SME4SMARTCITIES

Deliverable 3.2.1: Identification of the training and capacitation needs of technological and Innovative SMEs: Analytical Report

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1. Introduction

As cities continue to grow, so does the number of challenges they are facing including environmental, economic or social issues that call for new and unproven urban solutions. This increasing need for urban innovation will result in the development of a significant number of smart cities initiatives, creating new business opportunities for Mediterranean SMEs.

The SME4SMARTCITIES project plans to make this possible by reinforcing the capacities of Mediterranean cities and SMEs and creating a much-needed collaboration between public authorities and SMEs to come up with the best technological solutions for all urban and city problems . The project hopes to also help cities to be the front-runners of innovation, in particular through the use of Public Procurement of Innovative solutions and support Mediterranean SMEs in order to guarantee that their products and services meet the expectations and needs of smart cities.

WP3 targets SMEs and cities aiming at identifying the main urban challenges faced by the project territories & how the technological & innovative SMEs can support MED cities in solving & taking advantage of the opportunities those challenges can represent. More specifically, activity 3.2.1 intended to conduct a report stating the skills & training needs of the technological & innovation SMEs in order to enter into the smart cities market, which will eventually support the development of the content of the training material that will be used to support SMEs.

To do so, an online survey was designed and disseminated for each partner to share within their cities, and partner municipalities. The main aim of the survey was to gather information in regards to interested SMEs that want to apply to and benefit from the project, and to act as an informative exercise to map the SMEs that relate to the smart-city initiative within each city, and highlight the possible “categories they may fall under”. The survey also intended to set the basis for selection of SMEs based on the criteria and attended benefits of the project.

In the following section, the methodology behind the survey and its creation is explained.

2. Methodology

The main aim of the proposed methodology was a need-assessment document of the technologies required and capacity building requirements of the SMEs selected through the program. To achieve this objective a two-phase approach was conducted from the city-side (municipality), and from the SME side:

Phase I: “Possible Opportunities” the incorporation of city-needs and requirements in relation to Output 3.1 Four major steps were conducted to determine the needs of municipalities, each cumulative per city as general outputs. This phase was carried out and implemented by project partners and a separate report has been administered describing its results.
Phase II: “Matching possibilities” the selection and the training of SMEs that fit best with the city requirements and possess the needed skills and knowledge to develop the required technologies for smart cities.

2.1 Data Collection

Phase I [1]***:*** *Possible Opportunities*

Target: 10 representative cities of each one territories

I. Identify existing technologies (city-basis), as not to duplicate efforts of existing products and services, this should be conducted per partner in close corporation with each municipality.
II. Identify innovative smart-city digital products and services that exist within European Mediterranean partner countries and could be transferred and/or adopted by Arab Mediterranean countries.
III. Identifying the main common challenges faced by cities to adopt smart strategies based on a Mediterranean front and on an individual front.
IV. Identifying potential public buyers in relation to point (III), to assess need-based demand, and guarantee profit-generating future activities.

Phase II: *"Matching possibilities"*

Target: 10 representative SMEs of each one territories

SMEs could work with different countries and municipalities within the project, depending on their scalable model and problem-solving commonalities across countries.

One Steam approach:

Selection of SMEs that will participate in the project and Need Assessment for selected SMEs

One comprehensive online survey was developed and disseminated across partners for each to share within their cities and partner municipalities. The survey questions were divided into two sections:

Section one: Aimed at getting more general information about the SME, following these general categorical questions:

- Is the SME willing to take part in new innovative networks aimed at development and sharing solutions for common urban challenges?
- Does the undertaken initiative fall under the following categories?
  - Waste Management
  - Water use efficiency & water supply
  - Smart grids & smart public building/infrastructures
  - Climate changes adaptation & improvement of cities environment
  - Mobility & transportation
- Is the offered product/service already available in the city?
- Is the offered product/service available within partner Mediterranean countries?
- Is the offered product/service in-line with city needs?
- Is the offered product/service in-line with the requirements of different partner-cities, and can it be scaled-up to fit this model?
- Does the SME possess the required technical and financial capacity to undergo this project?
- Does the offered product/service fall within the required regulations of smart-cities proposed by the project, including an environmentally friendly component?
- Will the new technologies contribute to job-creation within the city?
- Is there demand for the offered services by the public? (city-based) and (partner counter-based)

[1] *phase 1 was part of a previous project activity and its results are described in a separate report*

- Is the offered product/service a more efficient method to conducting the task? (i.e. higher quality and cheaper)

Section Two: Contained in depth questions under a "needs-assessment" approach targeting the final 50 SMEs, to determine their needs to enable the development of training and capacity building activities required under a demand-drive and CBC approach, in addition, to grouping of trainings based on type and need of enterprise. As such the section answered the following questions:

- What are the specific products and services offered by the SME?
- How are the approaches conducted innovative?
- What type of training do you believe SMEs need to establish an adequate process regarding procurement procedures?
- What strategies could be implemented with the SMEs to guarantee skills improvement that will lead to more sustainable procurement procedures?
- What is the technological update and requirements for the SMEs to enable to operate within a smart-city approach?
- Does the SME possess the required managerial skills to carry forth the required tasks?
- What are the strategies currently used in terms of resource management and allocation? And does it fall under "green" categories?
- Does the SME possess the required marketing skills to promote the products and services and encourage the public to adopt them?

2.2 Survey Questionnaire

Annex I

3. Data Analysis

The identification of the training and capacitating needs of technological and Innovative SMEs Survey was conducted over a three month period, from Dec 2020 to Feb 2021 with the aim of examining the current situation of SMEs in the partner countries and identify barriers, challenges, development trends, initiatives and training needs they have. A mixed-mode questionnaire was used with both yes and no questions and open text questions (the details of the survey will be included in the Annex), a total of 53 responses from project territories were received and analysed.

A range of CEOs, CTOs, Heads of innovation, Sales managers, Researchers, marketing managers, product managers, technical managers, consultants and operational managers of SMEs answered the survey questions with degrees ranging from BA MSC and PHD in engineering, IT and other human and technological sciences. The SMEs size ranged from micro level with one employee to macro level with 85 employees and their date of establishment ranged from 1988 to 2020.

100% of participants expressed their willingness to take part in new innovative networks aimed at the development and sharing of solutions for common urban challenges. 27.1% of the participating SMEs have requested to keep their individual replies confidential, 25 % agreed to cite their replies in this survey report, and 47.9% of SMEs stated that they would like to engage in publishing an article about themselves and their city organization in the SME4SMARTCITIESproject publications. Therefore, all data will be kept confidential and only aggregated statistically, except for a few case studies and specific remarks by participating cities who have explicitly agreed to cite them.

This report is based on a priority and need categorization of training, that takes into consideration the SMEs individual needs, the cities' needs, and the Mediterranean needs. Therefore the report presented here will take the following structure:

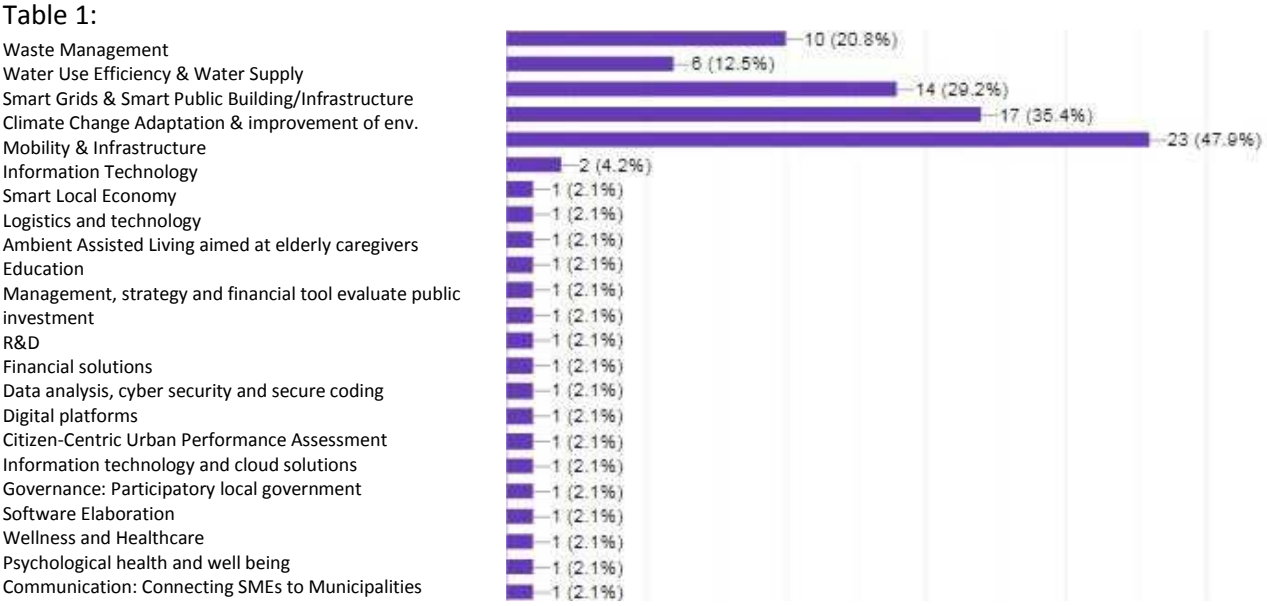
- SMEs categorization and groups based on the 5 main categories identified by the project
- SMEs work in relation to city/Municipality procedures
- The required development needs for SMEs under a innovative smart-city approach categorized across (1) Managerial needs and (2) technological advancement needs
- The main technologies that would be beneficial for SMEs, based on common factor and a faster pace development for the intended outcome
- Challenges and restrictions SMEs experience while working with municipalities
- Recommendations on future step in terms of identifying the following:
  1. Current and existing curriculums that will satisfy the intended results
  2. Knowledge transfer approaches and virtual seminars between partner countries
  3. Identifying potential trainers that are able to fulfil the required tasks

3.1 SMEs categorization and groups

The 5 main categories identified by the project were:

1. Mobility & Infrastructure
2. Climate Change Adaptation & improvement of city environments
3. Smart Grids & Smart Public Building/Infrastructures
4. Waste Management
5. Water Use Efficiency & Water Supply

Table 1:



The key categories that emerged from the survey were the five mentioned above, but many SMEs declared their involvement in more than one category. Other categories included: Information Technology, Smart Local Economy, Logistics and Artificial technology.

When asked about the product/service each SME offered, 60.4% answered yes to the question: Is the offered product/service already available in the city, while 39.6% said that their product or service is unique. While 88% of these SMEs said that their cities are in need of these services.

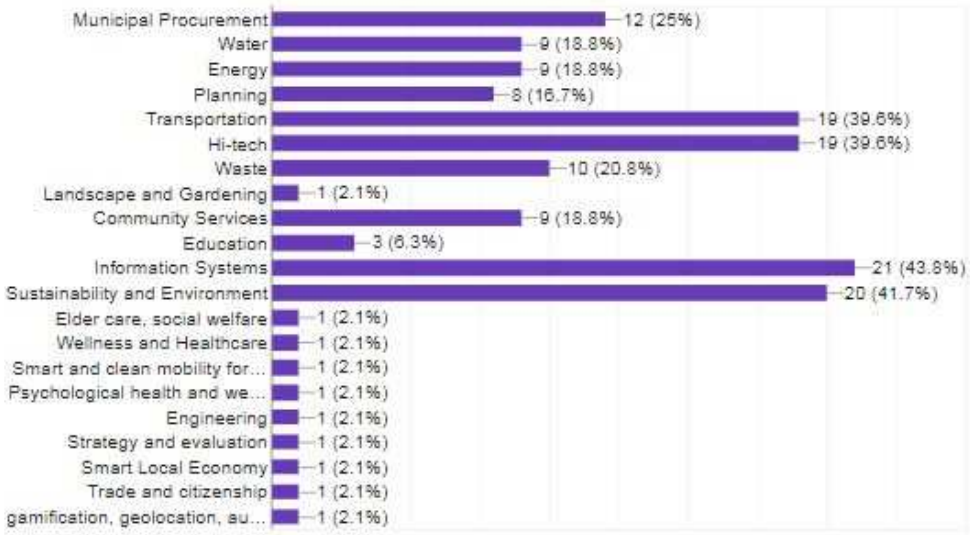
These services included security, e-waste management, Smart and green technologies for energy production, logistics, urban transportation, innovative solutions on agriculture and environment, Data management smart city solutions and many more.

3.2 SMEs work in relation to city/Municipality procedures:

When asked about their work and in relation to municipality procedures, 25% of them said that they have dealt or have to deal with municipality procurement policies, 39.6% have to deal with transportation and Hi-Tech policies, 43.6% deal with information systems and public online platforms, 41.7% deal with

environmental sustainability and policies while the rest of SMEs chose topics related to high tech, education, waste, community service and energy.

Table 2:



3.3 The required development needs for SMEs under a innovative smart-city approach: Managerial and Technological advancement needs

3.3.1 Managerial needs:

1. More efficient micro-service collections through SMEs to scale up solutions to the expectations required from cities.
2. Knowledge related to SME procurement procedures and any other legal regulations that can enhance the collaboration between cities and SMEs.
3. Easing up the tendering process for SMEs to work with cities.
4. Having policies that allow and support the collaboration between SMEs and municipalities
5. Establishing an online public records platform for any job listings with municipalities in addition to having access to projects they are working on so SMEs can customize solutions and tools to support their implementation.
6. Regular networking events/Galas that can introduce the work of SMEs to cities and other investors/buyers of solutions.
7. Better communication channels between SMEs and public authorities including city halls and municipalities.

3.3.2 technological advancement needs:

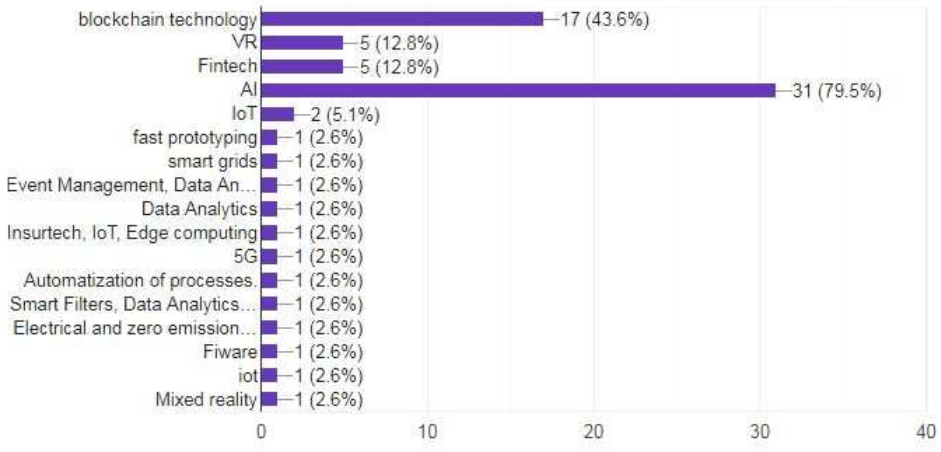
1. Real technology transfer from academic research, implementing a strong prototype phase before going to the market.

2. Addressing issues related to the scalability of the infrastructures and the technological resources required for implementing big projects.
3. Artificial Intelligence, management of big data and IOT
4. Consultants and computer specialists in ICT and mobile technologies. Includes apps for both IOS or Android systems
5. Technology transfer and communication between governmental organizations and the SME market
6. Access to better technological solutions by training the staff of municipalities on local and international technology trends.
7. Access to money through public or private funds that can support the development of SMEs.

3.4 The main technologies to be included in the developed training material for SMEs

Based on the survey sent out to all SMEs, the main technologies that they will benefit from ranged as follows:
1. Artificial Intelligence: 79.5% of SMEs said that they would benefit from AI training to support their work with cities and municipalities. This includes natural language processing, reinforcement learning, predictive analytics, the human brain and more.
2. block chain technology: 43.6% of SMEs said training for block chain technology would benefit them. Block chain technology is growing in use and it's essential to understand its core business uses and benefits. The training is designed to help both technical and nontechnical audiences learn the key concepts behind hyper ledger and block chain.
3. Virtual Reality technologies: 12.8% of SMEs voted that VR training would support their work with municipalities and cities.
4. Fintech: 12.8% of SMEs thought training in financial technology is necessary to support their work.
Other technologies included LOT training, Data Analytics, Fast prototyping and Smart grinds. The rest of the recommendations are visible in the table below.
5. IoT: 5.1% of SMEs voted for a need for training on IoT.

Table 3:



3.5 Challenges and restrictions SMEs experience while working with municipalities

1. Issues related to procurement and partners selection rules.
2. Issues related to payment methods and efficiency.
3. IT staff at municipalities are usually under trained for up to date processes and procedures making it hard for SMEs to work with them
4. Bureaucratic procedures including slow decision-making, long approval times and low budgeting for the sector.
5. Public tenders for Smart Cities are usually given to big consultancies which subcontract SMEs to cover the different tender cores.
6.The lack of symmetry of communications between SMEs and Municipalities, including the knowledge of their requirements, compensation, expectation, and access to networks.
7. Municipalities typically don't like to experiment and are less open to trial and error.
8. There is a general consensus that municipalities are not attentive to innovative solution and do not understand the value in them, and that working with municipalities require many distinct contacts that do not communicate internally and do not have a sense of a shared purpose
9. Lack of access to public information that could allow SMEs to develop the correct tools to support municipality needs
10. Complications in regulations and clear rules about the work of SMEs and municipalities.

4. Conclusion

The main aim of this report was to reflect on the survey taken by SMEs from all partner countries as a need-assessment document of the technologies required and capacity building requirements of the SMEs selected through the program. The findings of the report are as follows:

1. 89.6% of all SMEs believe that their product and/or service is in-line with city needs and will be beneficial to public authorities, cities and municipalities starting from their strategic planning down to their day to day operations. And the same percent of SMEs believe that they have a more efficient method to conduct the tasks required.

2. 91.7% of all SMEs believe that collaboration between them and cities will contribute to job-creation within the city.

3. 58% of all SMEs believe their product and/or service is innovative and unique to the city, while 85.4% believe that there is a demand for the offered services by the public

4. 81.3% of all SMEs said that they take into consideration green and environmentally friendly policies when operating while 54.2% of them said that they undertake Corporate Social Responsibility actions.

5. The top five topics all SMEs voted for when asked about training courses with municipalities were:

A. 70% of all SMEs believe that some type of training in municipalities operational processes and procurement procedures is vital for any future collaboration between the two.

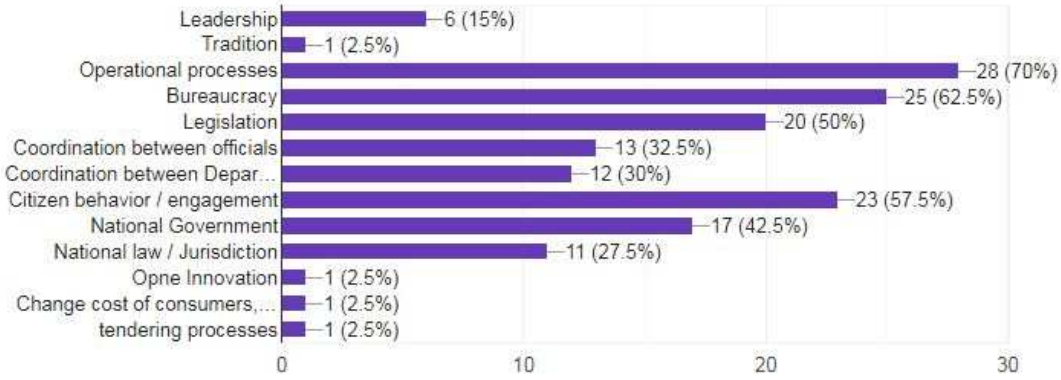
B. 62.5% believed that training on Bureaucracy can support SME collaboration with public authorities.

C. 57.5% of all SMEs voted for training related to the city's Citizen behaviour / engagement and Bureaucracy procedures.

D. 50% of all SMEs voted for training related to legislation processes.

E. 42.5% of all SMEs voted for training related to the national government.

Table 4:



6. The challenges faced by SMEs when working with cities/municipalities origin from the lack of communication, and the gap in technology training between the two.

7. More than 90% of all SMEs believe that there is a very high potential rate of success for both sectors if cooperation between them does occur.

Finally and in order for cities to be efficiently managed, a better communication plan and a more open relationship with SMEs is required. The survey shows the willingness of SMEs to work hard to come up with the best technological solutions for city problems, while emphasising the potential in benefits of the relationship that can be formed between those SMEs and cities.

SMEs are the future of smart cities, and the SME4SMARTCITIES project is working to support them by creating a training guide that reflects their needs and direct them to an object-oriented approach that can allow them to be flexible and able to design and deliver solutions aligned with the needs of cities.

5. Annex

Annex I

You can find the survey questionnaire here