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Introduction

During the last decade, the sector of waste management has rapidly changed and developed in Hellas, mainly due to the initiatives and policies adopted by the European Union and the new technologies and techniques introduced, thus raising a huge need of highly qualified personnel. Simultaneously citizens in Hellas were more and more sensitized in waste recycling procedures. However, until recently, big quantities of useful materials (i.e. paper, glass, aluminium, plastic, metal and wood) have not been, in some cases, exploited to their full potential, through recovery and recycling.

Waste management, in Hellas, is a challenging issue from an environmental, political, legal and social point of view. Growth of large urban areas, large tourist flow, rise of living standards and change of consuming patterns, have led to an increase of the produced volumes of solid waste, especially municipal waste, with a simultaneous change of its composition. At the same time, there is a growing concern on the site allocation for water and solid waste management installations. In recent years, significant progress has been accomplished in solid waste management, through increased allocation of funds, focusing largely on the promotion of recycling and the expansion of the number of managed sanitary landfill sites throughout the country.

Therefore, waste management and recycling industry is evolving quickly in response to the green / carbon agendas and as such, its reliance on technology and mechanization is increasing. New technologies and the automated processes now used to treat waste and recyclable materials require the industry to examine and review the solid waste management workers' competences agenda.

The present report documents the characteristics of the solid waste management labor market in Hellas, examines what are the most important training topics and the acquired knowledge, skills of the personnel occupied in different solid waste management facilities and other professional sectors also engaged in solid waste management activities. Additionally, the current working conditions and the national legislation concerning the operation of solid waste management facilities are investigated.

Brief Overview of the Report

The present report has resulted from the research conducted on different solid waste management facilities and companies (for facilities variance see Figure 4 of this report), local authorities and associations involved in solid waste management. The survey was conducted via:

- a) the distribution of more than 700 questionnaires (Annex I)
- b) direct contacts to managers
of solid waste management facilities, companies, local authorities and associations engaged in solid waste management

c) information collected from studies and reports issued by statistics authorities and market research companies on solid waste management, in Hellas.

Eighty six (86) answered questionnaires received back either at hardcopy format or electronic version.

The generation of solid waste, especially municipal solid waste, in Hellas has been constantly increasing since 2001, by nearly 1.5% per annum until 2009. That was reflected in various parameters, such as the entry of new firms in the waste management industry, the increasing activity of organized Recycling Schemes in collected volumes, improving recycling rates in all waste streams, establishment of new installations where Recyclable Materials are collected and sorted, new investments in recycling installations for different waste streams (i.e. glass), scope and number of contracted treatment plants. The later increase to 2010 was somewhat more moderate. Despite the economic recession and the subsequent financial crisis, the volumes of municipal solid waste have continued to increase.

The basic method of management of solid waste is landfill, which in 2010 won share 82% (vs. 40% in the European Union - EU), Followed by recycling 17% (versus 23% in the EU) and composting with 1% (versus 17% in the EU).

The legal framework that designates the direction of waste management, in Hellas, follows closely the development of the respective European waste management framework and the corresponding Directives. Hellas, as an EU member state has incorporated into its national legislation and is implementing almost all related European Community waste management legislative framework.

The current report incorporates the results of a survey aiming at the assessment of the nature, content and regulation of qualifications for Managers in Solid Waste Management Facilities. In the survey, the most important training topics and the acquired knowledge of the personnel occupied in different solid waste management facilities, the working conditions, and the status of Waste Management profession in industry and in society are documented. The survey was conducted via the compilation of a structured questionnaire (see Annex I).

The stakeholders' groups that were targeted in the hellenic territory were:

- Solid Waste Management Agencies (Landfill and Recycling (including collection and sorting activities) facilities)
- Private companies activated in hazardous and non-hazardous solid waste management (Collection, Sorting, Recycling facilities, Export).
- Consulting Companies and equipment providers.
- Local Authorities

active in solid waste management.

Based on the received answered questionnaires, it is resulted that Solid Waste Management Professionals search for available vocational training programs. Managers are interested mainly

in business disciplines, in acquiring negotiations and communication skills. Facilities maintenance planning and procedures are also important educational topics where training gaps are documented. They have also expressed interest in Project and Financial Management and Crisis Management.

Managers that have attended training courses in the past asked for better qualified trainers and updated training material.

Finally, solid waste professionals that participated in the survey rated as satisfactory the working conditions in solid waste management facilities, where they work. It is expected that further vocational training of workers occupied will also improve working conditions in solid waste management facilities.

Despite increasingly positive perceptions of the value of competences development, financial pressures very much remain a barrier to employers providing training. Further raising awareness of the benefits of developing employee competences is seen as crucial to encourage training provision.

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1. Overview of Waste Management Industry in Hellas

1.1. Characteristics of the solid waste management industry

Waste management has been recognized as one of the most pressing problems in Hellas, suffering of a low level of organisation and relying predominantly on semi-controlled landfills until the end of the previous century. Nevertheless, during the last decade the Hellenic solid waste management sector has been upgraded. While it is still generally considered as a major environmental, social problem, progress has been increasingly observed, and solid waste management is becoming a well-structured, organized and environmentally responsible activity with specific goals, mostly in urban areas.

1.1.1. National Legislation

The legal framework that designates the direction of waste management, in Hellas, follows closely the development of European waste management and the corresponding Directives.

Hellas, as an EU member state has incorporated into its national legislation and is implementing almost all related European Community waste management legislation. Thus, waste management is covered by a wide range of enactments for all waste types, hazardous and non -hazardous, e.g. municipal, industrial, medical etc. Moreover, all means and options for waste management are covered by corresponding technical specifications, from collection, transportation and transfer, to processing, utilisation, and final disposal/landfilling. Within this context, a series of more detailed technical enactments regulate particular issues like waste management sites (hazardous, nonhazardous, municipal and inert); small sanitary landfills; the technical specifications of management projects; management of hospital and hazardous waste; as well as the processes for alternative management of specific waste streams like packaging material, end-of-life tyres, end-of-life vehicles (ELVs), used lubricants, batteries and accumulators, waste of electric and electronic equipment (WEEEs) etc.

Over the last decade all relevant EU Directives have been transposed to Hellenic legislative framework, with the most recent case being the transposition of the Waste Framework Directive (2008/98/EC).

The major driver behind waste management, in the last decade, has been the Joint Ministerial Decision „on measures and terms for solid waste management - national and regional planning management“ with the National Waste Management Plan annexed to it. Basic principles and targets for solid waste management together with the specifications for national and regional planning are set there. The plan is foreseen to be revised every five years or earlier if necessary (HSWMA, 2012). A revision is planning to be made until end of 2013.

The Ministry of Environment Energy and Climate Change is responsible for policy making, national planning, technical matters, as well as licensing and regulating the financing of large waste treatment and disposal facilities. According to the National Solid Waste Management Plan

(NSWMP), the collection, the operation of transfer stations, the processing and disposal of municipal solid waste lies within the jurisdiction of local Waste Management Agencies (WMA), while the Ministry of Interior is responsible for the establishment of the registry of WMA. For waste streams apart from municipal solid waste, the management responsibility lies with producers, according to the „polluter pays principle“ introduced in 2003 by the NSWMP. An inter-ministerial committee for integrated waste management was established in March 2008.

The Hellenic Recycling Agency (HRA) is responsible for the monitoring of the management of specific waste streams which can be recycled. The purpose of Recycling Law is to designate the necessary measures and procedures for the management of packaging and other recyclable waste streams aimed at reuse and recovery of their raw materials. In Hellas, there are 17 Approved Recycling Schemes (October 2012) for the packaging waste, portable batteries (batteries), accumulators, waste electrical and electronic equipment, used tires, waste oils, Vehicle End of Life Cycle (cars) and waste produced by excavation, construction and demolition works. Significant progress has been made in the alternative management of different recyclable waste streams, reflected in some quantitative data. The period 2007-2009 the Recycling Schemes increased by 25.5% the quantities of packaging materials recycled, while the number of sorting facilities for recyclable materials (KDAY) increased from 15 to 28 units.

1.1.2. Solid Waste Management Facilities

In Hellas the basic method of management of solid waste is landfill, which in 2010 won share 82% (vs. 40% in the European Union - EU), followed by recycling 17% (versus 23% in the EU) and composting with 1% (versus 17% in the EU) - (Figure 1).

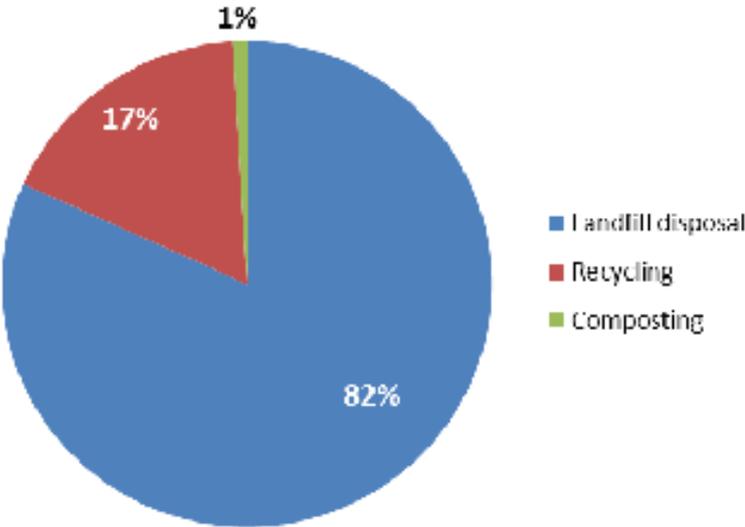


Figure 1: Management of Solid Waste in Hellas (Hellastat, 2013).

Thermal treatment is not implemented to the country, except for one installation which is used for the treatment of infectious health care solid waste. In comparison, thermal treatment in EU corresponds to the 20% of solid waste management.

All municipal waste landfill sites in operation, collect gas using an active and passive pump systems. Many landfill sites burn the gas they collect, while, so far only 2 landfill sites, one in Athens with a power plant with 23.5 MW installed capacity and one in Thessaloniki (Northern Hellas) with a power plant with 5 MW installed capacity capable of covering the energy needs of 80,000 residents, use gas for energy production. The energy produced is supplied to the Public Power Corporation (PPC) of Hellas.

Regarding disposal facilities, there are in operation 79 Sanitary Landfills. In Figure 2 the operating solid waste treatment infrastructures, in Hellas, are listed.

During the last two years, significant steps have been made towards shutting down and restoration of uncontrolled landfills. Restoration measures include mainly sealing the landfill surface, continuation of leachate collection and treatment, construction, if not existing, of a gas collection system and soil covering and appropriate planting. The after-care period lasts around 30 years.



Figure 2: Current solid waste treatment infrastructures in Hellas.

As of February 2013, still 73 illegal dumping sites all over Hellas remain in operation despite the ruling of the European Court of Justice of 2005 which dictated that by the end of 2008 all illegal dumping sites should have been closed and rehabilitated.

The generation of municipal solid waste in Hellas has been constantly increasing since 2001, by approximately 75,000 tn more each year, or nearly 1.5 % per annum until 2009. That was reflected in various parameters, such as the entry of new firms in the waste management industry, the increasing activity of organized Recycling Schemes in collected volumes, scope and number of contracted treatment plants, improving recycling rates in all waste streams, establishment of new installations where Recyclable Materials are collected and sorted (KDAY), new investments in recycling installations for different waste streams (i.e. glass). The later increase to 2010 was somewhat more moderate increasing only by 21,000 tn. Despite the economic recession and the subsequent financial crisis in Hellas, the level of municipal solid waste generation has continued to increase.

Overall, in 2010, 5.175 million tons of municipal solid waste (457 kg / person to 524 kg / person in the EU), were produced. Thirty-nine percent of them were produced in Athens in the wider Attica region (where the city Athens is located and where the 40% of the Hellenic population lives), while 16% and 9% in Central Macedonia region and city of Thessaloniki (second biggest city with a population of 1,000,000 people) respectively (Hellastat, 2013). Figure 3 shows the solid waste composition in Hellas for 2010 (Hellastat, 2013).

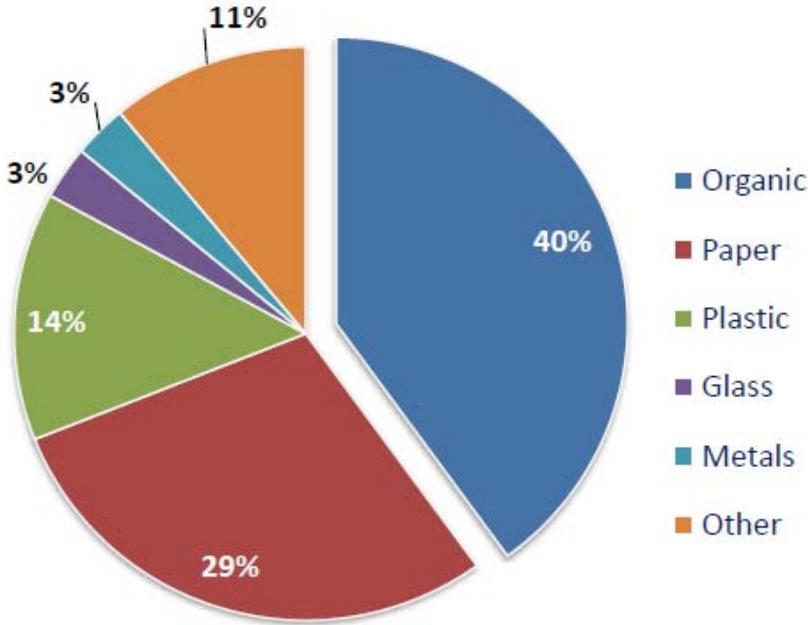


Figure 3: Composition of solid waste in Hellas (Hellastat, 2013).

1.1.3. Composition of Waste Management Industry (Public/ Private Sector)

Private Companies activated in solid waste management are operating in the following fields:

A. Solid waste producers who process their waste on their premises. All solid waste producers were forced by law to enter in one of the certified Recycling Schemes for recyclable solid waste.

Some of them decided to establish and operate by themselves sorting installations of recyclable materials (KDAY) and proceeded to the corresponding private investments. Their activities focus on the commercialization of the recyclable materials that produce, collect and sort.

B. Solid Waste collectors and transporters, which are involved in initial stages of management. These companies showed a significant increase the last decade, due to the fact that recycling of solid waste (different waste streams) has also increased. There are also specialized companies in collection, transfer and export of hazardous waste. Collection and transfer of non hazardous solid waste companies collaborate with respective recycling facilities. There are no facilities that can accept hazardous solid waste in the entire country. Therefore companies that collect hazardous waste they have to transfer them abroad and dispose them to a licensed respective facility in another country.

C. Companies that organize and coordinate Recycling Schemes, aiming to achieve the targets set by EU and Hellenic Recycle Association legislative framework. They are funded by the responsible solid waste producers. Seventeen Recycling schemes are currently approved and operating by the Ministry of Environment, Energy and Climate Change recycling different waste streams (see next page for recyclable waste streams).

D. Solid Waste Management Agencies (WMA) are the competent bodies of local authorities for the management of municipal solid waste. WMA activities are based on the implementation of goals and targets specified within the country, Regional Solid Waste Management Plans and especially for the operation of the Municipal Solid Waste Facilities (landfilling) and the installations of sorting and recycling of municipal recyclable solid waste, too. The inability to recruit permanent staff leads to a temporary solution to cover the needs or in the fixed-term contracts or through subcontractors' service contracts. There is therefore often creating discontinuity at the conclusion of contracts. The newly recruited staffs start working usually from scratch, without any prior vocational training.

E. Companies that construct and operate environmental protection facilities (i.e. landfill sites, biological treatment units, installations for sorting and recycling solid waste etc.). They may provide training on the operational procedures of the installations and the equipment used.

F. Companies supplying equipment for waste management (i.e. garbage bins waste processing machinery, etc.). The majority of those companies import the equipment and mainly cooperate with local authorities, collection and transport companies, installations that sort and recycle solid waste etc. They always provide training on the use of the supplied equipment.

F. Consulting and advisory firms, which play a complementary role in the industry by compiling environmental studies, issuing permits on behalf of solid waste management companies submitting applications for participation in subsidy programs etc. They usually participate in vocational training programs addressed to workers occupied in solid waste management facilities.

1.2. Solid Waste Streams

Generally, waste streams begin at the point of generation, then solid waste are picked up by collection and transportation services, separated for resource recovery, treated for volume reduction, detoxified, stabilised, recycled and/or burned for energy recovery and finally the remainings end at Sanitary Landfills. It is worth to be mentioned that recycling is considered as a preferable process in comparison with incineration or mechanical treatment, because higher quality products and therefore higher resources savings can be achieved. However, recycling usually needs a very well organized and efficient separation at source scheme, which in most cases demands plenty of time and resources to function properly.

Waste streams are employed to categorise particular types of waste which may be produced by individuals or organisations.

Primarily these are:

- Municipal waste (Household, from trading and crafting activities, from leisure parks and roads cleaning);
- Industrial and commercial waste;
- Construction and demolition waste;
- Extractive (mining) waste;
- Agricultural waste; and
- Hazardous waste.
- Health Care (medical, Hospital, etc)
- Sludge's from wastewater treatment plants

Waste may be further classified into more specific streams which identify the particular type of waste, often with attendant regulations relating to its collection, transport, treatment and disposal.

The Law obligates the economic actors (producers, importers) to organize or participate in collective (or individual) recycling schemes (i.e. return, collection, transportation and recovery systems) in order to achieve specific quantitative targets. Schemes, have to be approved by the Ministry of Environment and Climate Change and are funded through the corresponding producers.

Responsible for the monitoring of the management of specific waste streams is the Hellenic Recycling Association. Recyclable materials are:

- Packaging waste
- Tyres
- Cars
- Batteries
- Lubricating Oil
- Paper
- Glass
- Wood

- Aluminium
- Iron Scrap
- Agricultural films
- Light Bulbs
- Electronic and electrical household appliances

1.3. Waste Management Industry Associations and Networks

The Waste Management Industry associations and networks that exist in Hellenic territory are:

- **Hellenic Solid Waste Management Association (EEDSA)** – www.eedsa.gr
Hellenic Solid Waste Management Association is a scientific association. Members of EEDSA are university professors, highly experienced Solid Waste Managers and companies actovated in this field. EEDSA is the National member of Internation Solid Waste Association for Hellas. It was founded in 2001 and now comprise some of the major stakeholders of solid waste management in Hellas (Consulting firms, universities, management authorities etc). An interested stakeholder may find all the necessary information regarding the solid waste management in the country.
- **Municipal Solid Waste Management Agencies (WMA)** are the competent bodies of local authorities for the specification and implementation of goals and actions of regional waste management plans and particularly for temporary storage, transshipment, recycling, re-use and final disposal of municipal solid waste. They are also responsible for the operation of the Municipal Solid Waste Management Facilities.
WMA have established their own network – www.dyfodisa.gr.
- **PanHellenic Association of Companies activated in Environmental Protection (PASEPPE)**
Association of companies activated in the field of Environmental Protection. Almost all Hellenic solid management companies are members of PASEPPE. PASEPPE is also partner P2 in the SWFM-QF project.
- **Hellenic Federation of Enterprises** – Sustainable Development Unit

1.4. Other relevant information

Ministry of Environment Energy and Climate Change – Solid Waste Directorate

Top priority for the Directorate is the adoption of policies, measures and projects aiming at effective and efficient waste management, sustainable use of resources and prevention of degradation, restoring, maintaining and improving the environment.

The broader policy framework for waste management include:

- a unified and comprehensive treatment of all waste streams
- the hierarchy of priority activities in prevention, preparing for reuse, recycling,
- resource recovery and energy production
- the extended producer responsibility, and

- tackling waste management legislation violations.

The future EU targets, already transposed by Hellas refer to the Landfill and the Waste Framework Directives, when examining municipal Solid Waste. According to the current trends, Hellas is likely to miss the targets of both Directives if it does not intensify efforts towards recycling and diversion of waste from landfill considerably.

Regarding the Landfill Directive, the level of landfilling of biodegradable municipal solid waste was estimated to amount in 2010 to around 108 % of the generated amount in 1995. Therefore, besides missing the target for 2010, it is likely to experience great difficulties in meeting the targets for 2013 and 2020, too.

Hellas will need to make an exceptional effort in order to fulfil the 50 % recycling target of the Waste Framework Directive by 2020.

On the other hand, the competent authorities seem to have a strong future strategy regarding treatment of municipal solid waste. According to a 2010 study [1], a great number of plants are in the planning process or construction stage, mainly based on Mechanical Biological Treatment technology, which has the potential to contribute to all Hellas targets by simultaneously diverting the biodegradable fraction from landfills and increasing the material recovery. The establishment and operation of new plants could have the same effect on recycling as the two existing Mechanical Biological Treatment plants which boosted the figures for recycling.

[1]. Hellastat 2010 – Management and Recycling of Solid Waste – Market Analysis 2010.

2. Labour Status of the Solid Waste Management Sector

2.1. Average Number of Employees

Table 1 illustrates the overall labour force, in Hellas, for the years 2009, 2010 and 2011 and the labour force occupied in water supply, sewerage, waste management and remediation activities. The restructure of public sector was the reason for the slight increase of labour force in waste management during 2010. Then, during 2011, local authorities that manage public water supply, sewerage and solid waste management had to dismiss people, due to financial cutbacks.

	2009 (In thousands)	2010 (In thousands)	2011 (In thousands)
Overall Labour force	4,974	5,021	4,967
Persons employed in Water supply sewerage, waste management and remediation activities	29.9 (0,60%)	32.3 (0,64%)	28.1 (0,57%)

Table 1: Labour Force in Water and Solid Waste Management Sector, in Hellas (ELSTAT, 2013)

In Figure 3a the average number of employees at solid waste management facilities, in Hellas is presented, based on the survey results.

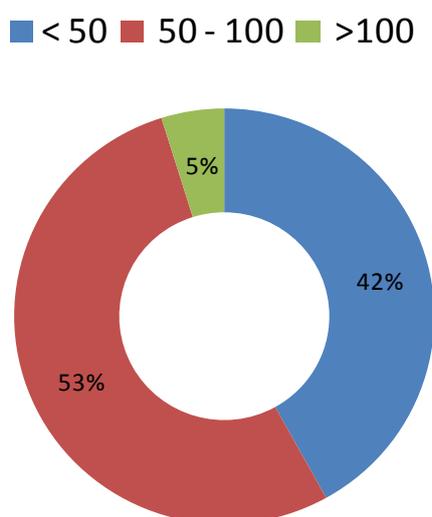


Figure 3a. Average Number of Employees at Solid Waste Management Facilities, in Hellas.

The average number of employees working in solid waste management facilities, in Hellas, strongly depends on the type of facility. For example landfill sites that operate under the operational framework of Waste Management Agencies, which are supervised by local authorities usually occupy more than 50 and less than 100 workers. Since landfilling is the main solid waste management activity in the country, it is expected that the majority of waste management facilities will have the abovementioned number of workers. There are only a few private companies and landfill sites that have more than 100 workers. The private companies are construction or energy recovery companies that also build waste management facilities. Finally, less than 50 workers have the collection, sorting and recycling companies, companies that collect, transfer and export hazardous waste and belong to the private sector. There are also some smaller landfill sites at islands or small municipalities.

2.2. Salary Level of Waste Management Facilities' Managers / Specialists

A lot of press has been given to public and private sector salaries, though the majority of workers in Hellas, during the last 3-4 years. The recession has changed the hiring and firing landscape, as many companies dump experienced professionals with higher salaries and replace them with younger cheaper labor force. Austerity measures lowered wages 22% for workers aged 25 and older and 32% for workers under 25 in the private sector. Many employees have already been forced to accept reductions in payment and benefits.

Despite the series of reductions and changes in labour law, the average salary in Hellas in waste management sector remains at a satisfactory level. The average annual salary for a typical Waste Management Manager in Greece in private sector is 35,000 including taxes and social security cost, while in public sector is €18,200.

On the other hand, the average annual salary for a typical Waste Management Technician in Greece in private sector is 21,000, while in public sector is €14,000.

Financial benefit provides a strong incentive for undertaking professional extra qualifications. Additionally, within waste management sector many salary scales need to be supported by a professional qualification who can apply for a wider range of positions (mainly managerial disciplines) and can additionally expect a higher salary.

2.3. General Social Status of Different Waste Management Facilities' Employees

Solid waste, in Hellas, is mainly landfilled. Recycling has evolved the last 10 years. People do not want to live nearby installations that treat solid waste, since they consider it as a "dirty" job. When a solid waste management installation is planned to be built then people living nearby they begin to protest, considering that the neighboring to the planned solid waste management facility, areas where they live, will be degraded environmentally, economically and socially.

More or less, the same stands for the social status of solid waste management workers especially the ones that are occupied in solid waste collection, transfer and sorting activities. This owes

much to a negative perception of people regarding the work which involves the handling of waste or unwanted material. Such people's perception leads to the disrespect for the work and in turn produces low working ethics of laborers and poor quality of their work. People involved, usually, have not received school education and vocational training to obtain knowledge and skills required for other jobs. They are also affected by limited employment opportunity available in the formal sector.

There is a different opinion for solid waste managers, who are responsible for the operation and management of respective facilities. This is due to the fact that solid waste managers are almost always University graduates, mainly engineers having also postgraduate studies. Moreover, in Hellas, recycling of solid waste is considered an environmental friendly business ascribing to the respective managers an additional social esteem.

3. Overview of Vocational Training of Solid Waste Management Facilities' Personnel

As already mentioned a survey was conducted aiming at the assessment of the nature, content and regulation of qualifications for Managers in Solid Waste Management Facilities, in Hellas. In the survey, the most important training topics and the acquired knowledge of the personnel occupied in different solid waste management facilities, the working conditions, and the status of Waste Management profession in industry and in society are documented. The survey was conducted via the compilation of a structured questionnaire. The questionnaires were circulated and answered by professionals at solid waste management facilities and other targeted SWFM-QF stakeholders both in hard copy and electronic format. All the answers that were received on hard copies were transferred in electronic form as well, in order to ease their analysis. There was also the possibility of on-line completion and submission of the questionnaires via the following link: http://www.swfm-qf.eu/main/?page_id=6452&lang=el, found at SWFM-QF project website. In Annex I of the report the hellenic questionnaire (translated in English) used for the information collection is attached.

Eighty six (86) answered questionnaires were received. The total number of the answered questionnaires along with the the VET organisations, survey that were received was 104. This number fully complies with the minimum requirement that was set in the project proposal as a target per project country.

In Hellas the survey was conducted by the two SWFM-QF Hellenic partners, **SIGMA Consultants – LP** and the **Hellenic Federation of Environmental Protection Companies (PASEPPE) – P2**.

The project partners exploited the companies, the local authorities, the networks they collaborate with in the waste management market in order to disseminate extensively the survey questionnaire to a broad range of the targeted stakeholders" group.

The stakeholders" groups that were targeted in the hellenic territory were:

- Solid Waste Management Agencies (Landfill and Recycling (including collection and sorting activities) facilities)
- Private companies activated in hazardous and non-hazardous solid waste management (Collection, Sorting, Recycling facilities).
- Consulting Companies and equipment providers.
- Local Authorities and agencies active in solid waste management.

The questionnaire was sent on behalf of the hellenic partners to more than 700 different recipients. Each body circulated the questionnaire among the staff members occupied as solid waste management professionals. In Figure 4 is presented the different categories of the solid waste facilities, companies, that have answered the respective questionnaire.

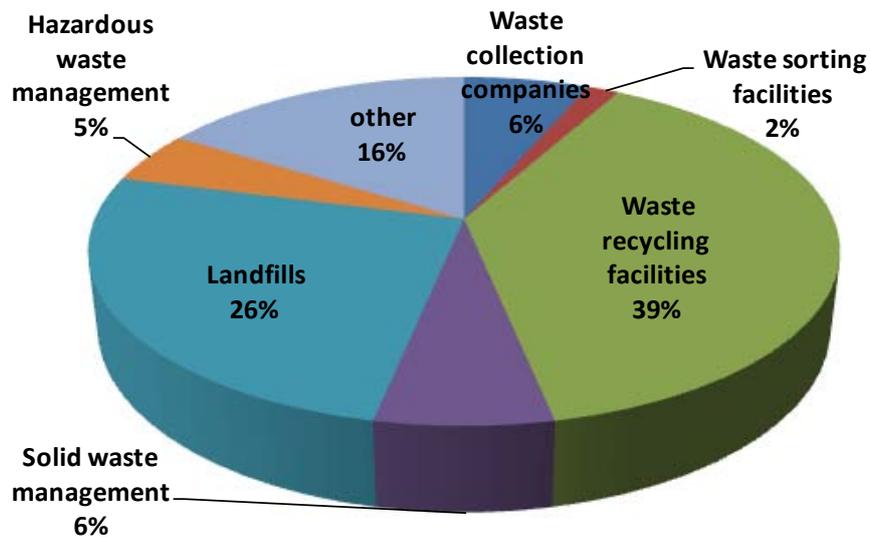


Figure 4. Different Solid Waste Facilities Categories that Have Answered at the Respective Questionnaire.

3.1. Interest/ Willingness of Waste Management Facilities' Professionals to Attend Vocational Training Programmes

The professionals occupied in solid waste management sector, in Hellas, exhibited significant interest in participating and attending vocational training programs (84% = 48% + 36% expressed high and medium interest respectively), highlighting the training needs existing in the field. It is worthwhile mentioning that managers have expressed the interest in specialised training courses in business management (i.e., negotiation and communication skills, project and financial management).

Only 16% of the questionnaires had a low interest answer. All the respective percentages are shown in Figure 5.

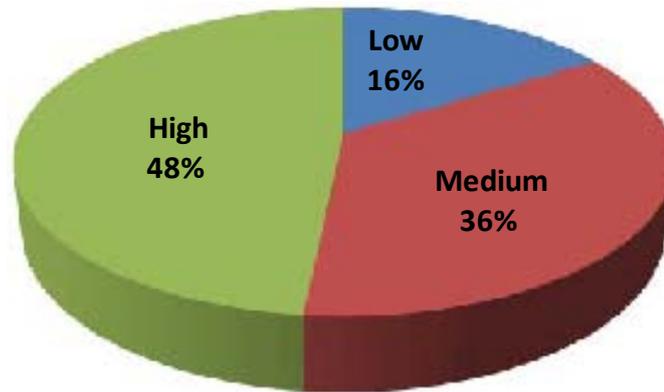


Figure 5. Interest/ Willingness of Waste Management Facilities’ Professionals to Attend Vocational Training Programmes.

3.2. Knowledge of the Availability of Vocational Training Programmes For Waste Management Facilities’ Professionals

Solid Waste Management Professionals search for available vocational training programs. This is based on the fact that the majority of them are aware of relevant vocational training programs. Training courses are mostly organised by the Vocational Training Centres (KEK) which offer non-formal training and only certificates of attendance which are not officially recognised. 74% of the professionals know about the training courses organised by KEK.

Formal training courses that end up with a qualifications certificate, addressed to managers, are offered from Universities. The vast majority of these courses have a technical background referring to waste management technologies. There is one public Vocational Training Institute that also offers to the high school graduates the 2-years course “TECHNICIANS for the MANAGEMENT and RECYCLING of SOLID WASTE”. Graduates are awarded the Vocational Training Diploma recognised both in Greece and in EU member states (for lower secondary education graduates) or the Certificate Level I (for upper secondary education graduates). It is worthwhile mentioning that more professionals (55%) do not know about formal training programs than those ones they do (45%).

There is only one distant learning course on solid waste management that is organised by the Hellenic Open University. Unfortunately, this is not widely known. As a result NO answers (58%) for on-line education are more than the YES (42%) answers. In Figure 6 are presented the YES and NO answers regarding the waste management facilities professionals’ knowledge on the availability of vocational training programmes.

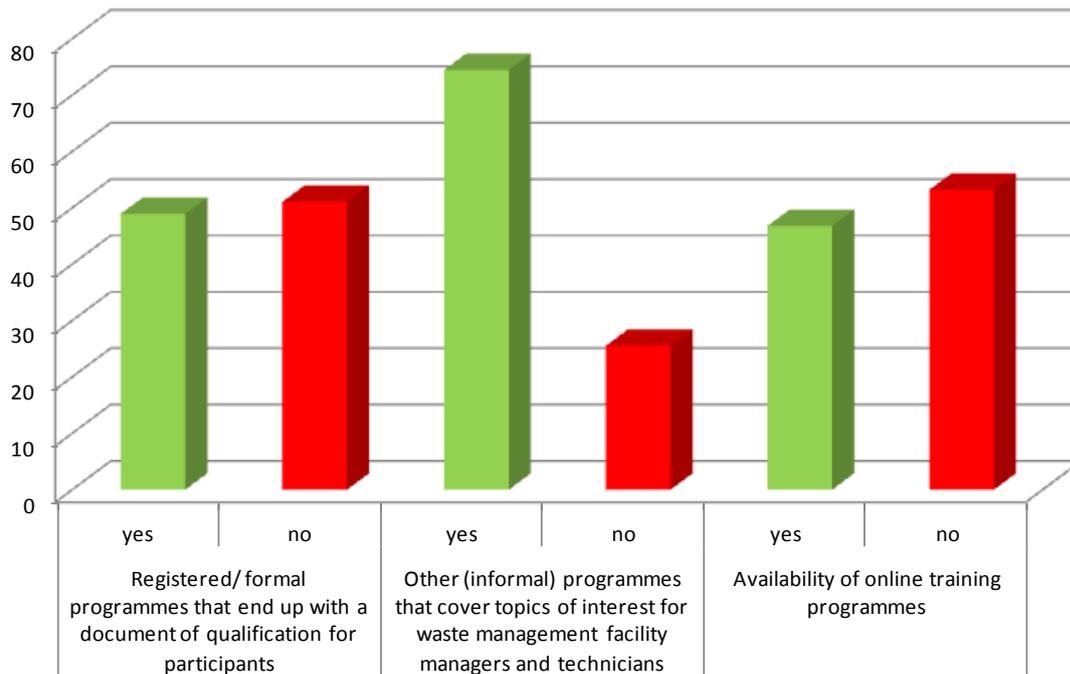


Figure 6. YES and NO answers regarding the waste management facilities professionals' knowledge on the availability of vocational training programmes.

3.3. Importance of Educational Topics for Waste Management Facilities' Professionals

Based on the results of the research conducted among the Solid Waste Facilities professionals, it is clear that they are interested in all 15 educational topics included in the questionnaires.

The highest percentage (more than 90% of the total number answers) received the topic that refers to National legislation. This is mainly due to the facts that: a) the legislative operational framework of solid waste management agencies, which are responsible for the treatment of the municipal solid waste, is not completed yet and b) the transposition of the Waste Framework Directive (2008/98/EC) was concluded late 2012.

The educational topics that refer to:

- EU legal requirements concerning waste management
- Criteria on waste classification
- Environmental Impact Assessment principles
- Management of specific solid waste streams
- Technical requirements for technologies and processes, equipment and of waste management activity in concern
- Health and Safety at Work

exhibit a high importance – interest of more than 80%.

The less interesting topics are:

- Product life cycle principles
- Principles of environmental management systems/ environmental risk assessment
- Principles of business/ corporate organisation and management

with a high interest ranging from 40-50%. But still the combination of high and medium importance accrues up to 80%.

Finally the educational topics that refer to:

- Waste management policy principles and planning
- Monitoring of Environmental Parameters
- Principles of emergency preparedness and planning

have received a high interest ranking ranging near to 75%.

All the above mentioned results are presented graphically in Figure 7.

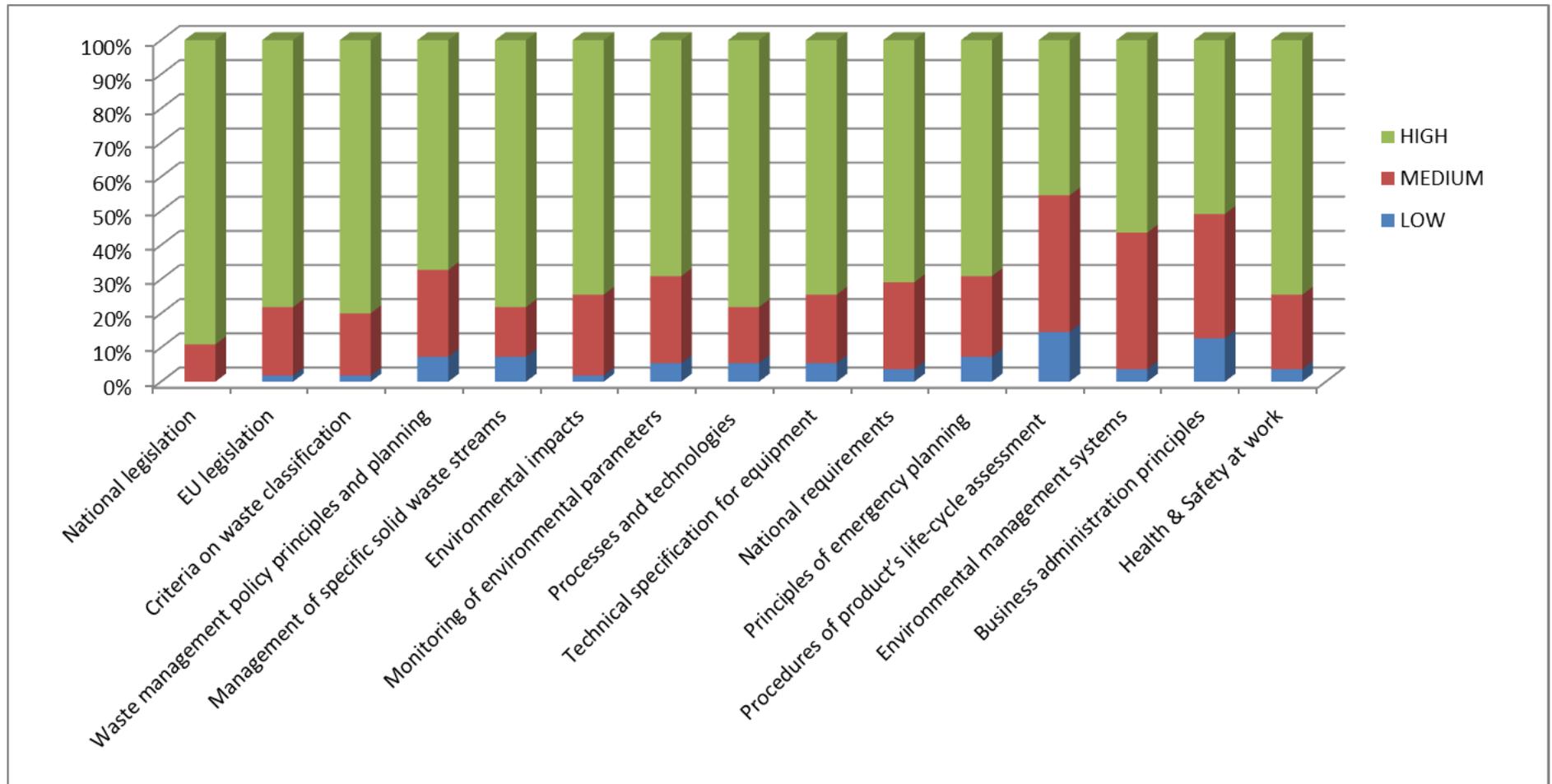


Figure 7. Importance of Educational Topics at the Vocational Training of Solid Waste Facilities Managers.

3.4. Current/ Knowledge/ Skills Among Waste Management Facilities' Professionals

Based on the results of the survey conducted, it seems that Solid Waste Facilities professionals need additional vocational training. This also explains the high interest they have expressed in almost all the educational topics (see Figure 6 of the report).

Solid Waste Facilities managers/operators expressed the opinion that they know better the topics of:

- Criteria on Waste Classification (low and medium knowledge level = 93% of questionnaires)
- Environmental Impacts Assessment (low and medium knowledge level = 88% of questionnaires)
- Health and Safety at work (low and medium knowledge level = 82% of questionnaires)

But even in this case the percentages of low and medium knowledge level are up to 62%.

On the other hand the **topics that Solid Waste Facilities managers/operators do not have enough knowledge** are:

- Product life cycle principles (low and medium knowledge level = 90% of questionnaires low level is 50%) mainly due to the fact that product life cycle principles is an unknown concept.
- Environmental Management Systems (low and medium knowledge level = 80% of questionnaires - low level is 44%) mainly due to the fact that Environmental Management Systems are not considered as managerial tools.
- Principles of business/ corporate organisation and management (low and medium knowledge level = 78% of questionnaires - medium level is 45%). Answers came mainly from managers.
- European solid waste management legislation requirements - (low and medium knowledge level = 75% of questionnaires - low level is 40%)

It is also worthwhile mentioning **the low knowledge for the following educational topics:**

- European Solid Waste Legislative Framework (low knowledge level = 40%)
- Monitoring of environmental parameters (low knowledge level = 40%)
- Waste management policy principles and planning (low knowledge level = 37%)
- Principles of emergency preparedness and planning (low knowledge level = 35%)
- Technical requirements for equipment of waste management activity in concern (low knowledge level = 30%)

For the remaining three educational topics that were included in the questionnaire 37% of the professionals answered that they know the national legislative framework very well. The same stands for management of specific solid waste streams with 30%.

All the above mentioned results are presented in Figure 7.

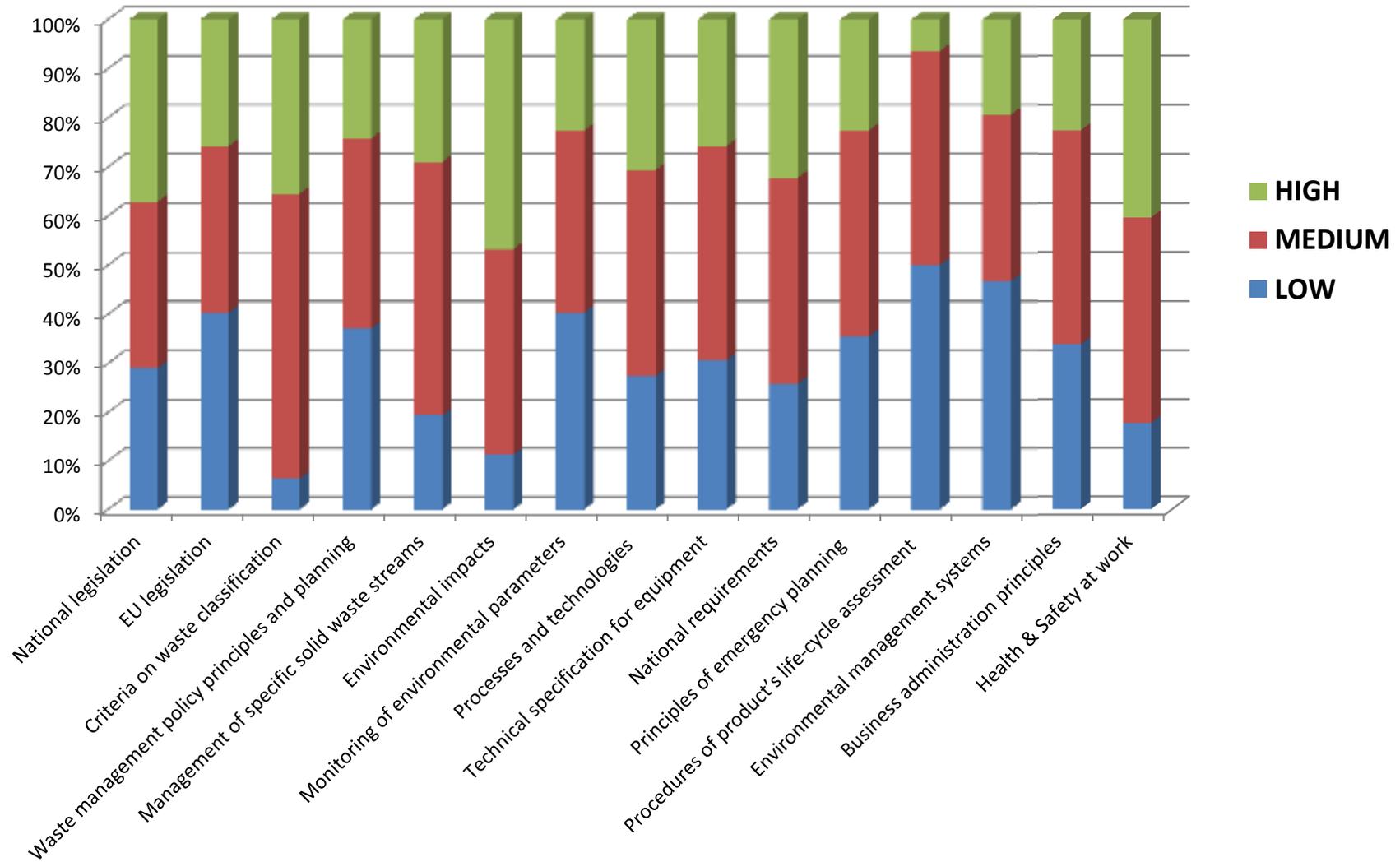


Figure 8. Existing Knowledge of Solid Waste Facilities Managers/Operators on Several Educational Topics.

3.5. Other Competences and Training Topics that Professionals are Interested

Solid waste management professionals were asked which other training topics would interest them, in order to be included in future training courses. The majority of the answers referred to:

- Negotiations Skills – Buying and Selling of collected waste material especially in recycling centres. One of the most important tasks that a Solid Waste Manager has to accomplish is the facility's financial management. Solid waste, especially the recyclable materials have to be bought, treated and then sold again. Recyclable materials present a lot of pricing fluctuations due to their different demand and offer levels in the solid waste materials' market. Therefore a competent manager must have the skill to negotiate with suppliers and buyers the prices of recyclable materials.
- Maintenance of Equipment used – Maintenance Planning and Procedures
- Communication Skills
- Report Compilation
- Project Management
- Financial Management - Cost Benefit Analysis
- Environmental Crisis Management
- Training on environmental awareness and sensitisation of public on solid waste management
- Identification, classification labelling and transportation of hazardous waste.

3.6. Quality of Existing Training Programmes Available

Solid Waste Management Professionals that have attended vocational training courses graded the quality of the offered training. The results are presented in Figure 9. It is worthwhile to compare the results of this question to the results of the same question that was answered by the VET organisations at the 2nd survey-report that was conducted during the SWFM-QF project, too.

At questions regarding the training material and the trainers' qualifications the solid waste management professionals graded negatively the training courses. The trainers' qualifications received from the 42% of the professionals a low mark and only 15% of them graded with a high mark. Instead the VET organisations graded trainers' qualifications with an excellent mark.

Similarly, 30% of the solid waste management professionals graded the quality of the training material as low and 35% as high. At the VET organisations survey, at the same question there were no low marks, at all.

The results between the two surveys are similar at the questions regarding the scope/contents (almost 90% for both high and medium mark answers) of the training course and the integration of the theoretical practical training (85% for both high and medium marks answers).

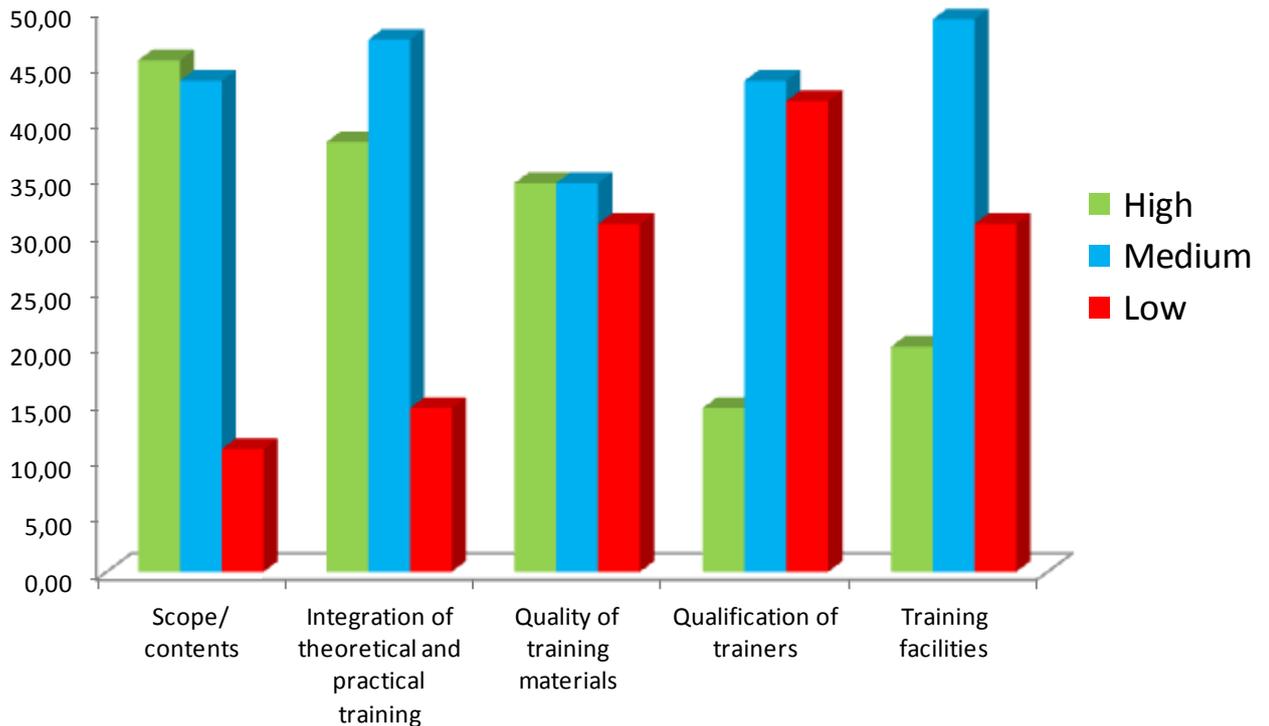


Figure 9. Quality of Vocational Training Courses Organised and Held at the Past.

3.7. Main Problems/Obstacles Related to Vocational Training for Waste Management Facilities' Professionals.

The main problems that solid waste professionals are facing before and during their vocational training courses are the following:

- Lack of interest and financial difficulties of solid waste management companies to train their employees
- Limited time and funds for retraining / attending seminars and conferences at home and especially abroad
- Ignorance on the qualifications and already acquired scientific training of the trainees (i.e. Engineers).
- Use of the same training material and provision of the same information during the courses.
- Lack of qualified trainers who have experience in training of solid waste and wastewater managers - Weakness in implementing specialized training programs
- Lack of specialized seminars in new, modern solid waste technologies.
- Improper quality and time allocation of the partial training sessions.

Landfill sites, in Hellas, are operated by waste management agencies (WMA) which belong to local authorities. Professionals working in WMA (the majority of workers in waste management sector in Hellas) strongly declared the lack of training seminars and specifications (i.e. training

needs, separation for managers and technicians) according to which the training seminars will be organised and held.

I

Although, Solid waste facilities' owners (private and public authorities) seek for trained personnel, they are not willing to ask and/or pay a vocational training centre to organise a training seminar for Solid Waste Facilities Managers. This attitude is attributed to the fact that solid waste facilities' owners believe that a) university graduates acquire the necessary competences, during their academic studies, to operate a solid waste facility without further training b) the training cost is high compared to the offered training level by VET organisations.

3.8. Working Conditions at Solid Waste Facilities in Hellas

The solid waste management facilities, in Hellas, include

- Collection
- Sorting of recyclable materials
- Landfills (82% of solid waste management)
- Recycling (17% of solid waste management)
- Composting (1% of solid waste management)

No incineration facilities exist in Hellas, except one that is used for the incineration of medical waste exclusively. Therefore it was decided not to include data for the incineration facilities, in the report, since the sample will not be representative.

Figure 10 illustrates the results for the working conditions of solid waste management facilities (Collection, Sorting, Landfilling, Recycling, Composting) existing in Hellas.

The majority of answers were marked at satisfactory working conditions level (third choice out of four. The fourth choice refers to bad conditions).

Landfill sites, where the majority of the solid waste professionals are occupied, received only a percentage of 27% for answers very good and good and 29% for answers declaring bad working conditions.

The situation is better in recycling facilities, the second biggest solid waste treatment sector in Hellas. The 37% of managers/technicians occupied in Recycling facilities marked as very good and good the working conditions. Less than 5% of the professionals graded conditions as bad.

The best working conditions exist in waste collection activities where very good and good answers received a score more than 40%. Less than 5% answers were given to bad conditions, respectively.

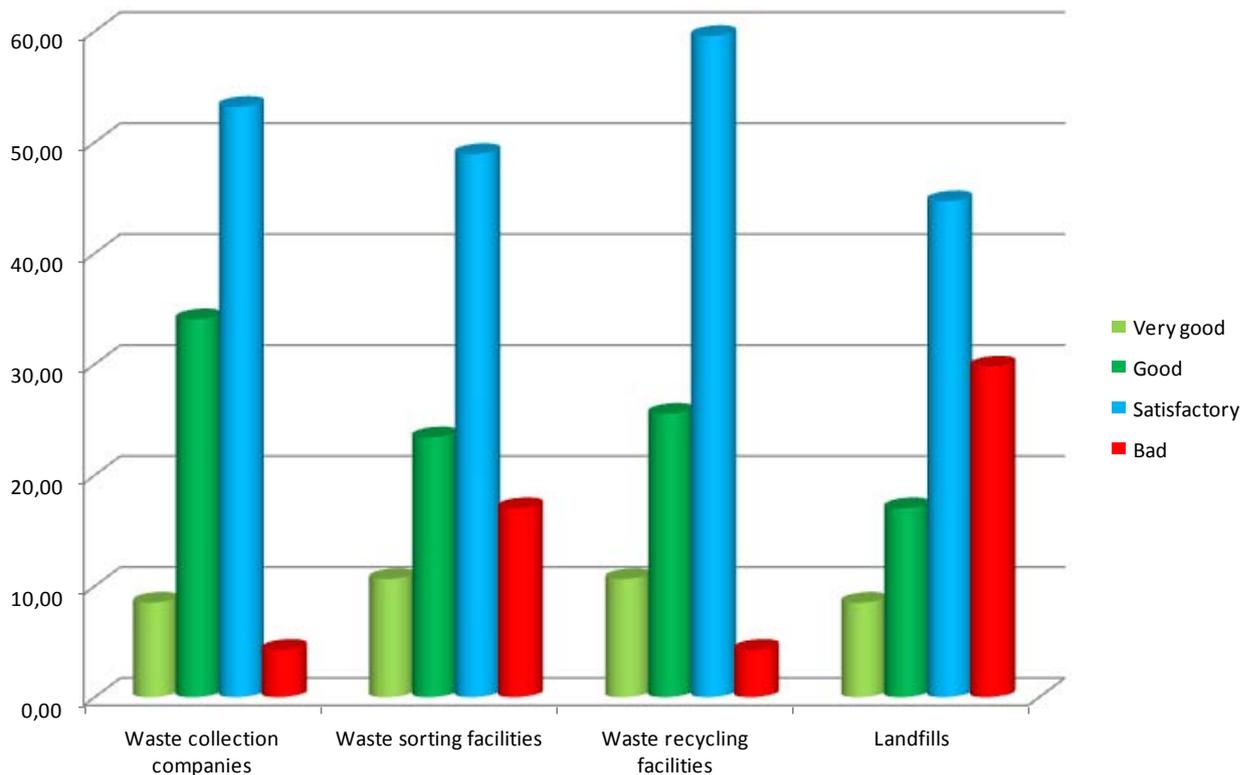


Figure 10. Status of working conditions of solid waste management facilities (Collection, Sorting, Landfilling, Recycling, Composting) operating in Hellas.

4. Conclusions and Recommendations

Despite the crisis and the recession that the Hellenic economy is facing the last 5-6 years, volumes of solid waste (especially municipal) continue to increase. Therefore, solid waste management activities and especially the recycling sector has shown a continuous rise which is reflected in various parameters, such as the significant investments in solid waste recycling facilities (including transportation means and sorting facilities), the increased number of established Recycling Schemes the improved recycling rates and collected volumes in all waste streams, etc. The same stands for the landfilled waste.

The waste management future prospects seem also to be favourable as key driver is the implementation of European and national legislative framework and especially the forwarding for implementation of modern waste management technologies such as incineration, anaerobic digestion, mechanical biological treatment etc. instead of landfilling. Thus, an opportunity for the solid waste management industry, in Hellas, may be the obligation to implement Directive 2008/98/EC (already transposed into national law), as it sets specific targets with specific timetables on waste management and commits member States to make the necessary actions to achieve them; It appears that opportunities are created for companies involved in the construction and management of solid waste management facilities and the companies that

cooperate with them, such as equipment suppliers, consulting companies, subcontractors, etc. As a result it is expected new job openings for several professions activated directly and indirectly to solid waste management.

In recent years, there has also awareness rise on the part of society, which is essential for the proper management of waste, but also for the promotion and implementation of alternative technologies (i.e. composting, recycling, thermal treatment).

Based on the above it is clear that solid waste management is a business sector with good economic prospects, in Hellas. It is anticipated that new jobs opening will be created and specialised personnel will be invited to occupy them.

The construction of new modern technology solid waste management plants will create the need for highly educated and trained solid waste managers.

It is certain that the professionals and the involved companies will seek for vocational training programs to improve their competences in the field.

According to the survey results, the educational topics in which the solid waste professionals have educational gaps are:

- Principles of business/ corporate organisation and management
- Negotiations“ Skills – Buying and Selling of collected waste material especially in recycling centres.
- Communication Skills
- Report Compilation
- Project Management
- Financial Management - Cost Benefit Analysis
- Environmental Crisis Management
- National requirements for waste management procedures and new facilities (licensing, waste accounting, reporting, etc.)
- Environmental Management Systems
- Maintenance of Equipment used – Maintenance Planning and Procedures

It is also worthwhile mentioning the low knowledge level of solid waste management facilities professionals at the following educational topics:

- European Solid Waste Legislative Framework – especially the new Directives
- Monitoring of environmental parameters
- Technical requirements for processes and technologies of waste management
- Principles of emergency preparedness and planning
- Technical requirements for equipment of waste management activity in concern

Solid waste facilities professionals that have attended solid waste management training courses during the quality evaluation of the training courses pointed out that there are needs for:

- more qualified trainers especially to the new waste management technologies
- better and updated training material

According to the survey results, the working conditions at the solid waste management facilities, (which are mainly mainly landfill sites), in Hellas, are described as satisfactory one choice before bad. The improved vocational training of the solid waste facilities managers and operators is expected to improve the working conditions at the respective facilities, too.

A second survey that was conducted within the framework of the SWFM-QF project, at Hellenic VET organisations, proved that:

- There is a lack of a vocational framework that will determine the level of knowledge management - employees need in theoretical and practical level to be able to cope with the demands both in terms of operation of the plant and in the overall functioning of a solid waste management facility.
- There is no developed qualifications framework for solid waste managers.
- Vocational training courses are organised only whenever the Ministry of Labour and Social Affairs foresees such a training need/gap in the labour market.

Despite increasingly positive perceptions of the value of competences development, financial pressures very much remain a barrier to employers providing training. Further raising awareness of the benefits of developing employee competences is seen as crucial to encourage training provision.

ANNEX

QUESTIONNAIRE FOR WASTE MANAGEMENT FACILITIES

1. A type of facility you represent

- waste collection companies
- waste sorting facilities
- waste recycling facilities
- incineration facilities
- landfills
- other.....

2. Please indicate current number of employees in your organisation

- < 50
- 50 - 100
- >100

3. Your opinion about the interest/ willingness of waste management facilities' professionals to attend vocational training programmes:

<input type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
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4. Please provide your opinion concerning availability of vocational training programmes for waste management facilities' managers and technicians in the country

Type of programmes	Programmes for managers	Programmes for technicians
Registered/ formal programmes that end up with a document of qualification for participants	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient
Other (informal) programmes that cover topics of interest for waste management facility managers and technicians	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient
Availability of online training programmes	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient	<input type="checkbox"/> sufficient <input type="checkbox"/> insufficient

5. Please provide your opinion on importance of the following topics for waste management facilities/ professionals, availability of these topics in existing vocational education programmes and current/ knowledge/ skills among waste management facilities' professionals

Topic	Importance	Availability of VET	Current knowledge/ skills among waste management facilities' professionals

National legislation in the Waste Management Sector	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
EU legislation in the Waste Management Sector	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Criteria on waste classification (hazardous or not)	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Waste management policy principles and planning	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Management of specific solid waste streams	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Environmental impacts of waste management facilities	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Monitoring of environmental parameters in waste management facilities and activities	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Processes and technologies applied in waste management facilities	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Technical specification for equipment using in waste management facilities	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
National requirements for waste management procedures (licensing, waste accounting, reporting, etc.)	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Principles of emergency planning and response measures	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Procedures and principles of product's life-cycle assessment	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Environmental management systems (EMAS and the EN ISO 14000 series)	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Business administration principles	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Health & Safety at work	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
<i>Other (please specify):</i>			
	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
	<input type="checkbox"/> low <input type="checkbox"/> medium	<input type="checkbox"/> low <input type="checkbox"/> medium	<input type="checkbox"/> low <input type="checkbox"/> medium

	<input type="checkbox"/> high	<input type="checkbox"/> high	<input type="checkbox"/> high
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6. Any competences that are not adequately covered by the existing training programmes available in the country

Programmes for managers	Programmes for technicians

7. How would you evaluate quality of existing training programmes available in the country?

Quality indicator	Programmes for managers	Programmes for technicians
Scope/ contents	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Integration of theoretical and practical training	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Quality of training materials	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Qualification of trainers	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
Training facilities	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
<i>Other (please specify):</i>		
	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high
	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high	<input type="checkbox"/> low <input type="checkbox"/> medium <input type="checkbox"/> high

8. What are the main problems/ obstacles related to vocational training for waste management facilities' managers?

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.....
.....

9. What is your opinion concerning working conditions in waste management sectors

Waste management sector	Work conditions (ion scale 1-5)
waste collection companies	<input type="checkbox"/> bad <input type="checkbox"/> satisfactory <input type="checkbox"/> good <input type="checkbox"/> very good
waste sorting facilities	<input type="checkbox"/> bad <input type="checkbox"/> satisfactory <input type="checkbox"/> good <input type="checkbox"/> very good
waste recycling facilities	<input type="checkbox"/> bad <input type="checkbox"/> satisfactory <input type="checkbox"/> good <input type="checkbox"/> very good
incineration facilities	<input type="checkbox"/> bad <input type="checkbox"/> satisfactory <input type="checkbox"/> good <input type="checkbox"/> very good
landfills	<input type="checkbox"/> bad <input type="checkbox"/> satisfactory <input type="checkbox"/> good <input type="checkbox"/> very good