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Towards the implementation of the e-CMR system in Italy

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Acronyms

CMR	Convention des Marchandises par Route
e-CMR	Electronic CMR
e-TIR	Electronic Transport International Routier
IRU	International Road Transport Union
GPS	Global Positioning System

1 Introduction

Today, the international transport of goods by road is regulated by the **CMR Convention (“Convention des Marchandises par Route”, signed in Geneva on 19 May 1956)** which had as main objectives the harmonization of the documentation supporting the transport and the facilitation of the operations: today fifty-eight countries, including Italy, have joined this Convention which provides for the use of the CMR consignment note in paper format.

The transformation of logistics and transport processes due to digital technologies has led to the definition of the **"Additional Protocol to the Convention concerning the contract for the international carriage of goods by road (CMR), relating to the electronic consignment note" (e-CMR), entered into force on 5 June 2011** in response to the needs of economic operators and governments for a digitization of transport and travel documents.

To date, thirty countries have ratified/adhered to the Additional Protocol, which entered into force on 5 June 2011. The last one has been Germany that formalized its accession to the Additional Protocol on 5 January 2022, thus bringing to 18 the number of EU Member States that recognize the e-CMR.

Since 2008 the International Road Transport Union (IRU) has promoted the introduction of a digital consignment note, e-CMR, as a secure and reliable way to exchange digital data between public institutions, actors in the transport chain and service providers. Nevertheless, at present time, the e-CMR is not a standard practice across the industry, because some Countries, such as Italy, are pending in ratifying the protocol and also due to some resistance of companies to make the digital leap.

2 Scope of the project

The “Toward the implementation of the e-CMR system in Italy” Project (which hereinafter may also be briefly referred to as "e-CMR Italy") promoted by the International Road Transport Union (IRU) and Unioncamere, which is the public body that represents the Italian chamber system, had the scope of paving **the way for the e-CMR deployment and support the ratification of the e-CMR protocol in Italy.**

The motivation of the project is the importance of the electronic consignment note- for the transport sector in Italy and also in Europe (as underlined by the Netherlands infrastructure Minister in 2018) to improve the efficiency of the logistics chain, optimizing processes, reducing the environmental impacts and the costs.

Moreover, the project is contextualized in the **implementation of the reform 2.3 envisaged in the Italian PNRR** (National Recovery and Resilience Plan) on the matter of simplification of logistical procedures and digitization of documents.

Specifically, **the project aims at identifying the obstacles to e-CMR implementation and to evaluate its advantages in relation to the Italian specific scenario.**

The Project aims at raising awareness among all the actors of the Italian logistic and road transport chain (including the production companies (clients)) about the benefits of using the digital consignment note (e-CMR) and, in parallel, pushing its ratification by the Italian Government.

The bottom-up approach is the innovative aspect of the Project: the involvement of some of the most relevant transport and logistic trade associations (ANITA, Confartigianato, Confetra/Fedespedi, FAI) and companies (Arcese, Barbiero S.p.A., FERCAM Logistics & Transport, Riva Logistic & Service, Rutilli Autotrasporti) was the basis for the development of the project in order to implement a **pilot case capable of detecting key/critical issues** that could hamper the adoption of the e-CMR and identifying possible actions (to be delivered to policy maker) to **push and support the digital transformation of companies** in the logistics supply chain, which is essential for increasing the efficiency and sustainability of this economic sector.

3 Project description

The e-CMR is a digital solution that struggles to be widely accepted, also in the Countries that have already ratified the Additional Protocol to the Convention, probably because many companies remain more confident with their paper-based model and are reluctant to make the digital leap.

The core objective of the Project is focused on raising awareness in Italy of the need of introducing the digital consignment note in the international road transport, facilitating its acceptance by the key players in the supply chain (the target audience), illustrating how they can benefit and pushing toward the e-CMR implementation in Italy.

To achieve that, a list of key activities was planned:

- a) Understand the current framework of international road transport management in Europe in terms of e-CMR and also e-TIR adoption.
- b) Survey of the Italian road transportation and logistics industry about the use of digital documentation and knowledge and expectation about the e-CMR.
- c) Design and implement cross-border e-CMR pilots using some e-CMR solution available on the market, involving some transport and logistic Italian key players (through trade associations) according to the current framework and the objectives of the Project.
- d) Monitoring the development of the pilot and sharing the most relevant results with the transport community and with the Italian Ministry of Transport.
- e) Deliver relevant insights to policy makers to push the next ratification by the Italian Government.

On this basis the Project was structured in the following **five Actions** including the Project management (Action 1) and the Communications (/Action 5):

1. **Action 1: Project Management**

This Action ensures that *Project* meets all the objectives on time, at a high level of quality and within the allocated budget. In addition, it manages and facilitates a continuous flow of information and exchange between the Project and IRU as well as among the project team and with other related activities and research projects.

2. **Action 2: State-of-art Assessment**

The aim of this Action is to understand the current framework of international road transport management in Europe with specific reference to Italy, spotting the existing gaps and/or potential obstacles toward digital services. The following activities will be performed:

- **Analysis of the current trends** in innovative technologies supporting the international transport operations by road (e.g., e-CMR and eTIR).
- **Benchmark assessment** of the already implemented e-CMR pilots that have involved Italy and their follow-up (if any), detecting key issues, such as critics and benefits.
- **Survey of the Italian logistic industry** in terms of level of knowledge on e-CMR, digital equipment, needs and barriers toward the implementation of the e-CMR (also through, as example, SWOT analysis, meetings with stakeholders, joint market analyses, surveys, etc.).

3. **Action 3: e-CMR Pilot Test**

Based on the current framework analysis, a proper e-CMR field test will be implemented setting key performance indicators to assess the potential benefits and to find possible obstacles of introducing the e-CMR.

The Action is divided in four sub-activities:

- 3.1. **Pilot test design** (sub-activity 2.1): definition of the test pilot “architecture” in terms of objectives of the pilot, design of the flow of e-CMR documentation (both digital and paper), identification of the necessary equipment and software, definition of the key performance indicators and methods of measurement, storage and processing.
- 3.2. **Pilot test implementation** (sub-activity 2.2): Roll-out of the test pilot “architecture”.
- 3.3. **Pilot test running** (sub-activity 2.3): several international road transports to and from Italy using e-CMR will be performed to collect the basic data for the calculation of the key performance indicators.
- 3.4. **Pilot test data analysis** (sub-activity 2.4): calculation of the key indicators on the performances of the Pilot to develop a swot analysis.

4. **Action 4 - Key Findings and Proposal**

Based on the pilot test results, guidelines will be produced, with the relevant insights and suggestions for short/medium term solutions, to be delivered to Italian policy makers to push the next ratification and the deployment of the e-CMR.

5. **Action 5 – Communication**

The purpose of this Action is to implement a series of effective communication initiatives, both towards policy makers and towards all players in the logistics chain, on the evolution and results of the Project.

Therefore, the Action 5 includes:

- **Monitoring the pilot development and sharing real time news** (events and results such as opening of the pilot, main results, benefits achieved, etc.) with the transport community through the main social channels (e.g., LinkedIn) and project partners’ websites.
- **Publishing the main outcomes/deliverables on project partners’ websites.**

During the Project, the following three deliverables were planned and produced in Italian:

- a) “International road transport: analysis of the Italian situation about digital documents”: output of Action 2;
- b) “Italian e-CMR pilot test results”: output of Action 3;
- c) “Guidelines for e-CMR deployment considering the Italian situation”: output of Action 4;

The Project run from October 2021 to September 2022 and then extended by two further months in order to take into account the delay incurred due to the Covid pandemic impact and the complexity to implement the pilot in the real world of the transport and logistic operations.

Figure 1 shows the Original GANTT diagram of the project: during the Project the GANTT was modified and the duration of the Project was extended up to November 2022.

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Action	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1) Project management	■	■	■	■	■	■	■	■	■	■	■	■
2) Analysis of the state of the art	■	■	■	■	■							
3) E-CMR pilot test			■	■	■	■	■	■	■	■	■	
3.1) Pilot design			■	■	■	■						
3.2) Pilot implementation					■	■	■	■				
3.3) Pilot project								■	■	■	■	
3.4) Analysis of the results									■	■	■	
4) Key findings and proposal											■	■
5) Communication activity	■	■	■	■	■	■	■	■	■	■	■	■

Figure 1 GANTT diagram

4 Project objectives

The core objective of the Project is focused on raising awareness in Italy of the need of introducing the digital consignment note in the international road transport, facilitating its acceptance by the key players in the supply chain (the target audience), illustrating how they can benefit and pushing toward the e-CMR implementation in Italy.

- **Survey of the Italian road transportation and logistics industry** in terms of knowledge level on: e-CMR, digital equipment, needs and barriers to the implementation of the e-CMR (also through, for example, SWOT analyses, meetings with stakeholders, joint market analyses, surveys, etc.).
- Identification of the impacts of the e-CMR on the current *modus operandi*
- Business operational processes
- Identification and quantification of the benefits of the e-CMR compared to the paper CMR
- Identification of possible barriers to adoption (by businesses)

Further objectives of the project were the following:

- **Teaming up with stakeholders.** Make a team involving all the most relevant stakeholders (MIMS, Central Committee of the Register, Ministry of the Interior, Ministry of Enterprises and made in Italy, Revenue Agency, Client Associations), in addition to the chamber system and trade associations.
- **Promote the use of the e-CMR.** Promote the use of the e-CMR as a tool of innovation and efficiency for all the players involved in the logistics chain (from the sender to the recipient, from the carrier to customs).
- **Create the conditions.** Create the optimal conditions to reach the ratification of the protocol on the electronic waybill (e-CMR) by the Italian Government as soon as possible.

5 Project deliverables

Thanks to the consolidated network of Unioncamere, the Project envisaged a strategic collaboration with the most relevant stakeholders in the field of freight transport by road (such as trade associations, transport and logistics companies, and policy makers) to support and validate the development of the Project.

The results were both in terms of framework analysis, with the outlook on the current state of the art and a survey on the Italian logistic industry, and in terms of promotion of the e-CMR knowledge, with the realization of the pilot project and an active communication campaign.

5.1 Deliverable 1 – “International road transport: analysis of the Italian situation about digital documents”

The first milestone achieved during the e-CMR Italy project was the completion of the analysis on the current state of the documentation used to support transportation activities around the world. The output of such activity consisted in the drafting of the first deliverable of the project i.e., the **report titled “International road transport: analysis of the Italian situation about digital documents”**.

This deliverable is divided in two sections: the state of the art of international road transportation documentation and a survey aimed at the Italian road transport companies on the use of digital documentation, knowledge and expectation about the e-CMR.

State of the art analysis on documents for international road transport and digitalization

The report reviewed today’s practices starting from an overview of how documents like the CMR consignment note and the TIR carnet were developed and implemented. The international scenario and the Italian one were described with particular reference to the documents currently used, such as the Italian “*documento di trasporto*” (DDT), which means “transport document” and is used for the transportation of goods within Italian borders. Also, the current implementation state and specific features of e-CMR were investigated, with a focus on other international projects which tested the use of the electronic consignment note. A benchmark assessment of the already implemented e-CMR pilots was conducted detecting key issues, such as obstacles and key factors.

Survey of the Italian logistic industry

The second achievement of e-CMR Italy was the **design and implementation of a 60-question survey** which was then submitted to over 1.600 Italian companies that provide road transportation services differentiated in two main groups: the ones that work in Italy only and the one that work internationally. Through the conduction of the questionnaire, it was possible to assess the current characteristics of road transportation in Italy, the level of digitization and current practices. More importantly it was asked to the companies involved what were the main obstacles and expected advantages of electronic documents, in particular of the e-CMR. Questions were asked to describe the level of knowledge with respect to the e-CMR and electronic devices in general.

The following main areas were investigated:

- Digitization of processes
- Electronic instruments on board
- CMR
- e-CMR
- TIR/eTir
- Knowledge of legislation

Deliverable 1 contains an extract of the complete survey¹.

5.2 Deliverable 2 – “Italian e-CMR pilot test results”

The core activity of the e-CMR Italy project consisted in the realization of the **pilot project**, which allowed to experiment the usage of the electronic consignment note in the field. It involved five Italian transportation companies (listed in Chapter 2) and three different providers of e-CMR platforms (ACCUDIRE, Pionira e Transfollow). **Over 100 test trips** were carried out, in which the e-CMR was used in hybrid form, i.e., in parallel to the traditional paper CMR. Eight European countries were involved in the trips, other than Italy, which acted both as destination and as origin of the transport.

Through regular meetings with the actors involved and the real-time monitoring of operations, it was possible to evaluate **the advantages of the digitization of documents** and at the same time identify the **critical aspects** that companies must take into account. Several recurring themes have been identified, among which the necessary greater familiarity with electronic tools and the indispensable integration with the IT environments of individual companies certainly stand out.

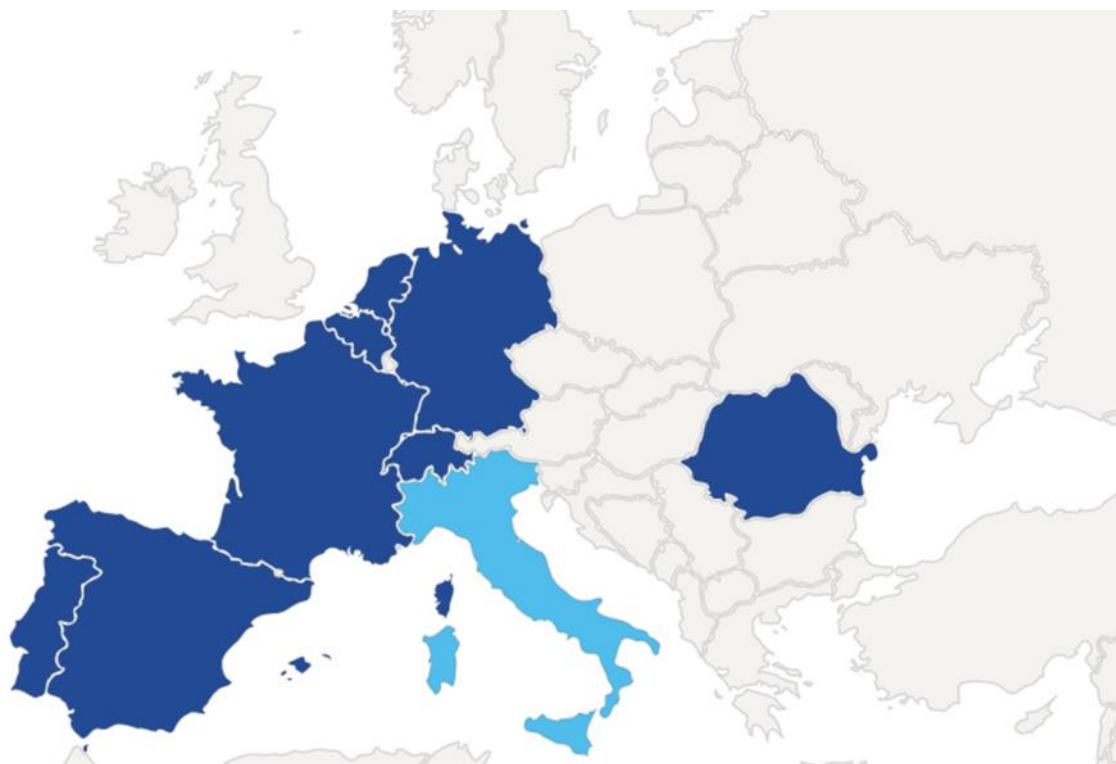


Figure 2 e-CMR Italy pilot project overview: the countries involved are highlighted in blue

The activity conducted as part of the pilot project was described in the second deliverable of the project i.e., the **report titled "Towards the implementation of the e-CMR system in Italy: pilot test results"**.

5.3 Deliverable 3 – “Guidelines for e-CMR deployment considering the Italian situation”

On the basis of the pilot test results, guidelines will be produced, with the relevant insights and suggestions for short/medium term solutions

¹ The full survey results are available in Italian at Unioncamere/Uniontrasporti.

5.4 Communication activity

An extensive communication campaign was conducted, comprising the **design of a logo** for the project (Figure 3) and the **development of a dedicated website** (www.ecmritaly.it) which is available both in Italian (Figure 4) and in English (Figure 5).



Figure 3 Project logo



Figure 4 Project website homepage (Italian)



Figure 5 Project website homepage (English)

Also, as part of the communication plan, several **press releases** were published along the successive steps of the pilot and **a video was produced** to explain the contents of the pilot project which was uploaded on YouTube (Figure 6).

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Figure 6 “e-CMR Italy” project video on YouTube

Finally, as part of the communication strategy, a series of press releases was scheduled to be released on a regular basis. Table 1 summarizes the press release campaign.

Table 1 e-CMR Italy: press releases issued

Date	Original Title (Italian)	Title Translation (English)	Distribution
May 12, 2022	Il nuovo progetto e-CMR Italia che faciliterà e semplificherà le procedure logistiche per i trasporti su gomma	The new e-CMR Italy project which will facilitate and simplify the logistic procedures for road transport	18 publications (web or paper)
August 2, 2022	Unioncamere e Uniontrasporti annunciano il primo dei viaggi sperimentali per promuovere l'utilizzo della lettera di vettura elettronica in Italia	Unioncamere and Uniontrasporti announce the first of the experimental trips to promote the use of the electronic waybill in Italy	5 publications (web or paper)
November 2, 2022	e-CMR Italy: conclusa con successo la fase dei pilot	e-CMR Italy: pilot phase successfully completed	7 publications (web or paper)

6 Key achievements and guidelines

Through the analysis of the results of the pilot and the discussion with the various stakeholders involved, belonging to both the transportation companies and the technology providers, it was possible to achieve the main targets of the project, namely: the definition of the major takeaways from the study and the test, which saw the field implementation of the electronic waybill, and the formulation of guidelines that cover which activities are required and which actions need to be taken in order to support the e-CMR implementation and the ratification of the Additional Protocol in Italy.

6.1 Key achievements

This section aims at summarizing the main takeaways from all the various activities performed during the project: the state-of-the-art analysis, the survey to the transportation companies, the pilot project and the following analysis.

6.1.1 Assessment of the Italian situation

Throughout the project it was possible to study and characterize **the current status of the Italian situation** concerning the transportation used today during road transport operations. Multiple features have emerged, in particular:

- **Low level of digitization:** currently, the actors involved in the transportation process are used to manual operations and, with particular reference to the drivers and warehouse workers there's little familiarity with electronic tools; often, they don't have a company device and they only carry the personal smartphone with them.

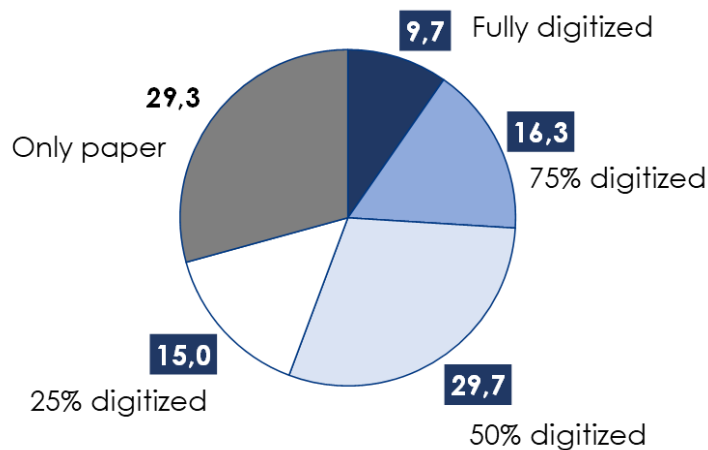


Figure 7 How digitized are your operational processes (freight operations, warehouse logistics, etc.)

- **Interest in e-CMR:** in the survey companies carrying out international transport were asked if they consider the adoption of the e-CMR useful: as shown in Figure 8 and Figure 9, 44.3% of the sample considered the adoption of the e-CMR useful, a figure that rises to 65.4% if considering only larger companies (more than 50 employees).

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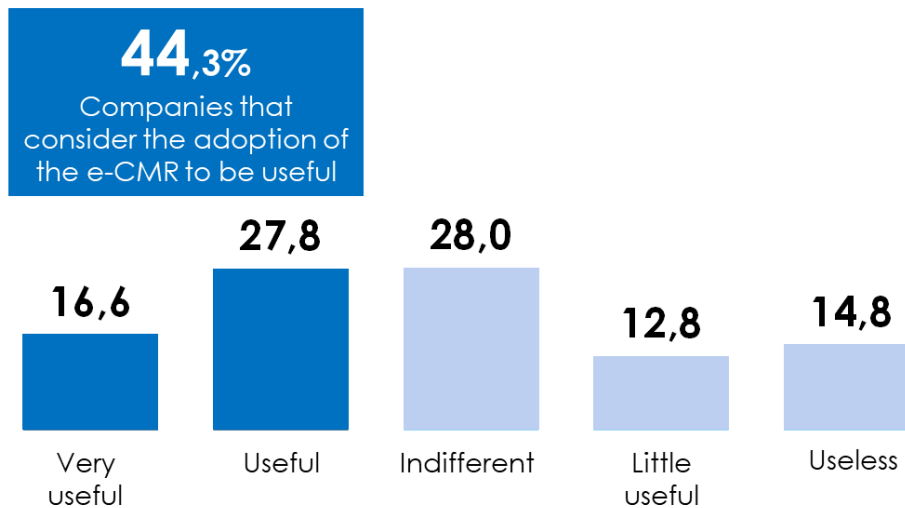


Figure 8 How useful do companies consider the adoption of the e-CMR

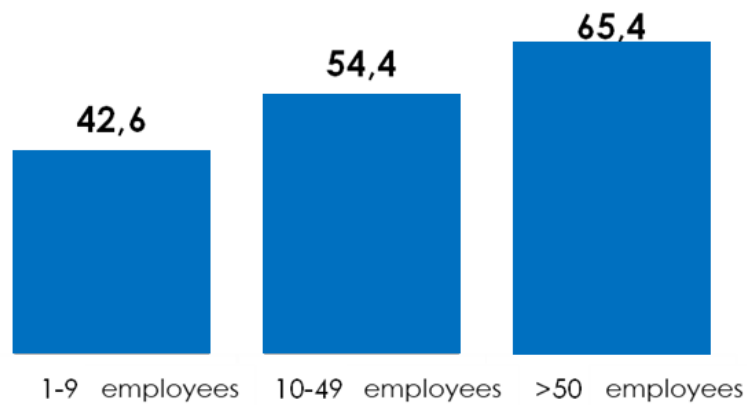


Figure 9 Percentage of companies that consider the adoption of the e-CMR useful, based on number of employees

Instead, with respect to the urgency of the e-CMR adoption it is possible to see how, for the same sample of companies, it is far less felt than its usefulness.

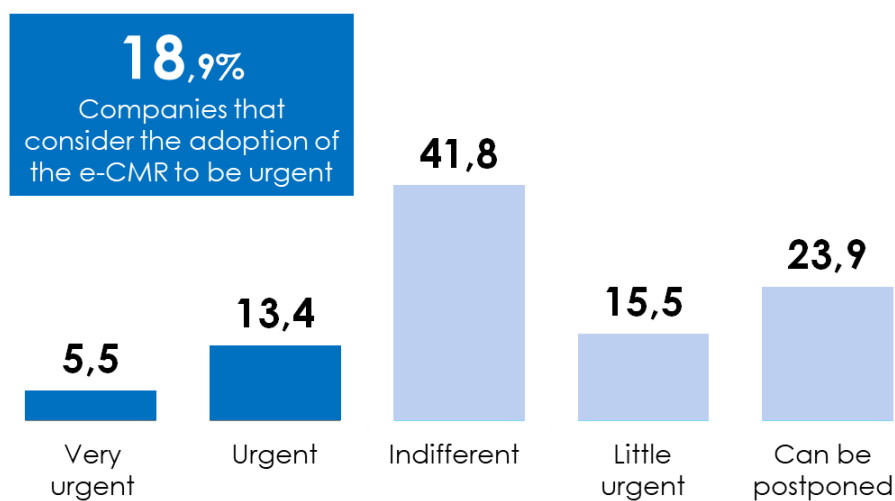
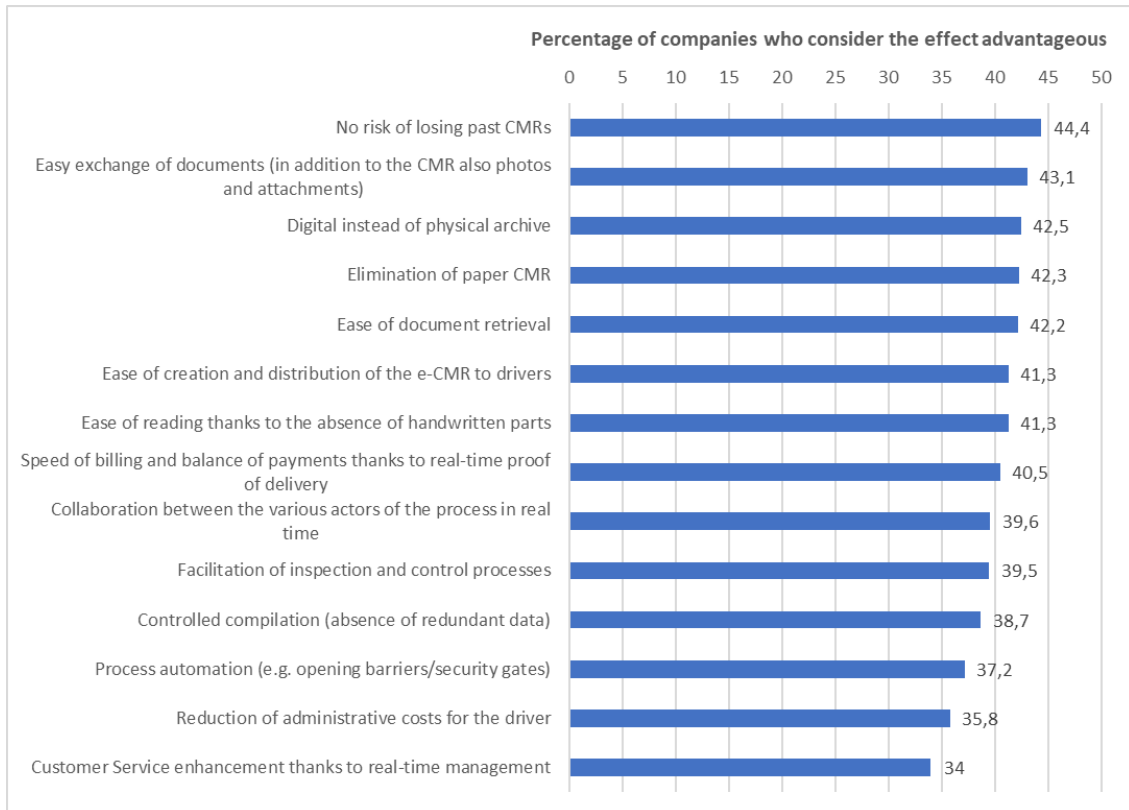


Figure 10 How urgent do companies consider the adoption of the e-CMR

Towards the implementation of the e-CMR system in Italy

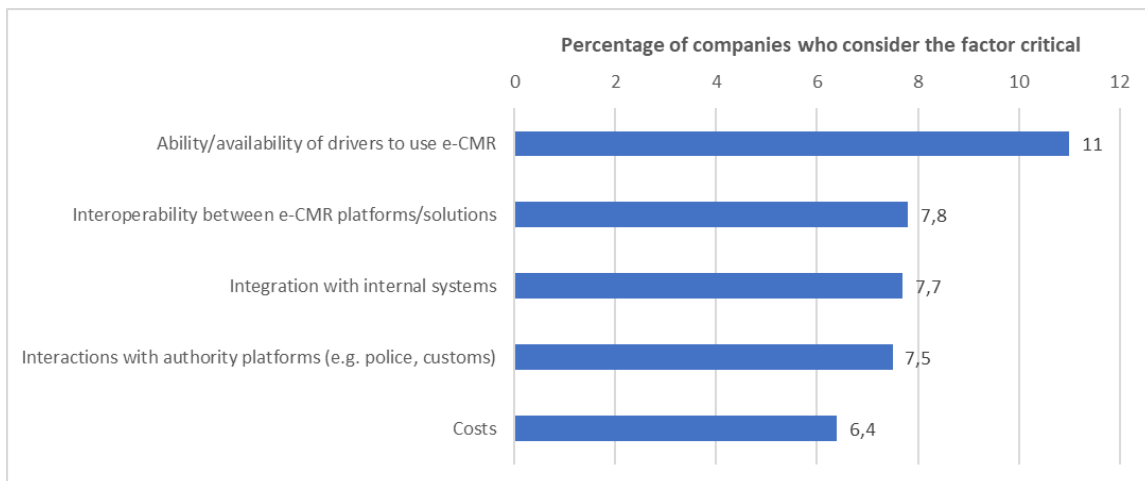
- Assessment of advantages and obstacles:** the main advantages expected from the use of the e-CMR are the security of archiving, the ease of document management and the elimination of paper, as shown in Table 2. Furthermore, the ease of reading and distribution of the e-CMR and the speed of billing thanks to the real-time proof of delivery were underlined.

Table 2 How beneficial do companies consider the following potential effects of using the e-CMR (using a scale of 0 = not at all beneficial, 10 = very beneficial)



With respect to the critical aspects of the e-CMR adoption, what most worries companies is the willingness of the drivers to use it, as shown in Table 3.

Table 3 How critical do companies consider the following factors in relation to the adoption of the e-CMR



- **Current volume of CMR issued (Italian scenario):** it was asked to 500 companies that perform international transportation of goods, how many CMR they currently issue per year.

The results are shown in Table 4 with an average of 5.000 CMRs per company.

Table 4 Current market data on the number of CMR issued

CMR issued	% of companies
Up to 1.000	38,7
Between 1.000 and 10.000	37,2
Over 10.000	35,8

It can be observed how the current market in Italy is significantly fragmented and diversified, with 38,7% of the companies that have less than 1.000 CMRs per year and 35,8% that issue more than 10.000.

6.1.2 Sustainability

A key impact of the transition to electronic documents pertains sustainability. As well know, the triple bottom line of sustainability is composed by three factors: environmental, economic and social. Throughout the e-CMR Italy project it was possible to assess the impact on each one of the three sustainability components and are described in detail in the following.

6.1.2.1 Economic impact evaluation

The economic impact related to the use of the e-CMR is twofold: on one side there's the **reduced materials' cost** and on the other there's the **increased efficiency**.

With respect to the CMR's cost, the need for paper, printers and archiving space is virtually eliminated. However, these costs are substituted by cloud services for storage and access to the online platform. Table 5 shows a comparison between CMR and e-CMR in terms of cost estimate.

Table 5 Cost estimate

Paper CMR	€/document	e-CMR	€/document
CMR cost (*)	0,96-0,54	e-CMR cost, access to platform and cloud service for storage	0,25-0,16

(*) physical archive space is not considered

The savings range between 83% and 54%, which for a **company** translate in a **cost reduction equal to up to 2.000 € per year, considering on average 2.500 CMR issued (50% of 5.000)**.

Considering the survey sample of companies that performs transportation of goods internationally, which amounted to 500 companies, the overall potential savings would reach 1 million euros per year.

With respect to efficiency, as part of project, a cost estimate table was compiled by surveying each company that participated to the pilot. The goal was to capture the expectations and perception by companies regarding the impact of the e-CMR on the economic balance. The results, shown in Table 6, show that companies expect an average reduction in time and costs of about 60%.

Table 6 Cost estimate provided by the transportation companies and impact on efficiency

OPERATION	ACTIVITY	Paper CMR	e-CMR
		Time (min) / CMR	Time (min) / e-CMR
Output	Printing of the document	3,3	0,0
	Delivery to the carrier	5,8	1,0
Use	Acceptance (data verification, observations/notes and signature)	4,0	3,5
	Checks during the journey	7,5	3,5
	Acceptance (data verification, observations/notes and signature)	3,8	3,8
	Return of copy signed by the three parties	4,7	2,7
Administration	Management during the document life cycle	5,0	4,0
	Storage	3,8	0,8
	Document recovery in case of controls (in the company)	12,5	1,3
TOTAL		50,3	20,6

Considering an average of 5.000 CMRs handled on a yearly basis, and estimating a displacement of 50% of those from paper to electronic, it is possible to estimate a total saving in terms of time equal to 74.250 minutes corresponding to **about 1.238 hours per year per company** that can be used in other activities generating more added value.

6.1.2.2 Environmental impact evaluation

The transition from paper to digital allows to obtain great advantages in terms of environmental impact and reduction of road transport carbon footprint.

To give an idea, it is possible to consider the survey sample of companies that performs transportation of goods internationally which amounted to 500 companies.

Considering an average of 5.000 CMRs handled on a yearly basis, and keeping in mind that every CMR is composed by five copies, a total of 12.500.000 sheets of paper is used every year.

With the further hypothesis that 50% of these CMRs will be e-CMRs in the future, 6,250 million sheets of paper will be saved. Considering that from a medium-sized pine tree (i.e., 15 meters high) 79.500 sheets of paper can be produced², switching 50% of the paper CMRs to e-CMR would correspond to a yearly saving of 79 trees. Even if the figure is approximated, a pine tree could absorb on average between 20 and 50 kg CO₂/year, these 79 trees will absorb **from 1.580 to 3.950 kg CO₂ per year**.

Translated to the transportation world, considering that a standard truck emits an average of 536 grams of CO₂ per kilometer travelled³, these CO₂ amounts saved correspond to the quantities produced by a truck covering respectively 2.948 km and 7.369 km.

² <https://www.focus.it/ambiente/natura/quantifogli-di-carta-si-ricavano-da-un-albero281217-1147>

³ Air emissions inventory (INEMAR) - Lombardy Region

6.1.2.3 Social impact analysis

Alongside the economic and environmental benefits, it is possible to observe that such improvements would also influence the social sphere thanks to the increased efficiency of the operations less delays and less pollution will ensue, improving the overall health of the people (both directly involved and not).

6.1.3 Key roles for the e-CMR adoption take rate

As part of the transportation process, it strongly emerged how fundamental are two roles in particular: **the drivers and the warehouse workers**. In fact, the whole process of collecting the signature is dependent on their activity.

- **Drivers.** The drivers are involved throughout the whole e-CMR process and the successful transmission of the digital document depends on their activity. They are in charge of carrying the electronic device (e.g., tablet), registering the various steps of the process and collecting the digital signatures of the recipients.

Furthermore, as some e-CMR solution providers have developed their mobile app beyond the operations required for the e-CMR allowing, for instance, the collection of some data on the status of the goods (for example the temperature) or implementing a list of things to do that the driver must follow before signing the e-CMR, it can be observed how **a new role is assigned to the driver** whose activity becomes a vital link for the correct functioning of the entire transport process. As the duties of the drivers will go beyond the current ones, it is likely that a revision of the current employment contracts will be necessary.

- **Warehouse workers.** Once the transportation activity reaches its final destination, it is fundamental to collect the final signature (i.e., the recipient's one) and, in most cases, is the warehouse worker present at the delivery who has to do it.

However, different observations need to be made: in many cases, the workers in the warehouse don't dispose of mobile devices and internet connection. Also, they often don't possess the skills to properly use the devices, with particular reference to what a digital signature is and what it could imply.

It is important to establish **effective forms of communication concerning the new way of receiving goods**: during the pilot, some practical difficulties using electronic device and a lack of inclination towards their use were observed with particular reference to digital signature of a document. In most cases, these was caused by a lack of coordination or a misperception of what was required when using an electronic tool and, for example, signing a document digitally. Often, after a quick explanation of the electronic waybill process, operators who, at first, were unaware of it were still cooperative. It appeared clearly that it is essential that **all the actors involved in the transport chain know what the electronic waybill is and know how it works**.

6.1.4 Transition from paper to electronic: impact of the role of the Authorities

While it is expected that, during the transition to the widespread use of the electronic consignment note, **companies will manage both paper and digital documents, the ease and speed of the adoption will depend also on the decisions made by the Authorities in charge of the export controls and verification activities**.

Presumably, **the Authorities will have to check both digital and paper documents**, depending on the case. Today, according to the **"Rules on cabotage applicable from 21 February 2022"**, in Italy it is already envisaged that in case of a roadside check a foreign transporter performing cabotage can present the documents to the authorized inspecting officer physically or electronically. In the latter case, the driver is allowed to contact the head office, the transport manager or any other person or entity in order to provide, before the end of the roadside check, any necessary evidence.

It would be desirable to have a common approach at least at EU level.

It is clear that topics such as the validity of the digital signature need to be further discussed and clarified. In fact, the signing part has a critical role in the whole process which also affects the involvement requested to the recipient of the goods. A **secure and reliable process** is needed without slowing down the signing process and without requiring a particular training of the recipient.

6.1.5 Medium term scenario: some considerations

In the light of what was observed in the questionnaire and during the pilot **it can be expected that a resistance to the transition to e-CMR** will have to be faced. Such resistance will be made by part of the supply chain and some of the subjects involved, therefore it is reasonable to expect that, at least in part, paper documents still will be used.

On another note, it must be kept in mind that, while many countries already have ratified the Additional Protocol on the electronic consignment note, not all of them are planning to do the same in the near future. Also in this case, it is expected the paper document will remain, at least in part, since it is required even just for transit in country that didn't ratify the Additional Protocol.

6.1.6 Interoperability between e-CMR platforms

Today, each e-CMR platform works completely independently from the others: all the actors involved in a given transport activity must share and use the same e-CMR platform.

This kind of framework brings with it an implicit rigidity: a transport company can work only with consignees (shippers) that use the same e-CMR platform (and vice versa). This is seen as a **limitation for the adoption of the e-CMRs in the road transport goods**.

Indeed, the request of making e-CMR platforms interoperable to each other and guaranteeing data communication between the different e-CMR platforms was strongly highlighted by the transport and logistics companies.

The **interoperability between the various e-CMR platform** available on the market can allow the transport and logistics companies to save cost and time in the implementation of the e-CMR: they can implement only one solution and train their personnel on it without considering which solution is used by their Client or Customer.

Therefore, **the interoperability of the platforms appears as a very important feature on which the e-CMR solution providers have to work** because it will ensure a more flexible use and increase the diffusion of the e-CMR.

Moreover, a **shared high-level architecture at the international level** should be promoted in order to ease the access and the data sharing to the governmental Authorities as well.

6.1.7 Current development of e-CMR solutions

The e-CMR solutions on the market or, more particularly, the three solutions that were used in the pilot (listed in Chapter 5.2) are different in terms of the implemented features, at least in their actual state of the development.

In general, to facilitate their adoption, the e-CMR solutions have been developed with a focus on the digital transposition of the information and uses of the traditional paper CMR. However, each one of the three e-CMR providers, that were used during the project, developed and enriched their own e-CMR solution in order to better support the digital transformation of a transport and logistics operator (for instance, some solutions can require that the driver should do some specific operations before the signature to check the status of the loaded goods, for example registering the temperature).

Each e-CMR solution provider has its own roadmap for the development of its solution with different implementation and timings for the release of the foreseen modules.

To date, in general, **the level of the development of an e-CMR solution available on the market does not cover all the operational cases possible with the paper CMR.**

In any case, **all the e-CMR solution allow** all the players involved in the transport of the shipment to **attach notes, documents and photographs, to report any anomalies and/or updates during the transport.**

In particular, in the pilots the different approaches among the three e-CMR solutions used were noted in relation to the following operative cases:

- **"Subsequent carriage"**: many transport companies make a change of tractor and driver during the transport of the shipment. To date, this change is accompanied by the passage of the paper document between the two drivers who deal with the shipment and it should be emphasized that often the two drivers do not know each other until shortly before the passage or, in some cases, they do not even meet (in this case, the paper CMR is placed in a "mailbox" by the first driver ready to be collected by the second).
The difficulty of transferring these strictly manual operations to a digital environment is therefore evident: it becomes necessary to know all the subjects involved in the transport of the goods in advance and to be able to transfer the e-CMR to each one's mobile devices.
To date, in some cases this feature is not available or has not yet been implemented in a way that covers all real operative cases experienced in the field.
- **One signature for multiple CMRs**: paper CMR allows one signature for multiple CMRs. This saves time in case the shipment consists of several deliveries from different senders to the same location. To date, in some cases this feature is not yet available.
- **Digital signature options**: the signature options are different from one e-CMR solution provider to the other. In general, all provide for the signature by connecting to a link or through the exchange of QR codes, but some allows the signature "on glass" and some the signature "without a counterparty" (i.e., in the absence of the sender or in the absence of the recipient who should sign once the loaded/received goods have been verified).
The critical point is the "legal" validity of the digital signature also in relation to the fact that the CMR is used as proof of export for the Revenue Agency of various Countries.
Moreover, the technical solutions for the implementation of the rules for the "legal" validity of a digital signature set in Additional Protocol could be different from Country to Country.
- **Language of the application**: the "Italian" CMR is in Italian and English. In the "digital world" is quite common that an application is available in different languages and is easy to switch from one to the other of the languages available. One of the advantages of the e-CMR is its possible availability in the mother tongue of the driver.
However, translating an application into a language needs a "good" knowledge of its specific terminology (an approximated translation can be source of misunderstanding).
Each of the e-CMR providers has its own roadmap for the release of its solution in different languages: one roadmap could match better than another the mix of the nationalities of the drivers of a specific transport and logistics operator.

All the three e-CMR solutions used allows the registration of the location and the time: therefore, it is possible to record where (GPS coordinates) and when (date and time) the loading/unloading of the goods started/ended, the truck departed/arrived at destination, the signatures were made and so on. In particular, the registration of the location and time of the signatures can be one of the requirements for the "legal" validity of the signatures.

The partial coverage of the operational options of the paper CMR by today e-CMR solutions combined with the different level of development of the e-CMR solutions available on the market are one of the elements that hinders the adoption and diffusion of the e-CMR.

Although the request for fully operational coverage between CMR and e-CMR by the transport and logistics operator is certainly to be expected, this coverage could be hard to implement and also to wish. In fact, **the tout-court transposition of an analogical (paper) process into a digital one may not bring the desired benefits**: only through a review of the operative processes, that the digital tools allow, the transport and logistics operators can fully obtain the digital transformation benefits.

6.2 Guidelines

On the basis of what was possible to observe during the project and the key results previously illustrated, some guidelines were elaborated to push the adoption of the e-CMR from the Italian transport and logistics companies and its widespread use in the Italian scenario.

Of course, the first and fundamental step will be the ratification of the *Additional Protocol to the Convention on the Contract for the International Carriage of Goods by Road (CMR) concerning the Electronic Consignment Note* from the Italian Government.

In this project, the **benefits for the Italian transport and logistics sector** due to the adoption of the e-CMR were estimated both at sector level and single company level:

- 1 million € per year of cost saving at sector level or 2.000 € per year per company (see Chapter 6.1.2.1);
- Efficiency recovery of 1.238 hours per year per company (see Chapter 6.1.2.2).

Moreover, in the Italian *Piano Nazionale di Ripresa e Resilienza* (PNRR) is stated that *“the digitization of transport documents is a key element of the EU strategy for the mobility of goods in all modes of transport, as demonstrated by the recent European Regulations 2020/1056 and 2020/1055”*.

Therefore, the ratification of the *Additional Protocol* from Italy should happen shortly.

The guidelines that are reported below are structured as a list of recommendations offered to the Italian Bodies that will be in charge of managing and eventually sustaining the transition from paper CMR to electronic waybill e-CMR for the Italian transport and logistics companies.

6.2.1 Digital alphabetization and e-CMR knowledge dissemination

For the use of the e-CMR, a familiarity, albeit "basic", with the digital tools is necessary for all the actors involved in the shipment transport.

The pilots highlighted that the digital skills of the operators involved (in particular warehouse workers and drivers) are not adequate to date and, in many cases, have constituted an obstacle to the correct use of the electronic waybill: for example, if the driver does not record the activities correctly on the mobile device or if the warehouse worker is unable to sign the document, the flow of information is interrupted or incomplete, invalidating the e-CMR.

Therefore, a training activity for all the players active in a road transport, from shippers to drivers up to the recipients of the goods, is essential to ensure sufficient familiarity in the use of digital tools such as smartphones and tablets aimed at using the e-CMR application.

In order to support the adoption of the e-CMR, two kinds of action have been identified:

- **Digital alphabetization of the employees of shippers, transport companies but also companies that receive goods**, through internal course eventually provided by external consultant that could also be

an e-CMR provider. This second action is more focused on improving the digital competencies of all the actors involved in an operation of road transportation of goods.

- **Courses/webinars and dissemination events on e-CMR main topics such as the operation of the electronic waybill and the digital signature options**, with an emphasis on the rules and legal validity.

Incentives can be envisaged for both the speakers/teachers in the events/webinars/courses and the companies who invest in such trainings.

6.2.2 Support for the e-CMR implementation

In order to switch from paper to digital, investments need to be made by the companies. For instance, in the following fields:

- **Personnel training:** companies need to train their employees, belonging to the various sectors of the company (operations, administrative, etc.), on what is the e-CMR and how it works. They can decide to arrange these courses internally or to choose some off-the-shelf external courses. Furthermore, a particular emphasis has to be put on the new role that the driver could be requested to play with an increase of its duties and responsibilities.
- **Mobile devices** for employees or subcontractors: in particular, the driver manages the electronic waybill through an application that can either be installed on a smartphone/tablet or that could be made available on an on-board unit. This device should be mobile, have an Internet access (through Wi-Fi or the 4G/5G network) and allows to take photos.
- **Interfacing of the possible back-office IT applications used by the company** such as ERP (Enterprise Resource Planning), TMS (Transport Management System), WMS (Warehouse Management System) and proprietary applications or, more generally, the company IT platform **with the chosen e-CMR platform**. In fact, even if an e-CMR platform normally allows access through a portal, the integration of the IT platform of a transport and logistics company with the platform of the chosen e-CMR provider allows, for example, to save time in the filling in of an e-CMR and also to limit typing errors.
- **Re-organization of the companies' operational and administrative processes:** the introduction of the e-CMR gives the possibility to transport and logistics companies to rethink their operational and also administrative process in a more efficient way. For this purpose, a company may need the expertise of some consulting firms for assistance in its digital transformation.

An economic support for the investments that a company, that decides to start the digitization process of the transport documentation, will have to sustain **should be considered**.

This support could be of different forms (for example vouchers or tax recovery) and of an entity related to costs incurred by the company.

6.2.3 Hybrid management support (CMR and e-CMR cohabitation)

In the medium-term scenario, it is unlikely that the paper CMR will disappear: the resistance to the digital transition is very hard to defeat due to the fear of change and the belief of greater "flexibility" allowed by the use of paper; also, it must be kept in mind that some Countries could decide not to ratify the Additional Protocol.

Therefore, a transport and logistics company will have to organize itself to manage both paper CMR and e-CMR and the choice between the two will be made on the basis of the customer (sender and recipient), the Country of the delivery and also the Countries encountered along the route of the truck.

This means that a company could not be able to fully enjoy the maximum of the benefits that the implementation of the e-CMR could bring because of a portion of its business which has to keep on using the paper CMR.

The impossibility to completely eliminate the paper CMR could prevent the adoption of the e-CMR by a company.

To reduce the impact of the CMR and e-CMR cohabitation, **a support to cover, at least partially, the costs of using the e-CMR could be also foreseen.**

In fact, even if a company can decide to develop its own e-CMR solution, most of the companies will select one of the e-CMR solution currently available on the market and will pay the provider according to volume of e-CMRs it will use.

For example, a total or partial reimbursement of the costs of the e-CMR “ticket” could be foreseen.

6.2.4 Regulatory framework

Two main issues, which are linked to the regulatory framework, have been identified to possibly have a significant impact on the adoption and the rapid diffusion of the electronic consignment note: the first is **the control of the e-CMR by a designated Authority or a body of police/carabinieri** while the second is **the compliance of the digital signature.**

As far as the **check of the e-CMR from a designated Entity**, after the ratification of the Additional Protocol from the Italian government, the driver will be allowed to show the electronic consignment note in case of stops during the travel. **The crucial point is related to how the designated Entity can check this digital document.** Today the Regulation (EU) 2020/1055, in force since 21 February 2022, inserts in regulation no. 1072/2009, paragraph 4-bis of article 8 which establishes that **in cabotage transport the documentation certifying international transport that the carrier must exhibit to the control bodies can also be delivered electronically in an editable structured format which can be used directly for storage and computer processing.** The documents in electronic format, instead of being presented, can also be sent to the police directly by the company that arranged the transport which, for this purpose, can be contacted directly by the driver during the execution of the check.

Envisaging for the e-CMR the application of the same rules for controls already in force for cabotage transport would be desirable.

The rules for the compliance of the digital signature are a sensitive argument.

A paper CMR, signed by the consignee, the driver and the receiver, is considered a proof of the goods exportation: therefore, also a fully signed e-CMR should be treated in the same way.

The Additional Protocol on the electronic consignment note sets the rules for the validity of an electronic signature. In particular, the reliability of the electronic signature is established if:

- is connected exclusively to the signatory;
- allows the signatory to be identified;

- is created with means over which the signatory can retain sole control;
- is linked to the data to which it refers allowing to detect if the data itself has been subsequently modified.

The pilot highlighted how these rules place various constraints on a quick and easy signature such as:

- the availability of a device, preferably mobile, by the driver and the recipient (typically a warehouse worker of the goods delivery company);
- the driver's willingness to record location and time (and not perceive this request as a control over his movements).

Every e-CMR platform provider proposes a set of options for the digital signature: some are compliant with the Additional Protocol, while other are not with reference, for instance, to the “signature on glass” that is preferred by the transport companies since is easy and quick.

In order to simplify the process for the adoption of the e-CMR and reduce possible resistance from the actors involved in the road transport of the goods, the possibility of **a transition period should be considered, before the full application of the rules set by the Additional Protocol for the validity of the digital signature for the e-CMR for example defining a roadmap for the application of these rules.**

Moreover, the technical solutions for the implementation of the rules for the “legal” validity of a digital signature set in Additional Protocol could be different from Country to Country.

Harmonization of the technical solution for the implementation of the rules for the validity of a digital signature would be desirable at least at EU level.

6.2.5 High-level architecture for the e-CMR

Regulation (EU) 2020/1056, related to electronic information on freight transport (eFTI), establishes a legal framework for the electronic communication of regulatory information between the economic operators and the competent authorities in relation to the transport of goods in the territory of the European Union. The regulation establishes:

- the conditions under which competent authorities are required to accept regulatory information made available in electronic format by the economic operators concerned;
- the rules on the provision of services which allow regulatory information to be made available to the competent authorities in electronic format by the economic operators concerned.

In summary, the regulation obliges all competent public Authorities to accept electronic freight transport information (starting at the latest from August 21, 2024) if companies wish to provide data in this way to demonstrate compliance with legal requirements.

In this framework, there is also the work of UNECE (United Nations Economic Commission for Europe) on the definition of a high-level architecture of e-CMR system with the recommendation for the **creation of an e-CMR international registry/system** (ECE/TRANS/SC.1/2021/3). This could also allow to speed the control of the customs Authorities, with the aim of having seamless border crossing operations, because these Authorities could be informed automatically and electronically about the departure of the truck and its destination.

Moreover, this recommendation could also push the interoperability among the different e-CMR platforms on the market.

Even if it a long and challenging process, **the realization of an international e-CMR registry/system should be supported** in order to fully exploit the benefits of the digitalization of transport/customs/trade documents required for on the electronic consignment note and the road transport of the goods.

7 Conclusions

The “Toward the implementation of the e-CMR in Italy” Project, promoted by the International Road Transport Union (IRU) and Unioncamere, had the scope of paving **the way for the e-CMR deployment and support the ratification of the e-CMR protocol in Italy.**

Specifically, **the Project aimed at identifying the obstacles to e-CMR implementation and evaluating its advantages in relation to the Italian specific scenario** adopting a bottom-up approach with the active involvement of some of the most relevant transport and logistic trade associations and companies in the supply chain under the technical coordination of Uniontrasporti. The core of the Project was the implementation of an operational pilot (more than one hundred road transport trips were performed) using some e-CMR solution available on the market to detect key/critical issues that could hamper the adoption of the e-CMR, to calculate the e-CMR benefits for a company and to elaborate possible actions (to be delivered to policy makers) in order to push and support the digital transformation of companies in the logistics supply chain.

By a detailed survey, it was possible to have a clear picture of the use of digital documentation, knowledge and expectation about the e-CMR in the Italian scenario, while the contribution of all the various participants in the Project was fundamental in collecting data and providing extremely valuable feedbacks during the pilot phase for the identification of the critical issues and the advantages that the transition to the e-CMR entails.

Regarding the **critical issues** for the implementation of the e-CMR, the low level of digitalization of the road transportation sector will require a considerable **effort for the digital alphabetization and training of the human resources** of the transport and logistics companies. Moreover, **the key figures** for the adoption of the e-CMR will not only be represented by the **drivers** but also by the recipients, typically **warehouse workers** of the company that receives the goods.

Also, some points were highlighted in relation to the **legal framework that could hinder or speed up the widespread use** of the e-CMR such as the **requirement digital signature and its legal validity** and the **ways in which a designated Authorities or police body can perform checks on the e-CMR.**

At the same time, the use of the **e-CMR will bring benefits** in terms of **cost reduction** (cost of the e-CMR “ticket” versus the paper CMR) and **recovery of efficiency** (time savings especially in the management and filing of the signed document).

Moreover, the impact of the **e-CMR on sustainability (environmental, economic and social performances)** were estimated as well as the potential **reduction of the road transport carbon footprint.**

Finally, the **introduction of the e-CMR gives the transport and logistics companies the possibility to rethink their operational and administrative processes** in a more efficient way allowing them to move towards the **digital transformation of their operations.**