality of data input and thus also guarantee the quality of key figures obtained from the database.

3.2 Czech Republic – project partner City Plan

Experience gained from this process is described in detail at the National Evaluation Report (WP3/D13) for Czech Republic.

3.2.1 Background information

Czech Republic does not have a national cost classification system, therefore LCC database is a developing for the market field.

Analytical comments on the cost and building information datasheets are presented on the WP3/D13 National Evaluation Report and mostly concern performance and maintenance level, BMS description, solar shading integration and building technical equipment and installations.

3.2.2 Cost collection process

Data were collected during cooperation with building operators by processing of energy audit and energy performance of buildings certificates by City Plan. Information from the energy audits is used for the LCC-DATA database purposes, such as general information about building (material of construction, heating system, ventilation, control etc). Furthermore, energy consumption is monitored and cost information in terms of operating energy and capital costs, is collected.

3.2.3 Points of interest and consideration

Choice of right parameters to evaluate of buildings is very important for possibility of objective and purposeful benchmarking of particular buildings in the same category (same kind of building and usage).

By projecting of new buildings, eventually by planning of reconstruction of older buildings are most important values of energy consumption and energy costs. These values are most related to technical parameters of building. Other operation, administration costs (salaries etc.) are more related to own activity of building user, not so much to technical parameters of building.

3.3 Germany – project partner BEA

National report has not been delivered in order to assess the barriers and potentialities of the cost collection process and database development.

3.3.1 Points of interest and consideration

BEA provided the following feedback regarding further development of the LCC database.

Due to the high relevance of refurbishment (and the relatively low rate of new buildings) the Senate of Berlin is involved in LCC Data with the focus of interest:

- Details of measures are of high relevance (especially the real LCC, in comparison to planned LCC), due to the running refurbishment process in many of public buildings and the respective decisions for/against specific energy related measures

- LCC with focus on whole buildings is not relevant due to the low transferability of whole building, and the low relevance for the running refurbishment process
- Public access for public authorities for planned and realised LCC for specific measures is foreseen in the future

This focus of interest of the partner in Berlin/Germany, which has been the focus from the beginning of the project, is confronted with developments, which could not be foreseen:

- The Senate will realise most of the planned and calculated measures (mostly with support of the economic support funding, as a reaction on the economic crisis), with start in May 2009
- BEA will evaluate the measures and actualise the LCC for single measures as well as whole buildings within the next years with real costs (until 2010/2011)
- Public access for the database for planned and realised LCC for specific measures is currently not feasible due to the running refurbishment process (and the connected procurement process, in which especially investment costs can not be communicated until the end of the refurbishment phase)

For this reasons, the last step, to publish the database within the project period, could not be realised. Nevertheless, the specific data and the results of the energy audits have been presented to engineers, political decision makers as well as to building owners. Thus, the main idea to participate third parties (expert level) at the know-how gained within the project has been achieved, but focused on a selected target group due to the above mentioned restrictions referring to the refurbishment/procurement process.

3.4 Greece – project partner CRES

Experience gained from the data collection and input process is described in detail at the National Evaluation Report (WP3/D13) for Greece.

3.4.1 Background information

In Greece there is no national classification system and no LCC applications on the construction sector. LCC is a very new approach as a decision making tool and mostly approached through Public-Private-Partnerships (PPP) in which targeted performance (economic and energy) is required. Therefore, it was essential to follow a structured dissemination plan in order to approach building owners and familiarise building actors with the potential and use of this method.

The inexistence of a national cost classification system provided difficulties in terms of uniformity on the data produced and stored. The presentation of a proposed

classification system (D9) created a ground of common discussion and a high perspective for future development and expansion of LCC as a principle decision making tool.

3.4.2 Cost collection process

The data collection task appeared to be highly time consuming for CRES and the potential data providers. Certain delay on this process caused by the delay of the agreement on a common LCC-DATA datasheet. Therefore, significant time was spent on discussions regarding the template of the datasheets in order to match with the building owners understanding and needs.

The cost data collection started with familiarised premises (CRES own offices), as an initiative and a way to encourage building owners to visualise this scheme and continue with their own building information. CRES insisted on the close cooperation with the Hellenic Public Real Estate Corporation as being a public corporation with high potential of building stock management and prospect to use the database as a benchmarking tool. Continuity and development of this cooperation is aimed beyond the project duration, in view to the national database enrichment. Most of the buildings under the management of KED are offices with few other special use buildings (police and fire stations, prisons, etc). Even with KED, difficulties appeared due to the fact that is responsible for the construction but not the management and operation of the buildings (except some cases), therefore operational costs are difficult to define.

Other target groups were municipalities (which manage a high percentage of building stock such as schools, social services and public offices) in order to raise awareness on economic management and sustainability, through systematic data storage and analysis. At last, facility management companies and other private organisations have been addressed aiming to raise the economic or environmental profile awareness. At this case, the constraints of data provision are mostly about the permission needed from the building owner to give cost data for the database (immature market, lack of knowledge).

3.4.3 Points of interest

The aim of LCC approach in the construction sector was widely appreciated as an innovative decision making tool with high potential and applicability. A cost database development considered as valuable in order to encourage further understanding of costs affiliated with a building’s lifetime and to facilitate benchmarking related to cost performance.

Special interest expressed by large building owners, aiming to use the database as a benchmark tool for their building stock and as a cost indicator source for evaluating new buildings procurements. Environmental awareness and economic difficulties on investments have been also registered as fields of interest regarding cost information management.

Additionally, PPP projects appear as an opportunity to apply LCC for economic and energy sustainability purposes (as commitment on specific energy and economic performance indicators are set from the beginning).

3.4.4 Consideration issues

Main points of discussion and consideration included data protection assurance and future use, as well as maintenance and management of the database. CRES will keep the maintenance and administration of the database at national level (as described in D11) as the national entity for energy efficiency, aiming to link and develop this field of work with energy benchmarks, databases, targets, policies, etc.

Special attention is needed on the level of access of information into the database, as the majority of data providers prefer to keep this information confidential and anonymous.

During the data collection process, problem occurred due the non-uniformity of the data format as it follows each company's accounting system and not a national common classification standard. Lack of stored information, as not requested in the past, also appeared as a main barrier for data collection. At last, especially in the public sector in which finances are often centrally managed, a main problem raised is that the energy costs (as well as other maintenance and cleaning costs) correspond to a number of buildings and is difficult to identify and allocate cost per building.

It was rather difficult to convince potential data providers to give cost data for a database which was not still developed and presented as a final format. This was repeatedly mentioned by the various target groups; therefore enrichment of the database is mostly expected beyond the project duration and when the national interface is finalised and assessed for each participating country.

3.5 Norway – project partner SINTEF

3.5.1 Background information

In Norway it already existed a national standard for LCC with cost classification system, and a network for benchmarking of cost with an associated data base for collecting and comparing costs. Improved quality and performance of public building has been focused the last year, realising that a major part of the buildings have not been properly maintained due to low budgets, and decisions are taken based on project costs, not on total costs over the life cycle.

The Public Procurement Act specifies that life cycle thinking should be implemented in all public procurements, and the focus on life cycle costing has increased the last year.

More pilot projects with Public Private Partnerships have also emphasised the need for more LCC information, ensuring that the contracts are based on reasonable costs. This is of interest for both parts of the contracts.

The last year it has been given a specific budget to KoBE - Kompetanse for Bedre Eiendomsforvaltning (Competence for improved Facility management), which has been distributed to different organisations for activities or projects (recommendations, seminars, training) to ensure more knowledge, and knowledge and competence transfer.

The costs of the data base is 500 € per year for building owners, and 700 € for consultants/net user of numbers. The costs are set by the general assembly every year.

3.5.2 Cost collection process

- Several building owners regularly add cost information about a selection of their buildings today. Some larger owner only add a few of their building, for not being to dominate, and decisive for the statistic. An important issue have therefore been to promote the data base to smaller owners, assisting them in adding the information. The cost has partly been added directly to the data base through the web side. For owners with several buildings, it is used a excel sheet with all yearly costs, and this is later transferred to the date base.

The main problem in the process has been to encourage the building owners to use the necessary time, and to prioritise this in a busy day.

3.5.3 Points of interest and consideration

The main point for many building owners has been to prioritise the work with adding data, and it is regarded important that resources have been allocated and that the activities are stated and prioritised in policy documents.

As the cost classification used in the data base is according to NS3454, there have not been any comments to the structure itself.

3.5.4 Consideration issues

Several topics have been raised in work shops or training courses, and the one of highest interest are mentioned below.

- The differences between maintenance and operation might be difficult, and is often more depending on who is doing the work (i.e work done by the care taker is considered to be operation, while hired help is considered to be maintenance).
- The maintenance process includes assessments and analysis (for instance energy analysis) that are not taken into action. Should the cost of the assessments still be included?
- Privacy and how to ensure full anonymity about the specific buildings, but still be able to make different types of statistics.
- The information have to main use; benchmarking and improvement of facility management, and as input to new LCC analysis. How should the information be made available for consultants/engineers doing LCC? Should they have

access to another information than those doing benchmarking (and in a way own the data).

- A good indicator should be possible to report in different ways for comparison, as energy use kWh/m2 or kWh/person. The benchmarking will depend on which indicator that are chosen.
- Private Public partnership – it is of interest to also include information from these projects during the PPP period, to compare with other projects, but the privacy issue is here important to solve.
- End of life scenarios are a part of life cycle costing, but this cost are seldom entered into the data base, mainly because the building have not reached their end of life, but also that for the building owner it will often not be of interest to benchmark this kind of costs.
- Future development, of which the link to energy use and energy certificate is of interest. Energy use is reported today.

3.6 Slovenia – project partner ZRMK

Detailed experience gained from the data collection and input process is described in detail at the National Evaluation Report (WP3/D13) for Slovenia.

3.6.1 Background information

For the Slovenian market it was pointed out, that the implementation of regular use of LCCA in building planning phase is necessary, and the development of an efficient and user friendly tool would ease decision making process. The intensive implementation of LCC database is necessary regarding the fact that use of LCCA in building planning phase is momentarily still far from being a standard procedure at this time. In Slovenia there are namely no standards, not even recommendations to methods, procedures or tools for any kind of life cycle costs calculations. However, there are few very encouraging findings at this stage of the project, showing the importance of LCC in the building industry.

In addition to that, green (public) procurement is becoming a core issue and LCC is an important additional criteria for decision making.

LCC has recently entered in the regulation about energy efficiency of buildings, namely, it is an element for evaluation of alternative energy systems under EPBD and will be even more integrated in the legislative frameworks with the transposition of the Recast of EPBD directive.

3.6.2 Cost collection process

During the data collection process, several barriers, difficulties and questions have been noted, both for the data collection itself and for the datasheet structure.

First of all, the draft excel format of the database was distributed to interested target groups for feedback and comments, in order to ensure that it meets user’s needs.

In Slovenia, case studies were mostly old primary schools in which were impossible to get adequate data, either due to lack of information or due to the highly time consuming process. Cost information was not available to principals of the schools (or to any other member of the staff, employed in the school building), and even if some information existed, it was difficult to assure their reliability. In addition to that, the form of the available cost data was according to national accounting standards (total amount of operational, maintenance, developing, cleaning, etc) and not completely correspondent to the structure of data required in the database (difficult to divide in subcategories of each cost category).

However, according to statements of the accountants, data collection would be possible in the future, even in the structure / form the database requires. This input process need is recommended to be continuous, whenever cost data information is received.

During the data collection process, it was evident that building information data was mostly provided by housekeepers (taking care of operation and maintenance of the buildings) and costs information data was mostly provided by accountants.

3.6.3 Points of interest

LCC database seems to be appropriate for starting the process of collecting suitable data in Slovenia, since there is (in spite of lack of suitable standards and regulations) a cost classification framework as part of regular Slovenian business accounting system (operation, maintenance, repair, minor and major investments costs, etc.). Therefore, this available data could be used for the database, even if is not divided into subcategories.

To guarantee future entries in the data base it is important that the building owners have a clear view of the expected benefits of the LCC data base (like permanent benchmarking, support in future investments in renovation)

BCEI ZRMK is momentarily in league for cooperation in reviving (enrichment and further development) of the LCC database in Slovenia with a number of highly interested Slovenian big construction companies (Vegrad, Primorje, IMOS). Initial attempt of collecting data for some multi-dwelling buildings is in progress. At the moment the cooperation is fluent and productive. But despite of companies' momentarily high level of willingness for cooperation, there is, however, a threat for the future of failing of this interest.

3.6.4 Consideration issues

The question of the accessibility and the terms of use of the database should remain one of the main areas for further discussions and issues for consideration.

Regarding the future use of the database, there is a risk that potential interested groups will not add any further information if there will be free yearly publication of cost indicators offered. The option of various levels of access to the collected data seems promising (following the principle: the more input a building owner provides

the more detailed indicators he can access). Only basic information from LCC data base should be regularly published (to be used free of charge).

Concluding, improvements on the database structure are proposed and analysed on the National Evaluation Report WP3/D13 (mostly proposals for new additions to the group of building features data).

4 Recommendations for improvement and development on the datasheets

The process of analysing the recommendations for improvement of the datasheets (building and cost information) was a critical and time consuming part of the work at national and project level, as one of the main concerns was to satisfy users' needs and expectations from this work. Therefore, specific recommendations from various partners have been recorded at national level (WP3/D13). However, as the database is common for all partners, general comments have been integrated at this stage, with the potential to alter any part of the (national and/or common) database in the future, when its performance is assessed in operation.

4.1 Building information

The recommendations on the building information section of the datasheet are summarised below, compiling the feedback from all participating countries and WP3 external consultant WLL Ltd. Regarding the building information datasheet, the main following comments have been pointed out:

- Mention whether the building is public or private
- Add details on façade type, which is linked directly to investment, maintenance and operating costs
- Additional descriptive information have been proposed such as: open plan or cellular, deep or shallow plan, detached or terraced, which might be interesting to include
- Operational hours and the percentage of occupancy
- Performance and maintenance level is something subjective, need to described clearly on the guideline document
- BMS was considered as important to analyse and describe in more detail
- References to "per m2" are according to national measuring systems –might differ for different countries, clarify to avoid misleading comparative indicators
- May need to adopt the heating and cooling system list in order to cover technologies widely used in all participating countries

4.2 Cost information

Cost information is more standard (derived from WP2 common cost classification) and no additions have been included at this stage. Most of the comments addressed to clarifications required in terms of cost input in various cost categories. Therefore, the guideline for the database use is crucial in order to ensure correct cost information input for each category.

The comparison between cost indicators for the different countries is not recommended as different national financial and measuring systems are affiliated with each building cost.

The type of façade typology in relation to LCC appeared to be an interesting field to examine and include in the project database, in order to ease level 1 decision making as well as for facility management purposes.

5 Conclusions and further needs

It was highly concerned by some project participants (such as CRES, ZRMK) that the delay of the development of the actual database (as an interactive tool) constrained the potential data providers to be involved on this process from now. It is expected that when the database is presented to the building industry showing the potential of cost analysis, more building owners and users will get involved in this process and the database will be enriched with more cost information.

It is essential to derive to a database that is user friendly, flexible for data analysis and also in accordance to national cost categorisation standards. For this reason was preferred to develop a European database with national interface in order to be compatible with national standards which would make easier data to be collected. The feedback from most partners was that data collection and input is a time consuming process which needs effort to increase knowledge and encourage systematic update.

Countries with no national cost classification system need to invest more on dissemination activities and on proposed legislative improvement on this field. This will eliminate large differences in the form and type of data collected (based on national standards and not on business accounting systems).

Additionally, the issue of data protection and confidentiality needs to be carefully addressed in the management and administration of the national databases. Within this framework, data quality assurance needs to be considered within the maintenance plan of the database.

Lack or inexistence of information frequently mentioned, either due to the difference of developer, owner, user, facility manager (data is scattered) especially referring to a long period from a building’s lifetime. Need to encourage building actors to collect and store data and to develop benchmarking standards.

New financial schemes, such as PPP projects and ESCOs favour the development of LCC and cost information collection and storage, therefore LCC database is widely appreciated as an important decision making and assessment tool.

Interested on the database are mainly the data providers (building owners) and the data users (facility managers, contractors, etc), either for benchmarking purposes or for LCC analysis purposes.

6 Performance indicators

Performance indicators concerning the WP 3 are:

1. Members of data base network: 60, at least 2 large building owners in per country
2. Data amount in data base: 100 buildings, at least 10 buildings per country
3. Quality assurance of LCC data – percent of data gone through an extern quality assurance: 50%

The achievement of those by the partners are shown in the following table.

Table 1: Performance indicators of LCC-DATA

	1	2	3	
Targets =	*at least 2*	*at least 10*	*50%*	Comments
AEA	10	40		Cooperation with IBI Kufstein University existing database
BEA	4	329	all audits checked by the BEA referring to quality and plausibility	Members: Berlin Senate department for urban Development, Senate department for Schools, Senate department for Culture, Senate department for Justice Most of the information data collected includes energy information and not LCC cost information
CITY PLAN				
CRES	4	6	60%	Members: Hellenic Public Real Estate Corporation (KED) – *letter of interest signed*, CB Richard Ellis – Atria (FM consulting company), 2 municipalities in Athens area Most data input will be developed from this stage and beyond, as the actual database interface is finalised and activated

SINTEF	50 of which 20 entered 2006 numbers.	1,5 mill m2, 159 objects in 2006	?	The number of objects in the data base is 250-300 82,5 mill m2), but costs are not reported for all buildings every year. The costs are only internally quality assured before input in the data base, but when creating the yearly key numbers (and statistics), "strange" numbers are excluded, even though they may be correct.
ZRMK	11	15		SPEKTER and VEGRAD, the others interested in using data for level 1 LCC analysis are: 2 large investors (Projekta, Akropola), 3 municipalities - public investments, 1 large state office responsible for public investments, 2 large construction companies, also investors (Primorje, Imos) = all together 11