

D.3.2.3 PRELIMINARY MARKET ANALYSIS

Working Package 3
Testing

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1. Introduction

a. The Green mind project

The Green mind project transnational challenge is the development of economic competitiveness and innovation in the green and smart mobility industry, by strengthening regional and transnational cooperation between businesses, research bodies and authorities.

More in detail, Green mind aims at:

- testing new market intelligence, public funding screening, B2B matchmaking services for SMEs;
- building a transferable model of the tested services for clusters and agencies;
- setting up a transnational innovation network involving authorities, business and research;
- implementing a transfer program targeted to clusters and agencies to foster their transnational activities; and
- delivering a policy support program to mainstream the project results based on the Smart Specialization Strategies of the involved regions

Being active in a context of: fast technological advancements and stricter environmental policies, Green Mind has the objective of strengthening the transnational activities of clusters and agencies to support SMEs systems in exploiting the market opportunities. But also in tapping the rising demand for green & smart mobility products and services in key mobility sectors such as transport and logistics, automotive, energy, and IT.

More specifically, Green Mind focuses in the following products and services:

clean fuels and infrastructures, green and automated vehicles, Mobility as a Service and new business models for green & smart mobility.

Green Mind's transnational approach lies in a joint learning, knowledge sharing and capacity building process for innovation in the MED area and involves eight partners from eight different regions in the Mediterranean, these are Emilia Romagna, Central Macedonia, Andalucía, Occitanie, Jadranska Hrvatska (Counties of Istria and Split-Dalmatia), Sarajevo, and Vzhodna Slovenija.

b. Purpose of the Testing Work Package

The Testing Work Package (WP3) has the aim of shaping and demonstrating new services for SMEs active in the green and smart mobility industry in the MED area. These services will benefit SMEs on multiple levels, as they intend to support their competitiveness, innovation capacities, and international visibility at the same time.

Alongside with the Transferring Work Package (WP4), WP3 lies at the center of Green-mind's operations in terms of importance, and allocated time and budget. More specifically, WP3 is responsible for the conceptualization, development, implementation, and evaluation of Green-mind's most important outputs, the service pilots, the model, and the transnational network.

WP3 consists of five distinct activities. These are:

- A.3.1** Methodology for Pilots Implementation
- A.3.2** Pilots Preparation and Planning
- A.3.3** Testing SMEs Services

A.3.4 Pilots Evaluation and Service Model

A.3.5 Green-mind Transnational Innovation Network

More in detail, A.3.1 refers to developing structured guidelines for the set-up, running, and coordination of the pilot activities. In A.3.2 the partners formulate the necessary knowledge background upon which Green-mind will develop its processes. Here, the partners exchange information about their experience, identify the needs of their beneficiaries, the SMEs, analyze the market, identify existing public funding and matching opportunities, and start involving the necessary stakeholders. This preparation stage is crucial for the optimal and unhindered development of A.3.3, the testing of the services, as its final outcome is a transnational pilots plan. In A.3.3, the plan is tested in each country in close collaboration with selected green & smart mobility SMEs and a transnational network is implemented. A.3.4 is responsible for evaluating A.3.3's produced results and constructing a transferable model for general use in the MED and EU areas. Finally, A.3.5 refers to online and physical events in regards to the transnational network and the exchange of information between project partners and stakeholders.

Upon the completion of WP3, three main outputs should be delivered. These outputs are:

Output 3.1: the delivery of three types of services to 200 hundred MED SMEs

Output 3.2: the development of a transferable model of transnational services for SMEs

Output 3.3: the creation of a transnational innovation network for SMEs

c. Scope of the Preliminary Market Analysis

The main scope of this document is the analysis of the current state of the green and smart mobility market in the MED and EU areas, so as the construction of custom-made tools, models, and policies for future development to be feasible.

More specifically, in this document the green and smart mobility industry is analyzed on a basis of the previous research, and the experience and knowledge of the involved parties, partners and otherwise.

In regards to the former, the extant literature is reviewed and the most relevant concepts and terms are defined and discussed in relevance to the needs of the project. Regarding the latter, the partners recollect their experience and knowledge, and gather new intelligence from local stakeholders – and especially SMEs. The gathered information is captured on a SWOT analysis for each territorial context.

d. Document's targeted audience

This Methodology for Pilots Implementation focuses on the following audiences and the accomplishment of the respective relevant objectives:

- Green-mind consortium partners: as a tool for the optimal coordination and proper development of all pilot related activities in each Green-mind region
- Stakeholders, and more specifically the SMEs: as a guide through-out the implementation of pilot development and testing

e. Document structure

After the introductory part, this document is developed as follows: initially a preliminary analysis of the state of the art of the green and smart mobility industry is performed, before the regional innovation performance status is assessed. Finally, conclusions are drawn in regards to both topics. The findings and insights from these analyses will be applied to the pilot preparation processes, before they will be incorporated to the produced service pilots.

- Assessment of the regional innovation performance status
- A preliminary analysis of the state of the art of the green and smart mobility industry
- Conclusions on both topics

2. Preliminary Market Analysis

In analyzing the MED area market, two distinct fields are under study: the regional market basics and the innovation performance metrics at a country, regional and city level for all six participating countries.

The former is analyzed on the basis of current theoretical advancements and partner insight with the use of SWOT analysis for each regional case.

The latter relies on public knowledge extracted from published indices. The findings from both analyses are connected and discussed together so as important conclusions to be drawn.

a. Green and Smart Mobility status

Here, the most important terms of green and smart mobility are defined, discussed, and analysed.

The following sub-sections contain information about the green and smart mobility industry in automotive, information technologies, energy, and transportation sectors. Some more specific insight is offered in regards to clean fuels and infrastructures, green and automated vehicles, Intelligent Transportation Systems, Cooperative Intelligent Transportation Systems, Mobility as a Service and other new business models for sustainable, technology-aided initiatives.

i. Green and Smart Mobility

In recent decades, society has come to realize dramatic changes in regards to social and environmental issues emanating from business and societal activity. This realization, although it came late, brought society to face its responsibilities and move towards addressing multiple problems of grave importance, problems such as climate change, the depletion of natural resources, water and air pollution, and environmental degradation in general.

As a consequence, development within planetary boundaries became a top priority for most international organizations including the European Commission (EU), the United Nations (UN), and the World Commission on Environment and Development (WCED). In addition, several terms, definitions, and concepts developed through the years to describe specific needs and conform to particular technological advances. The most important and most general, relevant, concept is that of sustainable development.

Sustainable development is broadly defined as this type of *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987, p.41). Camagni (1998, p.1) defined sustainable urban development as:

“a process of synergetic integration and co-evolution among the great subsystems making up a city (economic, social, physical and environmental), which guarantees the local population a non-decreasing level of wellbeing in the long term, without compromising the possibilities of development of surrounding areas and contributing by this towards reducing the harmful effects of development on the biosphere”.

Within this concept of sustainability and development, another core term is that of Green Economy. Green economy raises matters of environmental protection, social equity, and human wellbeing

(UNEP, 2011, in Bąk and Makolska-Tenold, 2017) and refers to changing direction towards cleaner economic **models** and activities for increased competitiveness (Bąk and Makolska-Tenold, 2017). Part of the umbrella term of Green Economy, are both ideas about green and smart mobility.

Green mobility – sustainable mobility or sustainable transport –:

“refers to the accessibility of individuals and societies to the affordable and efficient choice of the transport mode with the environmental content condition such as reduction of emissions, noise, land use and recycling demand of its components” (Bąk and Makolska-Tenold, 2017, p.48).

Smart mobility is the:

“ICT supported and integrated transport and logistics systems. Smart Mobility prioritises clean and often non-motorised options. Relevant and real-time information can be accessed by the public in order to save time and improve commuting efficiency, save costs and reduce CO₂ emissions, as well as to network transport managers to improve services and provide feedback to citizens. Mobility system users might also provide their own real-time data or contribute to long-term planning” (Manville et al., 2014, p.28).

“Sustainable, safe and interconnected transportation systems can encompass trams, buses, trains, metros, cars, cycles and pedestrians in situations using one or more modes of transport”, is an example of smart mobility. (Manville et al., 2014, p.28).

As it can be seen, technology-aided environmental protection and human wellbeing are core in both the green mobility and smart mobility conceptualizations and initiatives, thus both can be used together – or interchangeably – for the purposes of this text.

Green and Smart Mobility Influencing Factors

Hirz (2016, p.15) identified that the variables that influence green and smart mobility are the following:

- *Infrastructure: politics and law, road infrastructure, public transportation, connection of surrounding areas*
- *Individual variables: city size and topology, structure of population, economic environment, people’s mobility behavior*
- *Resulting variables: traffic volume, transportation distance and time, modal split, costs of mobility, and environmental burden*

Related to the structure of the population, as well as the people’s mobility behavior in Hirz’s (2016) typology, is the purchasing behavior of consumers in regards to green and smart products and services.

Price, perception of quality, acquisition convenience and brand loyalty greatly affect the market of sustainable products and services (Gleim and Lawson, 2014, in Moser, 2015). Moser (2015) added personal norms as important influence factors and he identified that the consumers actually do care

about the environment and when they identify sustainable products with beneficial features, they are willing to pay even higher prices.

Another important influential aspect is policy/legislation. Regulatory compliance, or else the conformity to environmental and social regulations, is a major driver of sustainable advances and innovations. Interestingly, in some cases, companies overcome themselves and the existing regulation by overcommitting and acting proactively towards sustainable development, this corporate behavior is known as voluntary over compliance (Köse et al., 2016).

Green and Smart Mobility Characteristics

Green and smart mobility targets and succeeds in reducing the environmental impact of transportation by maximizing its efficiency, speed and intelligence (Signorile et al., 2018). This is facilitated by reducing the amount of travelling, boosting modal shift, and minimizing the length of trips (Banister, 2008, in Signorile et al., 2018).

That way, green and smart mobility manages to decrease certain mobility constraints and to minimize traffic-related risks and aggravating factors (i.e. accidents, noise, smog), reduce the effect of time and land loss, and to create broad economic and societal benefits (i.e. liveability, health and safety improvements, equal opportunities) (Benevolo et al., 2016; Bąk and Makolska-Tenold, 2017). Nevertheless, in order to achieve such sustainable solutions efficiently, the need for a supportive network becomes apparent and requires the participation of actors that are active in different green and smart mobility sectors and areas of application.

Green and Smart Mobility Areas of Application

Some important areas of application of green and smart mobility that are relevant to the successful implementation of Green-mind's preliminary steps are the following:

Low carbon economy in transport

The transition to low carbon economy refers to the shift towards a future that is less dependent on emission-intensive forms of energy. It concerns various non-industrial (behavior, lifestyles) and industrial fields such as manufacturing, construction, energy, and transportation (European Commission, 2018).

For instance, UK has legally introduced a binding zero carbon emission policy by 2050. This trajectory guarantees not only the most necessary and extremely important shift to green economy, but also increased opportunities for local SMEs to innovate and become competitive (Mazur et al., 2015).

Clean fuels and infrastructures

Clean fuels, bio-fuels, alternative fuels or eco-friendly fuels, are fuels used as substitutes to fossil fuels (and other emission intensive fuels) as they generally produce less pollution (Gupta et al., 2010). They are usually produced from renewable sources of energy or from waste treatment.

Agrafiotis (2017) developed a novel technological framework for using solar thermal fuel production in green mobility initiatives. Electricity, hydrogen, and biomass-driven fuels are other, more known

and widely used, examples of clean fuels. For instance, Brazil promotes successful green solutions and programs on a basis of hydroelectricity and sugarcane ethanol production as a protective measure against fossil fuel dependency (Altenburg et al., 2017).

Transport infrastructure is the supportive system of transportation. The transport infrastructure of an area consists of all the roads, railways, waterways, airports, seaports, pipelines, and telecommunications (Biehl, 1993, in Rietveld and Bruinsma, 1998) and their related services.

One illustrative example of infrastructure related services is traffic management. De Schutter (2014) argued that besides improving the infrastructure of an area, dynamic traffic management can be used to ease traffic jams and their consequent outcomes (i.e. costs, environmental impact, quality of life). He described dynamic traffic management as traffic control measures (i.e. onramp metering, dynamic speed limits, dynamic route guidance, traffic signals, lane closures, tidal flow) towards regulating traffic flows in transportation networks. He proposed the use of traffic flow models and emission and fuel consumption models to reach sustainable mobility results.

Green and automated vehicles

Green, eco-friendly or clean vehicles are vehicles that run on clean fuels and thus they are environmentally friendlier to the mainstream vehicles with internal combustion engine. In other words, efficient vehicles, which operate with, reduced emissions (Hirz, 2016).

A prominent example is the electric vehicles (hybrid electric, plug-in hybrid electric, battery electric, hydrogen fueled) (Mazur et al., 2015). Electric mobility minimizes exhaust gases and, consequently, improves the quality of urban life (Abdelkafi and Hansen, 2018).

Similarly, to the example from UK that was mentioned earlier, China prepares an aspiring program to promote electric mobility as a measure for reducing gas-emissions and increase competitiveness (Altenburg et al., 2017).

In Europe, it has been identified that improving the capacity of green modes of mobility in terms of infrastructure (i.e. charging networks) and performance is key in changing the current mobility status (NOVELOG, 2018).

Intelligent Transport Systems and Cooperative Intelligent Transport Systems

Intelligent Transport Systems (ITS) “covers a wide range of potential applications of information and computer technology to road and transport networks. These range from improved public service vehicle communication to automated highways with robotically driven cars” (Maier, 1998, p.275).

Cooperative ITS (C-ITS) are intelligent transport systems that “allow road users and traffic managers to share information and use it to coordinate their actions” as they enhance “communication between vehicles, infrastructure and other road users” and target to the complete integration of the transport system (European Commission, 2018b).

Autonomous drive and car communication (internet in cars, car-to-car, car-to infrastructure communication techs, automated driving functionalities, electric energy supply) are seen as important trends in green and smart mobility (Hirz, 2016).

A contemporary example of using ITSs and C-ITSs is that of connected cars. Sivertsen and Lunden (2016) performed a literature review on mobility trends and described connected cars as directly linked to the internet and always able to communicate and share information with the surroundings (i.e. vehicles, infrastructure, service providers), facilitating an always-on connectivity (Festag, 2014). This kind of technological development is more than able to ensure safe and efficient mobility (Sivertsen and Lunden, 2016). Towards that direction, another rising trend is autonomous driving technology. Hirz (2016) discussed traffic planning, traffic control and the use of information systems as best practice approaches to urban mobility.

For more examples, please see Festag (2014) and See-ITS (2014).

New business models for sustainable, technology-aided initiatives

A business model refers to the ways an organization creates, delivers, and captures value (Osterwalder et al., 2010). The conceptualization and development of new business models is also called business model innovation (Chesbrough, 2010).

Tidd and Bessant (2014, p.342) defined business model innovation as a source of discontinuity that triggers a process in which *“established business models are challenged by a reframing, usually by a new entrant who redefines/reframes the problem and the consequent roles of the game”*. They added that some illustrative examples of business model innovation can be seen in the role of Amazon.com, in retailing business or that of low-cost airlines in the airline industry.

For a detailed account in regards to user business models for ecopreneurship refer to Abdelkafi and Hansen (2018). For more detailed information about business model innovation please see Chesbrough (2010) and Tidd and Bessant (2014).

Mobility as a Service (MaaS) or Transportation as a Service (Taas) is a way of doing business, and therefore a business model. In fact, MaaS is “a new model for delivering sustainable transport services (...) by allowing the personalized use of a bundle of public and private transport means” (Signorile et al., 2018, p.185).

In a sense, MaaS refers to a shift from transport to mobility (Signorile et al., 2018) and personally owned transportation means to integrated, technology-aided mobility services. For instance, it can be *“a digital platform that integrates end-to-end trip planning, booking, electronic ticketing, and payment services across all modes of transportation”* (Goodall et al., 2017, p.114).

MaaS usually provides some kind of an all-in-one, integrated subscription for a predetermined duration (Signorile et al., 2018; see also Sivertsen and Lunden, 2016) and gives the user the liberty to move freely between the different transportation modes. Finally, a typical, physical or online, city transportation card is a clear example of MaaS in action.

For more information in regards to MaaS applications in tourism please refer to Scuttari et al. (2013) and Signorile et al. (2018).

Green and Smart Mobility Business Opportunities

Besides making people's life better and protecting the environment, green and smart mobility initiatives can potentially become serious drivers of business opportunities, economic growth, and employment.

To exploit such opportunities, the enterprises that are active in the green and smart industry, and especially the SMEs, should dedicate their operations to innovative processes and the development of disruptive technologies in order to break the existing status-quo and become the key actors of tomorrow's business landscape (Mazur et al., 2015). More specifically, SMEs might be extremely beneficiaries if they focus their attention on filling the niches¹ of green and smart mobility.

Mazur et al. (2015) described markets based on three defining factors: the regime, the niche market, and the landscape. The regime is what is true now technology-wise, the landscape refers to the ecosystem within which the regime operates, and the niches are the most needed disruption for change to happen and the regime to be overturned.

These niche markets might refer to the type of the used fuel, the type of the vehicle, the information and communication technology that is used, the model under which an enterprise operates and innovates or a particular segment of consumers with green and/or smart needs.

Bąk and Makolska-Tenold (2017) identified the following business trajectories for enterprises to capitalize on the increasing customer awareness regarding climate change and resource depletion:

- Focus on green products and services
- Adoption of marketing strategies such as green marketing, eco-product promotion
- Adoption of environmental management systems
- Increase brand attribute (i.e. product differentiation, producing eco-friendly goods and services)
- Reduce waste and energy use to cut costs
- Focus on innovation to develop and produce green goods
- Promote green consumption to develop green consumption patterns amongst consumers
- Adopt environmental management standards – i.e. ISO²

Especially in regards to the latter, green enterprises are advised to develop tailor-made marketing initiatives to optimally approach green consumers (Moser, 2015) and, in the long run, develop green consumption patterns.

¹ A niche market is “a specialized segment of the market for a particular kind of product or service” (<https://en.oxforddictionaries.com/definition/niche>)

² ISO: The International Organization for Standardization develops and publishes International Standards (<https://www.iso.org/home.html>)

According to Bąk and Makolska-Tenold (2017), local governments can support the smart and green business initiatives in a two-fold way: regulation (command and control) and marketing (economic/fiscal incentives, shifting market trends towards green and smart mobility).

Köse et al. (2016) proposed overcompliance to sustainability measures as another way of developing sustainable business competitive advantages based on green and smart mobility advances. They suggested that enterprises should overcome the legislative and societal expectations ecologically-wise and apply proactive measurements towards sustainable product/service development and managing operations. In that direction, they pinpointed the importance of value-creation through networking with various business partners, funding entities, regulatory authorities, institutions, and other groups of special interest.

Finally, Signorile et al. (2018) developed a framework in which tourism gains value through green and smart forms of mobility. They proposed a MaaS model that consolidates travelling requirements from origin to destination based on different options such as the used mode, the travelling time, and the travel cost. That way, the authors argued, the travelling experience can become simpler, cheaper, more flexible, more reliable, and more environmentally sustainable. For more detailed information see Scuttari et al. (2013), Scuttari et al. (2016), and Scuttari et al. (2018).

ii. Analysis Methodology

Market analysis or research is a fundamental business tool nowadays as it is crucial in describing demand and market factors (Kothari, 2004), as well as identifying current trends, future opportunities, and potential threats (Keegan, 2008).

The basic functions of market analysis refer to the *“process of gathering, analyzing, and interpreting data about a particular market”* and its specifics, like brands, products/services and so on in order to develop offerings that match the needs of the customers (Keegan, 2008, p.496). Kothari (2004) defined market analysis as *“the investigation of the structure and development of a market for the purpose of formulating efficient policies for purchasing, production and sales”* (p. 6).

At the centre of market analysis lie some crucial characteristics of the market itself. For instance, the way the market is analysed deeply depends on the way the market is understood. Malliaris (2001) identified four ways of understanding and identifying a market: as a geographical area, as a product, as demand, and, finally, as the conditions of demand. The way the market is understood directly influences how the market is approached. For example, defining the market within a geographically confined area instantly excludes factors of competition, customer base, and supplying motives that are relevant to other geographical areas.

Other important aspects when analysing a market, are its size and its attractiveness. Both have important impact on the potential market opportunities and consequently on the possible sales (Malliaris, 2001). Especially the latter point, market attractiveness, takes into consideration the life-cycle phase in which the identified market currently is. Each market phase reflects different opportunities and different threats, as shown in figure 1 below.

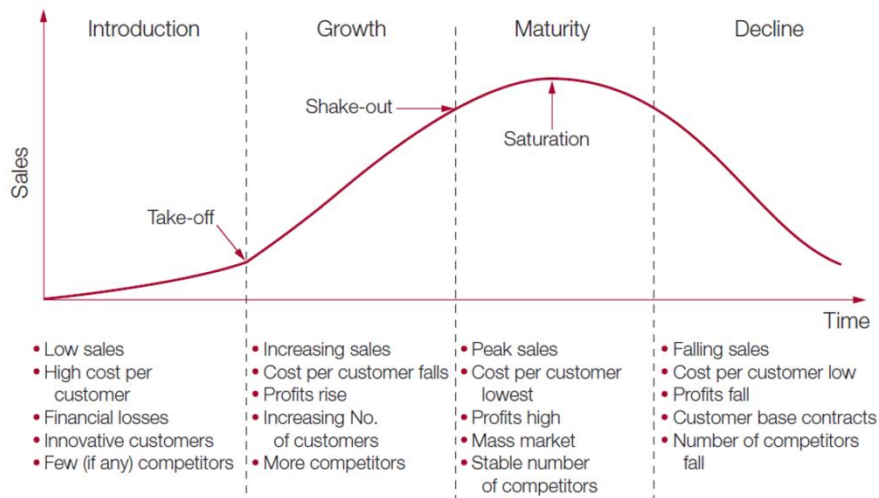


Figure 1. The four Life Cycle Stages and their Marketing Implications
(adopted from Claessens, 2017)

SWOT Analysis

In order to identify the state of the green and smart market in the geographical areas and industrial fields of concerns, a series of SWOT analyses were performed and based on those a collective and inclusive SWOT analysis was developed. The partners were required to, initially, fill-in the following four subsections – Strengths, Weaknesses, Opportunities, and Threats – and then include their most important findings in the fifth subsection, the actual SWOT analysis template.

The subsections were filled-in by partners following the guidelines below (figure 2):

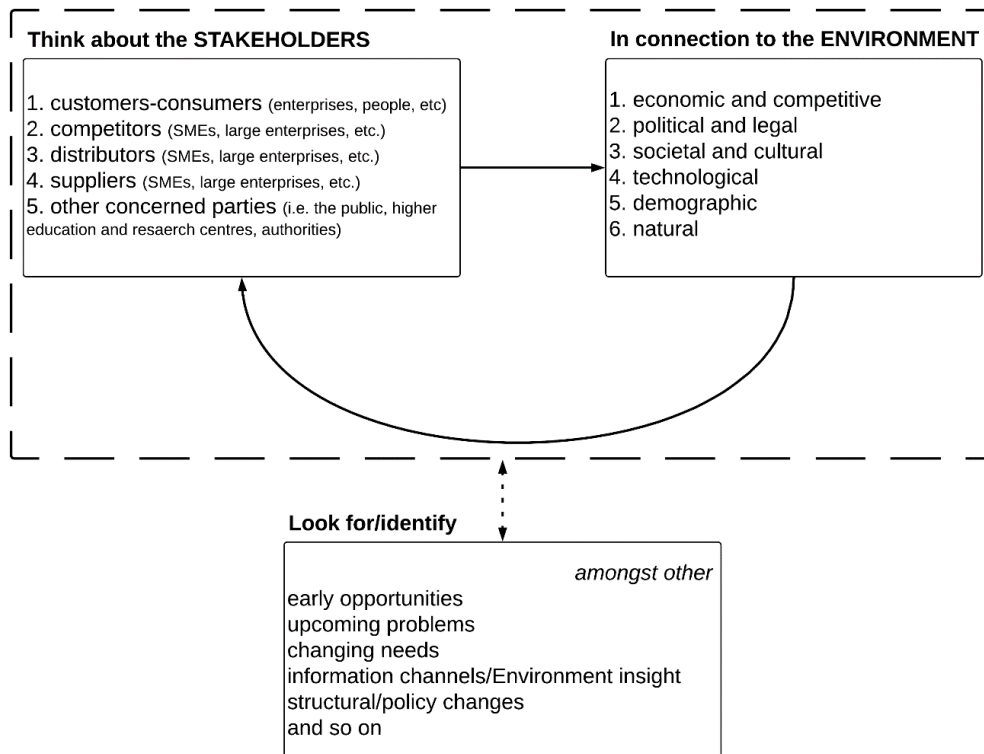


Figure 2. A market analysis framework

(as extracted from Siomkos, 2004, translated, and adapted for this figure)

Example: The government is considering an increase in taxation for all non-bio-fueled means of transportation. This is an opportunity for electric car suppliers.

The employed SWOT analysis template can be found on Appendix 1.

iii. Green and Smart Mobility Regional Findings

Findings from regional SWOT analysis were analyzed in a comprehensive way and the main outcomes were briefly presented. Afterwards, an effort is made to determine the core opportunity derived from the analysis to be a targeting proposal for each region.

ITALY-Emilia Romagna

Italy has a strong advantage and specialization on vehicles manufacturing as there are companies dealing with vehicles and vehicle components production and therefore able to provide autonomous driving systems and vehicle connectivity solutions. Otherwise the lack of integration on sharing information and the insufficient technological infrastructure on urban areas will be an obstruction on the disposal of new technology vehicles. The main throwback is that there is not a provision for clean fuels promotion in local strategies.

Core opportunity-NEW GENERATION VEHICLES, C-ITS SYSTEMS

With a view to Industry 4.0., Italy should take advantage of its well-developed automotive industry and invest towards the field of new vehicle technologies such as cooperative intelligent transport systems, road safety and smart solutions with a parallel necessary investment in supportive infrastructure such as sensors, 5G technologies etc.

GREECE-Central Macedonia

The highly skilled scientific resources of Greece and organizations that deal with promotion of ITS relevant technologies and usage of electric vehicles are able to form the capacity of green and smart mobility in the area. Long time period from tendering a project to implementation is a main throwback for the development of the industry but recent initiatives and measures such as the upcoming installation of electric rechargers and the planning of SUMP in cities will launch the enhancement of activity in this field. Economic crisis has a great impact on the green and smart mobility industry in the country as the funds for investments in transport sector are limited and this situation is being worsened because of the lack of efficient cooperation between the concerned stakeholders.

Core opportunity-EXPLOIT INNOVATION CAPABILITIES

In Thessaloniki there is an ecosystem composed of research centers, incubators, SMEs and clusters that can add value to research and development in green and smart mobility combined with the technology systems and applications that are already applied in cities' transport systems.

SPAIN-Andalusia

New policies and integration of EU Directives into national and regional laws and policies drive the growth of green and smart mobility industry. The good quality of transport infrastructures such as bus lines, pedestrian streets and finance measures for electric and hybrid vehicles are towards the

direction of enhancement of sustainable mobility. There are also several applications that offer plenty of solutions and services to the citizens and ITS systems are also established for traffic management. Weaknesses are detected in the field of clean fuels and low carbon economy as citizens' lack of awareness, poor integration of transport modes and limited offer of public bicycles and infrastructure for cyclists lead to high occupation by motor vehicles.

Core opportunity-EXPLOIT POLICIES:

Spain has to exploit the policies and measures that are being developed towards sustainable mobility in order to promote and enhance awareness of citizens about the benefits of using clean modes of transport.

FRANCE-Occitanie

Region of Occitanie is characterized by its potential in research and development as there are many big companies, such as Renault or Airbus, Thalès, Continental Automotive France, that choose the specific region in order to test and implement new technologies either in green and smart mobility industry or in other sectors. Hydrogen sector is growing rapidly as there are many enterprises dealing with the provision of hydrogen technologies. Also there is a great know-how on electro-mobility but the supportive infrastructure remains insufficient. ITS applications offered by different SMEs are being tested in order to improve mobility but are kept in the limits of big cities, creating imbalances between urban and rural areas. This imbalance is also observed in available transport infrastructures as the network is not well-developed in rural areas.

Core opportunity-EXPLOIT RESEARCH AND DEVELOPMENT CAPABILITIES

The region of Occitanie is 1st region for research and invests heavily in research and development. As the green and smart mobility industry is constantly evolving due to new technological possibilities Occitanie region should exploit its research potential and its qualified manpower to develop innovative solutions in the field of green and smart mobility. Also it is crucial that this workforce of Occitanie keeps developing its skills.

CROATIA- Jadranska Hrvatska, Counties of Istria and Split-Dalmatia

In Croatia, the lack of knowledge about green and smart mobility among citizens leads to the continuity of motor vehicles usage. This fact worsens because of insufficient infrastructures for bikes and pedestrians and low frequency and lack of connectivity among means of public transport in some areas. Public authorities' negligence to form specific roadmaps towards green mobility and the lack of research and innovation actions in this field does not support the evolution of the green and smart mobility industry.

Core opportunity-EXPAND PILOT APPLICATIONS, FOCUS ON SUMPS

Since there had been many pilot applications testing smart parking systems and multimodal connections, public authorities should investigate on these applications and expand their implementation. Also there has to be a focus on the sustainable urban mobility plans as through them a redesign of public transport and transport infrastructures could be possible.

BOSNIA/HERZEGOVINA-Sarajevo

Bosnia and Herzegovina has a high usage of alternative and eco-friendly fuels in its public transport systems such as CNG buses and LPG taxis. Also there is a public bike system and the ITS applications include parking services, ticketing systems and public transport information sharing but cooperative ITS are not developed yet. Also IT industry is being growth and there are start-ups that focus their business activities in solutions towards green and smart mobility such as carpooling. The major bottleneck for the industry in Bosnia is the insufficient and non-maintained transport infrastructure, the lack of investments in road and transport infrastructure, the lack of governmental support and the lack of focus in R&D operations in the sector of mobility.

Core opportunity-ALTERNATIVE SOURCES of ELECTRICITY PRODUCTION:

Bosnia-Herzegovina should exploit the opportunities that the power generation potential offers to it in order to promote mobility using environmentally friendly fuels.

- The price of electricity is among the lowest in EU
- It is planned to have around 300 small hydro plants for electricity production according to Energy Strategy Framework until 2035 and also there is potential fields for setting-up wind-turbines.
- Energy strategy framework states an extension of CNG and LPG network

The focus of mobility should capitalize on the alternative sources of electricity production and be turned towards electric technologies and infrastructure

SLOVENIA- Vzghonda Slovenija

In Slovenia, either national and local strategies target in promoting alternative fuels infrastructure and integrated transport systems, but slow transition from vision to implementation is observed. Nowadays, the lack of pedestrian and cyclist infrastructure and the lack of initiatives such as subsidies for the purchase of electric vehicles do not assist the development of green and smart mobility. There are some although limited applications that offer services towards smart mobility such as finding charging stations.

Core opportunity-ELECTRIFICATION:

Slovenia should invest in electrification since there are some core opportunities in this specific sector.

- After 2025, Slovenia should restrict the first registration of cars with diesel and petrol
- A Green Public Procurement measure was introduced concerning electrification of public transport

BRIEF REVIEW OF THE MARKET DYNAMIC

According to the analysis of the green and smart mobility market, there is a need for a coherent definition of this market so that stakeholders can understand the needs of their customers in this sector and invest in innovative products / services.

Although there are teams and research centers in most countries dealing with areas related to green and smart mobility, pilot projects and trials should acquire commercial character in a greater extent to

bring value to the market. The high quality of highway road networks can be the basis for the application of the new technologies of cooperative transport systems, otherwise nowadays the established systems need to be improved.

A very important parameter for the enhancement of the green and smart mobility market is its promotion by public authorities so that citizens are informed about the benefits of sustainable and green solutions. Furthermore, there should be a policy that motivates citizens to change the way they commute or travel.

This lack of awareness about importance of sustainable solutions leads to great occupation of motor vehicles and prevents the changing to more environmental friendly modes of transport. Smart applications in the field of green and smart mobility exist but companies working on ICT should advertise the benefits of their products and also form synergies to cover the growing needs of citizens for products that serve their mobility.

Table 1: Summary of the SWOT analysis results

	<i>ITALY Emilia Romagna</i>	<i>GREECE Central Macedonia</i>	<i>SPAIN Andalusia</i>	<i>FRANCE Occitanie</i>	<i>CROATIA Jadranska Hrvatska</i>	<i>BOSNIA/ HERZEGOVINA Sarajevo</i>	<i>SLOVENIA Vzhonda Slovenija</i>
Green and smart mobility industry							
Specified green and smart mobility industry							
Continuous and intensive research in the field of green and smart mobility							
Supportive clusters to foster green and smart mobility industry							
Low carbon economy in transport							
Citizens awareness about sustainable mobility	N/A			N/A			
Clean fuels and infrastructures							
Clean fuels usage either in private or public transportation (LPG,CNG)	N/A		N/A		N/A		N/A
Extended bicycle routes network	N/A			N/A			N/A
High quality of highway road network	N/A						N/A
Established system for efficient public transport operation and management (TMS, sensors etc.)				N/A		N/A	N/A
Electric mobility infrastructure	N/A						

Green and automated vehicles							
High usage of other means of transport against motor vehicles (i.e. high occupation of motor vehicles)	N/A						
Public bicycle sharing systems	N/A				N/A		
Logistics							
Consolidated logistic infrastructure	N/A						N/A
Intelligent Transport Systems and Cooperative Intelligent Transport Systems							
Integrated ticketing system	N/A			N/A			N/A
Smart parking applications	N/A						
Public administration							
Implementation of national, regional policies towards sustainable mobility							
Development of Sustainable Mobility Plans	N/A					N/A	N/A
Subsidies for purchasing green vehicles	N/A		N/A	N/A			
Coordination between the different modes of transport	N/A					N/A	N/A
New business models for sustainable, technology-aided initiatives							
Promotion of sustainable solutions	N/A						
Car-sharing systems	N/A				N/A		



Red: Low level of implementation or lack of extinction



Yellow: Moderate level of implementation or ongoing process



Green: Fully applied or integrated process

N/A: Not available information

3. Concluding Remarks

Regarding the Green and Smart Mobility status in the partner regions, the implementation of specific Directives of European Union and their integration in national laws as well as specific regional policies, such as RIS3, form the framework for sustainable transport and mobility planning in urban environment. Additionally, new provisions are incorporated towards the use of clean fuels and the progressive installation and use of electric vehicle recharging infrastructures. Initiatives banning the circulation of diesel and petrol-powered vehicles are towards this direction, although the private car usage in cities remains high and sets barriers to the enhancement of green mobility.

In order for an enterprise to invest in a new market and be able to seize the opportunities that this market offers, it is urgent that this market or industry is well defined. This lack of clear definition of the green and smart mobility industry prevents enterprises from investing in integrated environmentally friendly mobility solutions and seek collaborations with other companies that offer products/services on this market.

Economic crisis has affected the growth rate of countries and that fact had a strong impact on public investments in transport sector. As a consequence, public transport systems modernization and improvement is slow. But on the other hand, in Spain and Greece there is a traffic reduction due to economic crisis that offers opportunities for sustainable development. Poor cooperation and integration among the different stakeholders and the transport systems are a disadvantage in the increasing of public usage.

The opportunity that many countries must take advantage of is the existence of highly qualified manpower in the field of new technologies that can be exploited in order to develop new innovative solutions in the mobility sector. On the other hand, other countries should allocate resources to educate and train their professionals. This training should be widened in the entire population since a big threat for the development of green and smart mobility is the inability of mass population to understand the benefits of sustainable mobility and change their mobility habits.

In conclusion, the green and smart mobility market can offer great opportunities to enterprises working on the field of new, innovative and green technologies but there is a need to define their position into this market in relationship with the other involved enterprises and to form synergies that will lead to the development of high quality, integrated products and services

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5. Appendices

Appendix 1. SWOT Analysis Template

Strengths

Having in mind the market analysis framework above and the literature review in previous sections, please indicate the strengths of your country's market in the following areas (each underlined term is an area of concern):

Green and smart mobility industry

[\[replace this text to answer\]](#)

Clean fuels and infrastructures

[\[replace this text to answer\]](#)

Low carbon economy

[\[replace this text to answer\]](#)

Green and automated vehicles

[\[replace this text to answer\]](#)

Logistics

[\[replace this text to answer\]](#)

ITSs and c-ITSs

[\[replace this text to answer\]](#)

Business models for sustainable, technology-aided initiatives

[\[replace this text to answer\]](#)

Weaknesses

Having in mind the market analysis framework above and the literature review in previous sections, please indicate the weaknesses of your country's market in the following areas (each underlined term is an area of concern):

Green and smart mobility industry

[\[replace this text to answer\]](#)

Clean fuels and infrastructures

[\[replace this text to answer\]](#)

Low carbon economy

[\[replace this text to answer\]](#)

Green and automated vehicles

[\[replace this text to answer\]](#)

Logistics

[\[replace this text to answer\]](#)

ITSs and c-ITSs

[\[replace this text to answer\]](#)

Business models for sustainable, technology-aided initiatives

[\[replace this text to answer\]](#)

Opportunities

Having in mind the market analysis framework above and the literature review in previous sections, please indicate the potential opportunities in your country's market in the following areas (each underlined term is an area of concern):

Green and smart mobility industry

[\[replace this text to answer\]](#)

Clean fuels and infrastructures

[\[replace this text to answer\]](#)

Low carbon economy

[\[replace this text to answer\]](#)

Green and automated vehicles

[\[replace this text to answer\]](#)

Logistics

[\[replace this text to answer\]](#)

ITSs and c-ITSs

[\[replace this text to answer\]](#)

Business models for sustainable, technology-aided initiatives

[\[replace this text to answer\]](#)

Threats

Having in mind the market analysis framework above and the literature review in previous sections, please indicate the potential threats in your country's market in the following areas (each underlined term is an area of concern):

Green and smart mobility industry

[\[replace this text to answer\]](#)

Clean fuels and infrastructures

[\[replace this text to answer\]](#)

Low carbon economy

[\[replace this text to answer\]](#)

Green and automated vehicles

[\[replace this text to answer\]](#) Logistics

[\[replace this text to answer\]](#)

ITSs and c-ITSs

[\[replace this text to answer\]](#)

Business models for sustainable, technology-aided initiatives

[\[replace this text to answer\]](#)

Fill-in the following template with the most important aspects of the ideas you discussed earlier:

Strengths

Weaknesses

Opportunities

Threats